



FLORA OF THE USSR

Volume XXVIII

COMPOSITAE

Tribes Cynareae and Mutisieae

FLORA OF THE USSR

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

VOLUME XXVIII

COMPOSITAE

Tribes Cynareae and Mutisieae

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V.L. KOMAROV BOTANICAL INSTITUTE
ACADEMY OF SCIENCES OF THE USSR

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SCIENTIFIC EDITORS' PREFACE TO VOLUME XXVIII

This is the fourth volume of the six (Vols. XXV–XXX) that treat the large family Compositae (Asteraceae). We have, as a practical matter, concentrated our editorial review of this volume on the keys, discussions, and the habitat and distribution statements. We are confident of the general accuracy of the translation but also recognize that there will be imperfections.

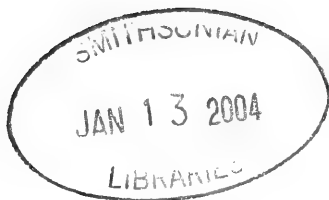
Throughout this volume, as in the other volumes on this family, the translators have used the Latin term “capitulum” (pl., capitula), instead of the more familiar English term, “head,” for the Russian term denoting the primary inflorescence of florets. “Head,” if it is used, describes a secondary inflorescence,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

December 2000

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PREFACE

The twenty-eighth volume continues and concludes the treatment of materials on the tribe Cynareae. It also includes the small tribe Mutisieae. The volume covers 42 genera, which include 452 species.

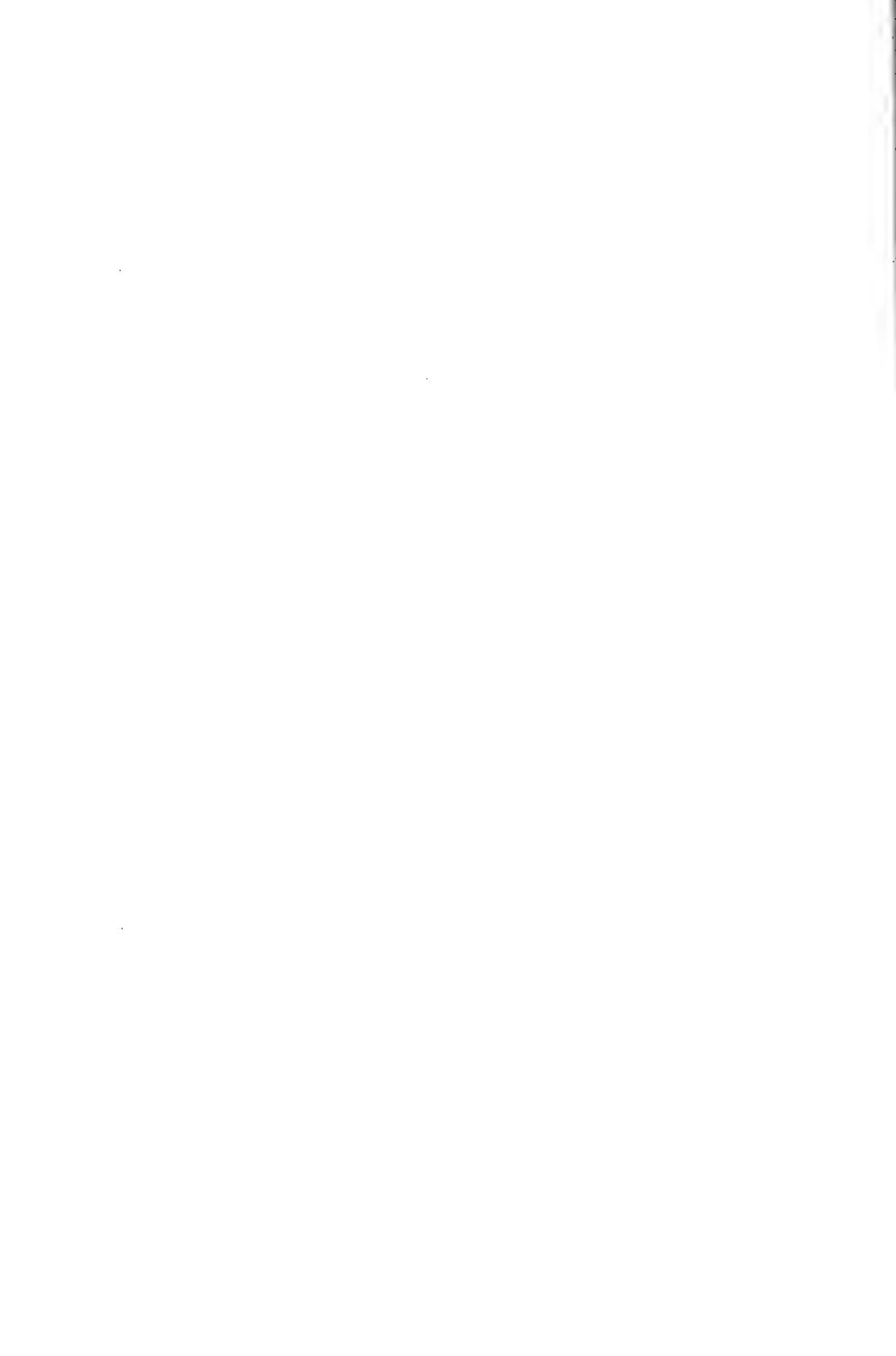
Centaurea is the largest genus; its 178 species are distributed in 22 subgenera. At present, the Editorial Board finds it more convenient, pending a complete revision, to retain basically the traditional circumscription of the genus. This is because the subgenera considered in this volume are more or less equivalent and could be raised to the rank of separate genera.

Cirsium is the second largest genus (111 species); a fresh look at the material of this genus allows us to describe several new species and to establish a number of new subdivisions.

A number of papers have been published in connection with the investigations for the present volume; nevertheless, descriptions of 49 new species, sections, and subgenera have been included in the Addendum.

Unlike in the earlier volumes, in the present volume the dates of actual publication of the different parts have been indicated when C.F. Ledebour's *Flora Rossica* is cited.

Editorial Board



CONTRIBUTORS

- S.K. Czerepanov Characteristics of the tribe and subtribes; Keys to the genera of the subtribe Carduinae and subtribe Centaureinae; Genera *Notobasis*, *Zoegea*, *Russowia*, *Crupina*, *Plagiobasis*, *Chartolepis*, *Callicephalus*, *Acroptilon*, *Oligochaeta*, *Schischkinia*, *Cheirolepis*, *Tomanthea*, *Centaurea* (Characteristics, Key to the subgenera, and subgenera *Calcitraba*, *Cyanus*, *Czerniakovskya*, *Jacea*, *Seridia*, *Solstitiaria*, *Sosnovskya*, *Tetramorphaea*).
- S.G. Tamamschian Genera *Carduus*, *Picnomon*, *Lamyra*, *Lamyropappus*, *Ancathia*, *Modestiä*, *Cynara*, *Silybum*, *Onopordum*.
- M.M. Iljin and
G.L. Semidel Genera *Alfredia*, *Syreitschikovia*.
- M.M. Iljin Genera *Olgaea*, *Cnicus*.
- A.L. Charadze Genus *Cirsium*.
- I.A. Linczevsky Genus *Tricholepis*.
- A.G. Borissova Genera *Serratula*, *Synurus*, *Schumeria*.
- Yu.D. Soskov Genus *Rhaponticum*.
- N.N. Tzvelev Genera *Amberboa*, *Stizolopus*, *Hyalea*, *Centaurea* (subgenera *Amblyopogon*, *Centaurea*, *Hyalinella*, *Lopholoma*, *Microlophus*, *Odontolophopsis*, *Odontolophus*, *Pseudohyalea*, *Rhizocalathium*, *Xanthopsis*), *Phalacrachena*.
- D.I. Sosnowsky Genera *Grossheimia*, *Aetheopappus*, *Centaurea* (subgenus *Psephellus*).

- M.V. Klovov Genus *Centaurea* (subgenera *Acrolophus*,
Heterolophus, *Phalolepis*).
- S.A. Shostakovsky Genus *Carthamus*.
- E.G. Pobedimova Key to the genera of the subtribe Mutisinae; gen-
era *Gerbera*, *Leibnitzia*, *Uechtritza*.

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KEY TO GENERA OF CARDUINAE

1. Stamen filaments hairy or densely barbate.....2.
- + Stamen filaments glabrous, rarely glandular or slightly tuberculate, but never hairy.....8.
2. Plants not spiny.....3.
- + Plants spiny.....4.
3. Receptacle flat, alveolate, with pits surrounded by small scales; achene lacking corona, with obtuse edges; plants acaulescent 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 small apical corona; stems much taller (50–100 cm high), strongly branched from base, numerous (Central Kopetdag).....1588. **Nikitinia** Iljin
4. Pappus hairs scabrous.....5.
- + Pappus hairs plumose.....6.
5. Stamen filaments free above, fused below because of dense short, mucilaginous hairs covering them; pappus surrounding corona of very short, thin, smooth hairs along upper edge of ringlet joining base of hairs; leaves with large white spots.....1600. **Silybum** Adans.
- + Stamen filaments free throughout their length; pappus lacking corona of short hairs; leaves lacking spots.....1589. **Carduus** L.
6. Achenes with thick pericarp, becoming hard with maturity, woody, ovate-hemispherical or somewhat pyriform.....1595. **Lamyra** Cass.
- + Achenes with less thick pericarp, of different shape.....7.
7. Receptacle covered with scales; capitula homogamous, with bisexual fertile florets.....
.....1592. **Cirsium** (Mill.) (cf. also couplet 26).
- + Receptacle covered with narrow linear scales; ray florets externally similar to bisexual fertile disk florets, but with undeveloped ovary and empty (lacking pollen) anthers, as a result capitula considered heterogamous.....1593. **Notobasis** Cass.
- 2 8. Receptacle deeply pitted; pits with membranous, unevenly incised-toothed margin; capitula large (4–7 cm in dia, smaller only in *O. frickii* Tamamsch.); plants highly spiny.....1601. **Onopordum** L.
- + Receptacle covered with bristles or scales, very rarely (in some species of *Saussurea* DC.) glabrous.....9.
9. Pappus bristles scabrous or serrulate, rarely achenes lacking pappus (in some species of *Cousinia* Cass.).....10.

- + All or only inner pappus bristles plumose.....18.
- 10. Anthers lacking basal appendages; achene (mature) usually one in each capitulum (Nuratau Mountains in Soviet Central Asia).....1577. **Anura** (Juz.) Tschern.
- + Anthers with basal appendages; achenes numerous in each capitulum.....11.
- 11. Pappus bristles connate at base forming ring, readily falling off together.....12.
- + Pappus bristles not connate at base and not forming ring, falling off singly.....15.
- 12. Leaves not spiny.....13.
- + Leaves and involucre bracts spiny.....14.
- 13. Receptacle covered with few scales; achenes oblong-obconical, with inconspicuous ribs, lacking apical corona (Central Kopetdag).....1586. **Perplexia** Iljin
- + Receptacle usually densely covered with scales; achene terete, 4-angled, ribbed, less often somewhat compressed, nearly oblong, with apical corona.....1584. **Jurinea** Cass. (cf. also couplet 21).
- 14. Involucre bracts with scaly appendages; corolla tube always shorter than limb; basal appendages short (1.0–2.5, less often to 4 mm long), broad; inner pappus bristles slightly flattened at tip.....1590. **Alfredia** Cass.
- + Involucre bracts lacking appendages; corolla tube longer than limb, less often as long; basal appendages long and narrow; inner pappus bristles not flattened at tip but much longer and closely toothed.....1591. **Olgaea** Iljin
- 15. Pappus bristles slightly unequal in length but usually of same thickness.....16.
- + Pappus bristles distinctly unequal in length.....17.
- 16. Involucre bracts coriaceous, spinescent, usually not uncinata; receptacular bristles longer than achene or almost equal, sometimes 1/2–2/3 as long; pappus bristles readily falling off.....1578. **Cousinia** Cass.
- + Involucre bracts scaly, with very small apical spine; receptacular bristles 1/5–1/4 as long as achene; pappus bristles persistent, falling off later.....1579. **Lipskyella** Juz.
- 3 17. Involucre bracts strongly spinescent, not uncinata; receptacular scales serrulate-scabrous; plants perennial; leaves spiny (Tien Shan).....1580. **Hypacanthium** Juz.
- + Involucre bracts with thin uncinata spiny; receptacular bristles scabrous; plants biennial; leaves not spiny.....1576. **Arctium** L.
- 18. Receptacle covered with scales, occasionally with papillae (receptacle glabrous in some species of *Saussurea* DC.).....19.

- + Receptacle covered with bristles.....22.
- 19. Achenes pubescent with scattered long hairs, recurved below, squarrose above; bristles of inner row of pappus connate at base and fused to tube at different heights, tube appressed-hairy outside (3.0–5.5 mm long).....1583. **Polytaxis** Bge.
- + Achenes glabrous; pappus bristles not fused to tube.....20.
- 20. Pappus many-rowed; its bristles unequal, connate at base in ring or firmly fused with achene and then ring absent.....21.
- + Pappus one- or two-rowed; bristles of outer row of pappus shortened, toothed or finely plumose, readily falling off singly, those of inner row equal, always long-plumose, connate at base in ring, persistent.....1582. **Saussurea** DC.
- 21. Anthers covered with long, thin, sinuate, fragile, readily deciduous hairs; pappus without 2–5 longer inner bristles (Soviet Central Asia).....1587. **Pilostemon** Iljin.
- + Anthers glabrous; pappus with 2–5 longer inner bristles.....1584. **Jurinea** Cass. (cf. also couplet 13).
- 22. Pappus bristles not connate at base in ring, readily falling off singly, short-plumose. Alpine and subalpine plants with twice pinnately cut leaves (Tien Shan).....1581. **Schmalhausenia** Winkl.
- + Pappus bristles connate at base in ring, falling off together.....23.
- 23. Capitula surrounded by apical leaves; outer involucre bracts with plumose and spiny appendages; annual or biennial.....1594. **Picnomon** Adans.
- + Capitula not surrounded by apical leaves; spines of involucre bracts not plumose; perennial.....24.
- 24. Receptacle fleshy; leaves very large, broad, twice pinnately cut, clustered in rosette. Cultivated plants.....1599. **Cynara** L.
- 4 + Receptacle not fleshy; leaves almost entire, undivided or pinnately lobed.....25.
- 25. Achenes slightly compressed from both sides, not ribbed.....26.
- + Achenes not compressed, ribbed-angular.....27.
- 26. Achenes obliquely truncated at apex; pappus many-rowed.....1592. **Cirsium** Mill. (cf. also couplet 7).
- + Achenes apically flat, with saucer-shaped depression; pappus two-rowed, of bright golden bristles, outer ones at first somewhat thickened brushlike at top, then acuminate (Soviet Central Asia).....1596. **Lamyropappus** Knorr. and Tamamsch.
- 27. Stem winged; leaves oblong-elliptical or lanceolate; achenes white, pale yellow or brownish; pappus many-rowed, of short-plumose bristles, outer pappus shorter (Pamiro-Alai Region).....1598. **Modestia** Charadze and Tamamsch.
- + Stem not winged; leaves linear or linear-lanceolate; achenes dark

brown or almost black; pappus more or less two-rowed, of long-plumose, almost equal bristles.....1597. *Ancathia* DC.

GENUS 1589. *Carduus* L. emend. Gaertn.^{1,2}

L. Sp. pl. (1753) 820 p. p.; Gaertn. De. fruct. II (1791) 378.

Capitula homogamous, homochromous, with few (10–12) or numerous (100) bisexual flowers; usually all fertile. Involucre ovate, cylindrical, more or less oblong, campanulate, obconical, globose or flat-globose; involucre bracts many-rowed (8–10 rows), imbricate, appressed or divergent, their tips projecting in same or different directions, appressed or recurved at apex, sometimes geniculate, constricted in middle; outer bracts ovate, deltoid-ovate, lanceolate or linear with short or long cusp; middle longer, sometimes abruptly narrowed upward from much wider base; innermost bracts usually longest, sometimes colored in upper half, membranous, acute or obtuse, usually not spiny, fimbriate-toothed or irregularly incised on upper margin; all bracts more or less flat or convex outside, with prominent or inconspicuous midrib, glabrous or variously pubescent with unicellular hairs usually on margin or with vesicular greenish or yellowish pseudoglandular hairs (usually in annual bristle-thistles having a close resemblance with *C. pycnocephalus*), or with clavate hairs in lower part on outside or margin, or with long multicellular arachnoid hairs. Receptacle flat or slightly convex, densely covered with long bristles. Corolla tubular-cyathiform, often irregularly incised; corolla tube equal to, shorter or longer than limb including throat, usually straight or geniculate in ray florets such that ray florets form a circle from surface, wider than receptacle and involucre; limb lobes narrowly lanceolate, bent hood-like at tip. Stamen filaments pilose in middle, with long and curly hairs; anthers with slightly incised basal appendages. Style branches short, usually approximate, spirally recurved in some species at end of flowering, with ring of short erect hairs at base; style with thin articulation at base where it breaks. Achenes 3–6 mm long, oblong, ovate, obtusate or more or less terete, slightly compressed laterally, weakly truncate at base, not ribbed, smooth, with oily lustre, olive, grayish, bright- or dark brown, with or without very thin longitudinal striations and with darker undulating transverse striations; after falling of purple, orange, pink, bluish-pink, rarely white or yellowish corolla and pappus there remains in upper portion of achene a nectary-

¹Treatment by S.G. Tamamschian.

²From the ancient Latin name used for spiny plants.

like tubercle of uncertain morphology, which is variously called in the literature (umbonus, mamelon, regma, epiregma, elaiosome, nectary); lower portion of hilum scarcely visible, almost straight or somewhat truncate, narrow; pappus of many-rowed bristles often unequal in length and thickness, connate at base in ring, entirely falling off, equal to, longer or considerably shorter than inner involucre bracts or corolla; each bristle consists of relatively thick central axis in contrast with bristles of *Cirsium* formed by short and broad cells, usually tapering upward, along sides covered with short trichomes not longer than the diameter of axial part of pappus bristles. Annual, biennial or, less often, perennial, usually spiny herbs with alternate, usually large, undivided, pinnately lobate, pinnately parted or pinnately cut leaves, spiny on margin and at tip.

Type of genus: *C. nutans* L.

Note. The genus *Carduus* [plumeless or bristle-thistles] includes about 120 species, of which more than 30 are found in our country. Despite numerous reviews of the genus for different parts of the world (it is found mainly in Europe, Northern Africa, and West Asia, and is introduced in America and Australia), there is no monograph of the genus. The systematics of *Carduus* poses tremendous difficulties because of the confusion of polymorphic species aggregates with very many hybrid forms. Many hybrids have been described as new species in Western Europe.

Economic Importance. Almost all bristle-thistles are good honey-producing plants. Some species are highly ornamental, but they are weeds nonetheless. Oil is contained in their cotyledons.

1. Involucre globose, oblong or hemispherical or broadly ovoid, biennial or perennial, quite large (approximately 40 to 100 cm high) plants.....2.
- + Involucre oblong, cylindrical, narrowly campanulate or truncate-obconical.....26.
2. Capitula nodding, involucre bracts somewhat broad, herbaceous, slightly constricted and geniculate near middle, often recurved in upper half.....3.
- + Capitula on straight peduncles or very slightly nodding at end of peduncles just below capitulum; involucre bracts never geniculate.....6.
3. Plants 50–100 cm high; stems usually many, branched; capitula large, globose, (3) 4–6 (7) cm in dia; leaves glabrous or pubescent beneath along veins.....1. *C. nutans* L.
- + Plants to 40–50 cm high; stem usually solitary, less often 2–3, simple; capitula oblong-globose.....4.

4. Plants hardy, with highly spiny-winged stem and spiny leaves; capitula in racemes at stem apex; corolla usually white.....2. **C. songoricus** Tamamsch.
 + Weaker and less spiny plants with peduncles not winged; capitula usually solitary.....5.
5. Involucral bracts 1.5–2.0 mm wide, green, all uniformly colored; slender, few-leaved plants.....3. **C. schischkinii** Tamamsch.
 + Involucral bracts 2–3 mm wide; outermost bracts yellowish-green at base, greenish-pink in middle and more or less violet at tip; capitula oblong-globose, large, 2.5–3.5 cm long; corolla pink or straw-colored.....4. **C. coloratus** Tamamsch.
6. Involucral bracts herbaceous, but narrow, stiff, sometimes woody, projecting upwards, slightly or sharply recurved, with long cusps or distinctly or indistinctly uncinata.....7.
 + Involucral bracts not woody, usually with short spines or cusps, imbricate or indistinctly imbricate below, more or less recurved in upper half, widely divergent or uncinata.....16.
7. Involucral bracts tapering from more or less broad base to more or less long, cuneate cusp, erect or divergent, recurved or in various directions, sometimes almost horizontal or curved saber-like.....8.
 + Involucral bracts narrow, grooved inside, distinctly (and then capitula globose) or indistinctly (and then capitula more oblong) uncinata.....14.
- 7 8. Plants glabrous or slightly pubescent, light-or yellowish-green or more or less bluish-dark gray.....11.
 + Plants more densely pubescent, with grayish-arachnoid-hairy pubescence, white-tomentose or dark green.....9.
9. Whole plant white-tomentose; involucral bracts narrow, curved saber-like, in upper half narrowed to sharp, slightly curved spine, below tightly appressed.....6. **C. hystrix** C.A.M.
 + Plants dark green with fine, more or less arachnoid-hairy pubescence.....10.
10. Capitula ovate-globose, to 2–3 cm in dia; involucre subglabrous or slightly pubescent; involucral bracts subulately spinescent from narrowly lanceolate base colored.....7. **C. poliochrus** Trautv.
 + Capitula globose, 3–4 cm in dia, almost sessile; involucral bracts narrowed from ovate base, to long straight, more or less distinctly triangular spines.....5. **C. acanthocephalus** C.A.M.
11. Plant dark bluish-green; stem tall (70–80 cm), divaricately branched; capitula solitary, on slightly nodding peduncles; corolla dark purple.....8. **C. hajastanicus** Tamamsch.
 + Plant bright green, glabrous or slightly pubescent; stem generally solitary, unbranched; capitula solitary or aggregated on short erect

- peduncles; corolla light-pink or slightly purple.....12.
12. Capitula oblong or broadly obconical; involucre bracts with short spines, smaller and more or less herbaceous.....13.
- + Capitula globose, involucre bracts, stiff, abruptly narrowed from more or less broad base to subulate tip, terminating in almost horizontal stiff spine; bracts variously directed.....
.....9. **C. furiosus** Tamamsch.
13. Involucre bracts almost equal in length; outermost usually shorter than middle and inner ones, all acuminate-spinose from broad base to straight, small, erect spine, with prominently raised midrib, more or less distinctly triangular.....
.....10. **C. onopordioides** Fisch. ex MB.
- + Involucre bracts distinctly unequal in length, outer 1/2 as long as erect inner ones, recurved, 1/2 as broad as in preceding species, lacking distinct midrib, more flat and less stiff.....
.....11. **C. atropatanicus** Sosn. ex Grossh.
14. Capitula oblong, medium-sized, 1.5–2.0 cm in dia; 2.5–3.0 cm long; involucre bracts indistinctly uncinately, more or less distinctly imbricate below.....12. **C. pseudocollinus** (Schmalh.) Klok.
- + Capitula flat-globose, large, 3.5 cm in dia and long, sometimes larger; involucre bracts distinctly uncinately, recurved, stiff.....15.
- 8 15. Plant large, often to 1 m high; peduncles 18–20 cm long, usually not winged or narrowly and discontinuously winged only above, with small leaves; capitula large (3.5) 4.0–4.5 cm in dia; involucre bracts very distinctly and uniformly uncinately; corolla tube including throat 16–18 mm long, limb 8–9 mm long.....
.....13. **C. transcaspicus** Gand.
- + Plant shorter, 50–70 cm high; peduncles shorter, almost always winged; capitula globose or slightly oblong; involucre bracts not so distinctly and uniformly uncinately; corolla tube including throat 16–18 mm long, limb 9–10 mm long.....14. **C. hamulosus** Ehrh.
16. Involucre bracts appressed, distinctly imbricate, outer short, ovate, abruptly narrowed to short spinule.....22. **C. adpressus** C.A.M.
- + Involucre bracts not appressed, indistinctly imbricate, recurved to varying degrees in upper half.....17.
17. Involucre bracts more pliant, generally grayish-pubescent, sharply uncinately-recurved; capitula oblong or depressed-globose.....18.
- + Involucre bracts more stiff, squarrose, recurved in upper half, but not uncinately, usually glabrous or slightly pubescent either on midrib or on margin.....19.
18. Capitula large, 3.5–4.0 (5.0) cm in dia, broader than long, depressed-globose; involucre often compressed in middle, grayish-arachnoid.....18. **C. uncinatus** MB.

- + Capitula smaller, oblong, 2.5–3.0 cm long, 1.5 cm in dia; involucre oblong, not compressed in middle; involucre bracts almost glabrous, slightly arachnoid pubescent only in upper part.....19. **C. stenocephalus** Tamamsch.
- 19. Peduncles short, usually winged right up to capitula or not winged only below capitula, but covered with spinules.....20.
- + Peduncles long, wingless, lacking spines, but with white or grayish pubescence.....23.
- 20. Corolla white; peduncles sometimes not winged just below capitulum.....17. **C. navaschinii** Bordz.
- + Corolla light or dark purple; peduncles spiny-winged or simply spiny, rarely not winged, almost always densely pubescent.....21.
- 21. Leaves pliant, long-petiolate, ciliate-spiny on margin, grayish beneath from dense pubescence, dark green above, sometimes slightly pubescent, large (to 20 cm long); middle cauline leaves elliptical, slightly incised or entire, sometimes almost orbicular; upper leaves always entire, lanceolate.....20. **C. personata** (L.) Jacq.
- 9 + Leaves stiffish, often more or less coriaceous, smaller, if large then short-petiolate, lanceolate, broadly lanceolate or oblong, but distinctly lobed, with lobes of different sizes.....22.
- 22. Plants dark green; capitula much smaller, in clusters of 3–4(5) at tip of peduncles, occasionally fewer; peduncles sometimes not winged just below capitulum; involucre bracts less stiff, upper part recurved at obtuse angle, linear; lower leaves sometimes slightly lobed, large.....15. **C. crispus** L.
- + Plants bluish-gray; capitula large, usually solitary, on spiny-winged peduncles; involucre bracts stiffer, with longer upper half obliquely divergent and recurved at wide angle, with shorter, yellowish spine.....16. **C. acanthoides** L.
- 23. Plants dull green with bluish tinge; capitula somewhat drooping at flowering.....21. **C. glaucus** Baumg.
- + Plants green or grayish-green; capitula on erect, very long peduncles.....24.
- 24. Involucre bracts and pappus bristles considerably shorter than corolla; involucre bracts distinctly imbricate in lower part.....25.
- + Involucre bracts and pappus more than 1/2 as long as corolla; outer and middle bracts linear, almost equal, recurved; stem often glabrous, 0.8 cm in dia, ribbed-sulcate.....23. **C. multijugus** C. Koch.
- 25. Peduncles equal to or more than half the length of entire plant, irregularly floccose-white tomentose; leaves lanceolate, narrow, 2–3 cm wide, thick, or broader, to 5 cm, but then thinner, slightly sinuate-toothed.....24. **C. seminudus** MB.

- + Peduncles not so long, pinkish white-tomentose; leaves oblong, thick, sometimes even more or less coriaceous, pinnately parted or very symmetrically and deeply pinnately lobed.....25. *C. kernerii* Simk.
26. Upper part and triangular spine of involucre bracts in mature and young capitula recurved. Corolla 16.0–16.5 mm long.....
.....26. *C. pycnocephalus* L.
- + Involucre bracts appressed, with erect, not recurved, spine or with slightly recurved spine only in outermost bracts.....27.
27. Outer involucre bracts lanceolate, ovate, or ovate-lanceolate, together with middle bracts in upper half, with dark purple spot, more or less thickened and hard, abruptly ending in small spine.....
.....27. *C. beckerianus* Tamamsch.
- 10 + Outer and middle involucre bracts at upper end not thickened, lacking dark spot, imperceptible narrowing to a spine.....28.
28. Involucre bracts strongly pubescent, not lustrous after flowering, besides pseudo-glandular hairs, densely covered with multi-cellular, often entangled hairs; plants grayish- or white-pubescent.....29.
- + Involucre bracts subglabrous or weakly pubescent; capitula often becoming somewhat lustrous green toward end of flowering; bracts narrowly scarious along margin, yellowish only at base from pseudo-glandular hairs.....30.
29. Plant entirely light gray; capitula medium-sized, on unwinged conspicuous peduncles, usually 1–2; achenes 3–4 mm long, if up to 5 mm, then peduncles also longer and capitula larger and solitary.....28. *C. cinereus* MB.
- + Plant weakly pubescent or white-pubescent; capitula sessile, in clusters of 3–4, axillary and terminal on usually winged and spiny-winged peduncles; usually one middle capitulum much larger and more densely set, rest readily falling off already in predehiscent condition.....29. *C. arabicus* Jacq.
30. Plants 5–18 cm high, with 1–2 small, almost sessile capitula 10–11 mm long; capitula in leaf axils and at end of peduncles; leaves grayish.....30. *C. nikitinii* Tamamsch.
- + Plants 30–40 cm high, with capitula 15–18 mm long at stem tips in clusters of 3–6 long, thick (1.5–2.0 mm in dia) peduncles.....
.....31. *C. nervosus* C. Koch.

Section 1. Carduus.—Sect. *Carduus* subsect. *Pachycephali* auct. non-null. p. p.—Sect. *Platycephali* Rouy, Fl. Fr. IX (1905) 75 p. p.—Capitula large, 3–6(7) cm in dia, globose, flat-globose, broadly obovate or somewhat oblong; involucre bracts with long spines. Biennials or perennials.

Type of section: type of genus.

Series 1. Nutantes Tamamsch.—Capitula nodding; involu-
 cral bracts broad, herbaceous, slightly constricted in middle and
 geniculate.

1. *C. nutans* L. Sp. pl. (1753) 821; DC. Prodr. VI, 621; Ldb. Fl.
 Ross. II, 718; Boiss. Fl. or. III, 515; Hegi, Ill. Fl. VI, 2, 848; Grossh.
 Fl. Kavk. IV, 174; Shishk. in Kryl. Fl. Zap. Sib., XI, 2878; Klok. in
 Vozn. Rosl. URSR, 566; Tamamsch. in Bot. Mat. Gerb. Bot. Inst.
 Akad. Nauk SSSR, XV, 392.—*C. nutans* β . *thoermeri* Schmalh. Fl. II
 (1897) 97.—*C. armenus* Boiss. Fl. or III (1875) 516, pro syn.—*C.*
thoermeri Weinm. in Bull. Soc. Nat. Mosc. X (1837) 69; Iljin in Izv.
 Bot. Sada Akad. Nauk SSSR, XXX, 3–4, 349; Grossh. Opređ. Rast.
 Kavk. 479; Klok. loc. cit.; Kapeller in Fl. Gruzii, VIII, 465.—*C.*
 11 *thoermeri* ssp. *sibiricus* Iljin, loc. cit.; Schischk. in Kryl. Fl. Zap. Sib.
 XI (1949) 2878.

Biennial. Plant 50–100 cm high. Stem usually branched, less often
 simple, cylindrical, weakly sulcate, arachnoid-hairy or subglabrous,
 winged, wings sinuate-toothed, on margin covered with long spines.
 Lower leaves short-petiolate; middle and upper leaves decurrent, 15–
 40 cm long, 5–10 cm wide, uniformly bright green on both sides, with
 prominent midrib, glabrous or pubescent beneath along midrib, some-
 times lateral veins with long, multi-cellular crisped hairs; sometimes
 entire surface somewhat arachnoid-hairy-pubescent, pinnate and lo-
 bate, with 2–5 ovate, shallow lobes, sharply spinose on margin. Ca-
 pitula nodding, 4–7 cm in dia, sometimes with as many as 100 florets,
 solitary on white-tomentose wingless peduncles. Involucre globose;
 involucre bracts unequal, outer and middle geniculate and somewhat
 constricted usually below middle, sublanceolate above, broadly del-
 toid or ovate, flat or somewhat grooved inside, divergent or recurved,
 sometimes recurved at an acute angle, less often erect, terminating into
 sharp spine. Corolla purple or pink, to 15 mm long; limb including
 throat 5 mm long, quite irregularly incised. Achenes 4–5 mm long,
 light gray or light olive, with fine longitudinal striations and transverse
 fine zigzags; pappus of white scabrous hairs, considerably shorter than
 corolla. Flowering June to September.

Borders, roadsides, weedy places, glades, pastures.—*European*
Part: Almost all regions except Arctic; *Western Siberia*: Upper Tobol,
 Ob Region, Irtysh, Altai (in the last two places rarely); *Caucasus*: All
 regions. *Soviet Central Asia*: Aralo-Caspian Region, Lake Balkhash
 Region, Kyzyl-Kum (rarely). *General distribution*: Almost whole of
 Western Europe, Armenia and Kurdistan, Iran, North Africa. Described
 from Western Europe. Type in London.

Economic Importance. It is considered a good honey-producing plant; it yields abundant nectar, and the honey obtained is light-colored, very aromatic, and with a pleasant taste. The seeds contain up to 20–30% rich oil in their cotyledons. It can be recommended as an ornamental plant.

2. *C. songoricus* Tamamsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XV (1953) 391.—*C. nutans* var. *songoricus* Winkl. ex O. and B. Fedtsch. Perech. Rast. Turk. IV (1911) 277, nomen.—**lc.:** Tamamsh. op. cit. Fig. 8 on p. 387.

Perennial. Stem thick, sulcate, straight, simple, winged, densely leafy. Basal leaves on short, spiny winged petioles, densely pubescent, particularly on midrib with long crisped hairs, oblong or oblong-obovate, pinnately lobed, lobes 5–7 toothed, acute, spiny; middle and upper leaves much narrower and longer, decurrent, pinnately lobed, 12 lobes 3–5 toothed with prominent veins, extended into stiff sharp spine, on both sides, particularly on midrib, with very sparse, long hairs. Capitula at stem tips in clusters of 3–5, on short, drooping, white-tomentose peduncles, winged almost to capitulum, globose, to 4–6 cm in dia. Involucral bracts geniculate, ovate in lower half, lanceolate in upper half, slightly recurved, ventrally grooved, dorsally with prominent midrib, terminating in acute spine, with 2–4 thin, distinct, lateral veins. Corolla mostly white, sometimes pink; limb irregularly incised; pappus bristles whitish, slightly scabrous, more than a half as long as corolla. Achenes 6 mm long. Flowering July to August.

Stony steppes, dry mountain slopes.—*Soviet Central Asia:* Dzhungaria-Tarbagatai, Pamiro-Alai Region. *General distribution:* Dzhungaria-Kashgaria. Described from Dzhungarian Alatau. Type in Leningrad.

3. *C. schischkinii* Tamamsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk. SSSR, XV (1953) 389.—*C. onopordioides* auct. non Fisch. ex MB.: O. and B. Fedtsch. Perech. Rast. Turk. IV (1911) 277 and auct. al. fl. turkest.—**lc.:** Tamamsh. op. cit. Fig. d, e on p. 387.

Annual or biennial. Plant to 50–60 cm high. Stem simple, mostly single, slightly angular, sulcate, slightly contorted, narrowly winged, wings on margin finely ciliate-spiny. Leaves decurrent, of average size, 10–12 cm long, 2.0–2.5 cm wide, oblong-ovate, slightly lyrate or sinuate; lobes 3–5-toothed with thin spines; lamina bright green on both sides, glabrous above, slightly hairy beneath at base on midrib with long wavy hairs; peduncles long, not winged, white-tomentose, with solitary capitula. Capitula almost cylindrical; florets almost twice as long as involucre. Involucral bracts narrow, 1.5–2.5(3.0) mm wide;

outer bracts more or less appressed; middle and inner slightly recurved, geniculate, with oblique spine saber-like curved; innermost involucre bracts colored at tips. Corolla light-purple, irregularly incised. Achenes immature, large, gray, oblong; pappus hairs distinctly shorter than corolla. Flowering June to August.

Rocky, stony mountain slopes.—*Soviet Central Asia*: Tien Shan, Dzhungaria-Tarbagatai. Endemic. Described from banks of Ketmen River. Type in Leningrad.

Note. Among the collections of Aitchison from Afghanistan (Kuroma Valley) one specimen greatly resembles this species. Owing to the limited material we are refraining from referring this specimen to *C. schischkinii*.

4. *C. coloratus* Tamamsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XV (1953) 390.—*C. nutans* var. *coloratus* Winkl. ex O. and B. Fedtsch. Perech. Rast. Turk. IV (1911) 277, nomen.

Perennial. Stem branched almost from base, 80–100 cm high, ribbed, slightly sulcate between ribs, covered with very sparse, long, wavy hairs, broadly and discontinuously winged at base, wing lobes rectangular, toothed, spinescent. Leaves quite narrow, oblong, sinuate-toothed; lobes deltoid, with small and large spines; lamina thin, decurrent, green on both sides, covered with long, very sparse, undulate hairs mainly on veins. Peduncles to 5–7 cm long, white-tomentose, not winged, with solitary capitulum. Capitula nodding, quite large, 3.5–4.0 cm in dia. Involucre more or less broadly oblong; outer bracts in young capitula horizontal, inner ones more or less erect, appressed; bracts in opened capitula oblong-lanceolate, geniculate in middle, sharply sulcate inside in upper part, with long recurved cusp, yellowish in lower part, green in middle, bright purple above, particularly innermost puberulent outside, finely ciliate; narrow spinulose bracts below capitulum at base of involucre. Corolla stramineous or pink; corolla limb irregularly incised; pappus of white silky hairs with fine teeth, distinctly shorter than corolla. Flowering July to August.

Foothills, on dry slopes.—*Soviet Central Asia*: Tien Shan, Pamiro-Alai Region, Kyzyl-Kum, Syr-Darya. *General distribution*: Dzhungaria-Kashgaria. Described from Alai Mountain spurs, upper reaches of Shakhimardan River. Type in Leningrad.

Series 2. Acanthocephali Tamamsch.—Grayish or densely white-tomentose plants; involucre bracts narrow, spiny, erect, divergent or curved saber-like, lacking constriction in middle, not geniculate. Caucasian species, of which one species occurs in Transcaucasia and northern Iran.

5. **C. acanthocephalus** C.A.M. Verzeichn. (1831) 71; DC. Prodr. VI, 622; Ldb. Fl. Ross. II, 718; Boiss. Fl. or. III, 516; Grossh. Fl. Kavk. IV, 174; Isaev in Fl. Azerb. VIII, 381.

Perennial. Stem branched, sulcate, arachnoid-hairy, broadly winged; deltoid wing lobes unevenly sinuate on margin, with yellowish, stiff, unequal spines, middle lobe with distinct vein terminating in long, to 1.0–1.5 cm long, yellow spine; sometimes wings narrowed below capitulum or abruptly narrowed into stiff, long, acute cusp. Leaves oblong, decurrent, densely hairy beneath; pinnately lobed; lobes large, distant, irregularly toothed, with long stiff spines. Peduncles very short with solitary capitulum, winged and spiny. Capitula large, 3.0–4.5 cm long, subglobose. Involucral bracts densely grayish-arachnoid-hairy, subulate; outer and middle bracts more or less recurved, somewhat flat in lower half, grooved inside in upper half, deltoid in transection, hard, spinescent, with prominent midrib and 2 distinct lateral veins, with pseudo-glandular hairs in lower part; inner bracts not spiny, slightly pinkish, linear; corolla purple, 20–25 mm long, irregularly incised, distinctly exceeding inner involucral bracts. Achenes oblong, yellowish-brown, with darker and quite distinct longitudinal and weaker transverse lines, tubercle indistinctly lobed; pappus of white fragile hairs, considerably shorter than corolla. Flowering July to August.

Alpine zone, in meadows.—*Caucasus*: Ciscaucasia, Eastern Caucasus. Endemic. Described from Tfundag Mountains. Type in Leningrad.

6. **C. hystrix** C.A.M. Verzeichn. (1831) 71; DC. Prodr. VI, 622; Ldb. Fl. Ross. II, 719; Boiss. Fl. or. III, 517; Grossh. Fl. Kavk. IV, 175; Isaev in Fl. Azerb. VIII, 382.

Biennial or perennial. Whole plant light-colored, almost whitish from dense pubescence. Stem 80–100 cm high, branching from middle, deeply sulcate, wingless below, arachnoid-hairy-pubescent, white-tomentose above including peduncles, narrowly winged up to capitulum, lobes of stem wings unevenly incised, with sharp unequal spines. Leaves slightly pubescent above, white-tomentose beneath; lamina of lower leaves oblong-ovate, 10–12 cm long, 4–5 cm wide, pinnately parted; lobes broadly deltoid, sinuate, with short, thin spine along margin; middle leaves narrower, decurrent, pinnately lobed, spinose-toothed and ciliate, narrowed toward apex, terminal lobe lanceolate, spinescent. Capitula pedunculate, solitary, erect, quite large, to 3.0–3.5 cm in dia, cylindrical before flowering; peduncles wingless below capitulum. Involucre only up to opening arachnoid-lanate; outermost bracts somewhat shorter than others, appressed; other bracts to 2–3 cm long, saber-like recurved, more or less subulate, broad at base, spinescent,

with prominent, hard midrib beneath, stiff; innermost bracts linear, not stiff, not spinose, with 3 distinct veins beneath, colored above. Corolla light purple, to 38–40 mm long. Pappus white, pinkish-golden, more or less silky, distinctly longer than corolla tube. Achenes 4–5 mm long, lustrous, grayish-olive, with distinct longitudinal brownish lines and weak transverse striation. Flowering August to September (Plate II, Fig. 3).

Dry high-mountain meadows, up to 2,000–3,000 m.—*Caucasus*: Eastern Transcaucasia, Talysh. *General distribution*: Iran. Described from Talysh. Type in Leningrad.

- 16 7. *C. poliochrus* Trautv. in Tr. Peterb. Bot. Sada, III (1875) 272; Boiss. Fl. or. Suppl. 307; Grossh. Fl. Kavk. IV, 176 (sphalm. *C. polyochrus*).

Biennial. Plant 25–35 cm high. Stem corymbosely branched, arachnoid-pubescent, narrowly winged. Leaves oblong, decurrent, more or less pinnately lobed, ovate-deltoid; lobes abruptly narrowed, spinescent, rarely sparsely arachnoid above, densely arachnoid white-tomentose beneath. Peduncles narrowly winged, usually bearing solitary capitulum; capitula 2–3 cm long. Involucre subglabrous or slightly pubescent; involucre bracts somewhat recurved till full bloom, subulately spinose from narrow lanceolate base, with prominent vein in mature capitula, and long but straight apical spines; outer bracts almost 1/2 as long as middle, hairs in lower part on dorsal surface pseudo-glandular; inner bracts subulately narrowed, but not spinose, with 3 prominent veins, finely ciliate, colored. Corolla purple, 12–13 mm long. Pappus longer than corolla tube excluding throat. Achenes 5.0–5.5 mm long, narrow, grayish or brownish, with few indistinct, darker, longitudinal striations, narrowed below and slightly oblique, with small 5-lobed tubercle above. Flowering July to August.

High-mountain meadows.—*Caucasus*: Dagestan. Endemic. Described from Akhta and Murukh. Type in Leningrad.

Series 3. Onopordioides Tamamsch.—Subglabrous, usually light green, rarely dark green plants with oblong or globose capitula; involucre bracts more or less herbaceous with variously curved spines, but not geniculate.

Species of this series are found mainly in different regions of Transcaucasia. They are, however, also found in the northern part of Iran.

8. *C. hajastanicus* Tamamsch. in Addenda XXVII, 599.

Perennial. Plant bluish-green, 40(50)–100 cm high. Stem divaricately branched from base; branches discontinuously winged,



spiny, more or less ribbed-sulcate like main stem, slightly arachnoid-pubescent, wingless in upper part of peduncles, with few prickly cilia and sparsely pubescent. Leaves narrow, oblanceolate, sessile, shallow and unevenly pinnately lobed, lobes deltoid with long, stiff, yellow spine to 8–9 mm-long, bluish-green, both surfaces with fine pseudo-glandular hairs and distinct veins, lighter than lamina. Capitula large, solitary, 3.0–3.5 cm long and 2.5–3.0 cm in dia, oblong-globose, pedunculate, slightly nodding just below capitula. Involucre subglobose, in lower part slightly appressed around peduncle; involucre bracts unequal, broad and appressed at base, subglabrous or pubescent only
 17 along margin and inside; outer bracts more or less brownish, almost horizontally deflected, cuspidate, on margin arachnoid-pubescent, dorsally with pseudo-glandular hairs and prominent thick midrib; inner bracts narrow, purple, with white, pointed tip, ciliolate; florets longer than involucre, dark purple or reddish-purple. Corolla 19.0–19.3 mm long; corolla tube considerable shorter than limb including throat. Pappus $\frac{3}{4}$ as long as corolla; pappus bristles distinctly scabrous. Achenes oblong, straight or somewhat curved, slightly narrowed below, including tubercle 6 mm long, light-brown, with lighter, thin, longitudinal lines and darker, transverse striations. Flowering May to August. (Plate I, Fig. 2.)

Grassy, stony mountain slopes.—*Caucasus*: Southern Transcaucasia. Endemic. Described from shores of Lake Sevan. Type in Leningrad.

9. **C. furiosus** Tamamsch. in Addenda XXVII, 599.— *C. onopordioides* auct. cauc. nonnull. non. Fisch. ex MB.

Biennial. Plant highly spiny, 30–35 cm high, light-green. Stem single, densely leafy, ribbed-sulcate, narrowly spiny-winged; wing lobes deltoid, with stiff, yellowish spines 5–15 mm long. Leaves slightly coriaceous, lighter above, with thick, raised midrib beneath, sparsely arachnoid-pubescent; lower and middle leaves almost equal, upper leaves somewhat reduced; all leaves decurrent, 7–12 cm long, 2.0–2.5 cm wide, lanceolate, pinnately shallow-lobed, with short deltoid spiny lobes. Peduncles below capitula usually spiny winged, erect, less often wingless but spiny. Capitula flat-globose, 3.0–3.5 cm long, 3–4 cm in dia; except upper undeveloped ones, capitula axillary in middle of stem. Involucre subglabrous or sometimes slightly arachnoid-pubescent; all bracts longer than pappus and corolla; outer and middle bracts stiff, becoming very hard toward end of flowering, abruptly narrowed from somewhat broad base into sulcate tip, with long, stiff, almost horizontal or recurved, divergent spines, latter 1.5–2 times as long as involucre bracts, yellow or purple. Corolla dark pink, 22–23 mm long;

corolla tube shorter than limb including throat. Achenes thick, fusiform, including tubercle 6 mm long, dull gray, with many longitudinal darker striations; pappus 1.5–2 times as long as achene. Flowering June to July. (Plate I, Fig. 1.)

Gravel beds, dry stony slopes.—*Caucasus*: Eastern Transcaucasia (southeastern part), Talysh. *General distribution*: Northern Iran, whence described (Badalan). Type in Leningrad.

Note. The diagram of "*C. onopordioides* Fisch." in Plate XXXIX in Volume VIII of the *Flora Azerbaidzhana* [Flora of Azerbaidzhan] probably refers to this species.

- 18 10. ***C. onopordioides*** Fisch. ex MB. Fl. taur.-cauc. III (1819) 552; DC. Prodr. VI, 622; Ldb. Fl. Ross. II, 719; Boiss. Fl. or. III, 516; Grossh. Fl. Kavk. IV, 174; Kapeller in Fl. Gruzii, VIII, 465.

Annual or biennial. Plant light colored or yellowish-green, 30–50 cm high. Stem simple below, weakly branched above, sulcate, subglabrous, unevenly winged; wing lobes deltoid, spinose on margin, with long, straight, less often curved spine in middle. Leaves thin, thick or slightly coriaceous, glabrous or with thin isolated hairs only on midrib, sessile, somewhat unevenly and pinnately lobed, oblong or oblong-lanceolate, strongly spinose, with stiff thin spines on margin of leaf lobes. Peduncles branched at apex, short, usually with solitary capitula, wingless below capitulum, grayish-tomentose or with short, small, discontinuous wings or spines. Capitula oblong or ovate-cylindrical, 2.5–3.0 cm long. Involucre subglabrous, slightly arachnoid pubescent only when young; all bracts more or less herbaceous, not very stiff, spinescent; outer bracts recurved, sulcate inside with lighter midrib, inner almost erect, as long as florets or somewhat shorter, membranous, acute but not spinescent, finely ciliate, with 3 or 5 distinct veins in middle. Corolla bluish pink or darker, 20.0–20.3 mm long; corolla tube excluding throat 9.0–9.3 mm long. Pappus of very thin silky hairs, up to 1/2 as long as corolla. Achenes grayish or light-brown, quite compressed, with indistinct, thin, longitudinal and many transverse striations, thick, 5-lobed tubercle somewhat narrowed below, along with tubercle 5 mm long. Flowering June to August. (Plate I, Fig. 3.)

Dry stony places.—*Caucasus*: Eastern Transcaucasia (central part). Endemic. Described from vicinity of Tbilisi from Wilhelms' collections. Type in Leningrad.

Note. This species does not grow in Soviet Central Asia. All herbarium specimens seen by me identified as *C. onopordioides* belong to *C. schischkinii*. This remark pertains also to literature references to the occurrence of *C. onopordioides* in Soviet Central Asia. In Volume

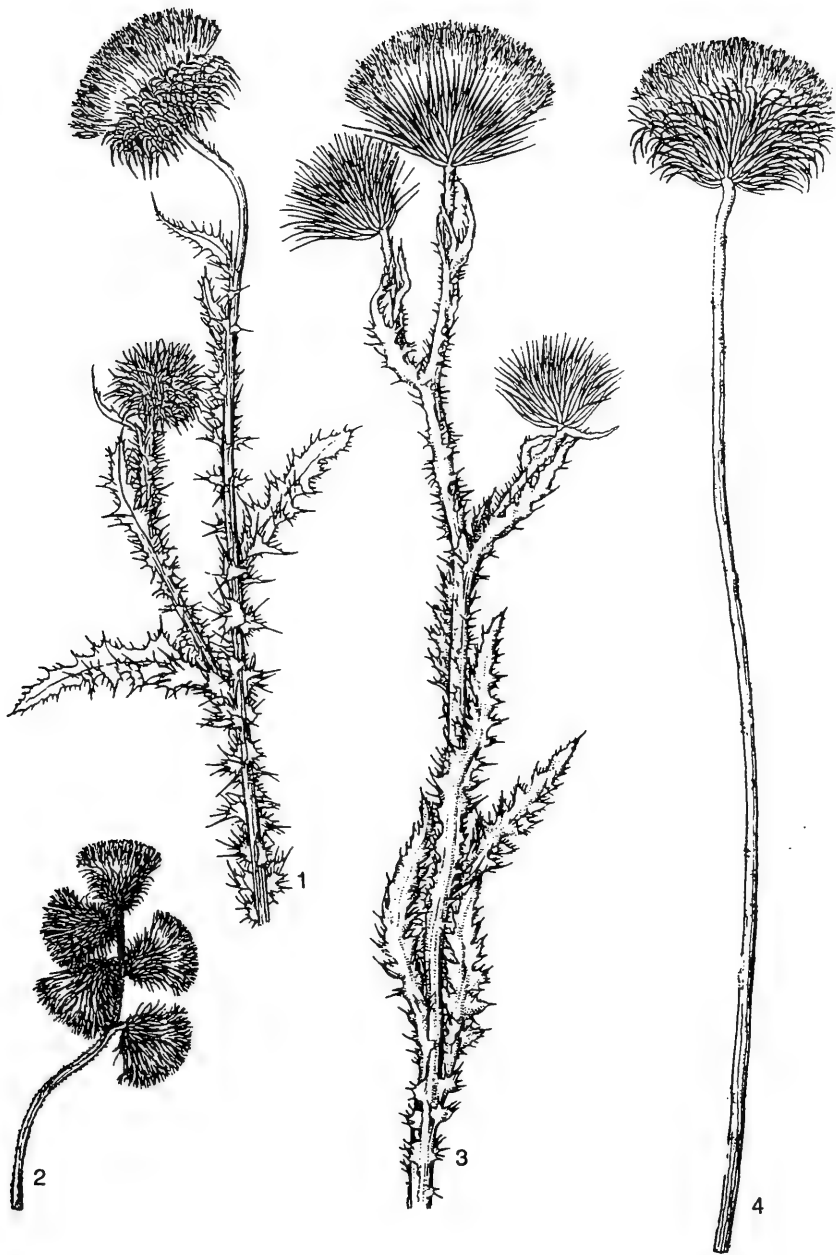
VIII of *Flora Azerbaidzhana* [Flora of Azerbaidzhan], Ya. Isaev included *C. atropatanicus* Sosn. in the synonymy of *C. onopordioides*. The history of the former species is as follows: D.I. Sosnowsky himself did not publish the description of this species, but only gave it the name. The first description, by Grossheim, is in *Flora Kavkaza* [Flora of the Caucasus], Vol. IV (1934). However, to judge from herbarium
 20 specimens, Grossheim understood quite different things under the label "*atropatanicus*," which only with great difficulty could be referred to the given series or even the section. Sosnowsky himself, in his time (in litt.), found it difficult to determine the affinity of *C. atropatanicus*. Guided by the autotype with Sosnowsky's signature, I came to the conclusion that *C. atropatanicus* undoubtedly is close to *C. onopordioides* but is a separate more southern race.

11. ***C. atropatanicus*** Sosn. ex Grossh. Fl. Kavk. IV (1934) 175 p. p.—*C. onopordioides* auct. p. p. non Fisch. ex MB.; Isaev in Fl. Azerb. VIII (1960) 382.

Annual or biennial. Plants to 30–35 cm high, subglabrous, light colored, or yellowish-green. Stems spiny-winged, slightly sulcate. Leaves oblong below, lanceolate above, pinnately lobed, with spinulose deltoid lobes and thick, brighter midrib more prominent dorsally; whole plant considerably less spiny than the preceding two species. Capitula small, obovate, 4 cm in dia above, 2.5 cm below. Involucre broadly obconical, somewhat foveate below; involucre bracts at tip subglabrous, sparsely arachnoid-tomentose below, light green; inner bracts bright purple at tip, slightly pubescent, weakly spinescent; outer bracts gradually narrowed from oblong base, spinescent, recurved. Corolla pale pink, sometimes almost white, scarcely exerted from inner involucre bracts and pappus, 17–18 mm long; corolla tube excluding throat as long as corolla lobes including throat; achenes with tubercle 5.0–5.2 mm long, 2 mm wide, inequilateral, truncate below, light olive-gray or yellowish with darker, thin, longitudinal and many transverse striations; tubercle sessile, indistinctly lobed. Flowering June.

Middle mountain zone, in dry places.—*Caucasus*: Southern Transcaucasia. Endemic. Described from Nakhichevan. Type in Tbilisi; cotype in Leningrad.

Section 2. Carduastrum Tamamsch. in Addenda XXVII, 600.—Sect. *Platycephali* Rouy, Fl. Fr. IX (1905) 75 p. p.—Sect. *Carduus* subsect. *Pachycephali* auct. europ. non-null. p. p.—Capitula large or of average size, depressed globose or more or less oblong; involucre bracts narrow, stiff hard or somewhat soft, distinctly or indistinctly imbricate, appressed or divergent. Plants with spiny-winged or wingless long peduncles.



Type of section: *C. crispus* L.

Series 1. Collini Tamamsch.—Involucral bracts narrow, hard, uncinata. Capitula oblong or depressed-globose.

The species of this series, widely distributed in the eastern and southeastern part of Western Europe, number about 6–7, three of which we have.

- 21 12. *C. pseudocollinus* (Schmalh.) Klok. in *Vizn. Rosl. URSR* (1950) 566; Geidemann, *Opred. Rast. Mold. SSR*, 288.—*C. collinus* auct. non. Waldst. and Kit.: *Ldb. Fl. Ross. II* (1846) 721; Boiss. *Fl. or. III*, 519.—*C. collinus* var. *caucasicus* C. Koch in *Linnaea*, XXIV (1851) 394.—*C. hamulosus* β . *pseudocollinus* Schmalh. *Fl. Yugo-Zap. Ross.* (1886) 317; *Fl. II*, 98; *Grossh. Fl. Kavk. IV*, 175; *Stank. and Tal. Opred. Vyssh. Rast.* (1949) 660.

Biennial or perennial. Stem simple or branched from middle or above, discontinuously and unevenly winged; wings spinose. Leaves decurrent or with winged petioles; petioles sulcate above, carinate below; lamina sparsely pubescent above, but grayish beneath from denser pubescence; lower leaves almost linear, deeply pinnately lobed, lobes deltoid, 3–5-toothed, spinescent, finely ciliate; middle and upper leaves gradually reduced, lanceolate, spinose; peduncles below capitulum wingless, almost white from densely tomentose pubescence, with solitary capitula. Capitula of average size, 1.5–2.0 cm long. Involucre globose-ovate, toward tip slightly constricted or hemispherical; involucral bracts more or less stiff, brownish or purple-violet, narrowly linear, spinescent, in young capitula more or less appressed, in mature capitula uncinata, indistinctly grooved inside; middle bracts dorsally with somewhat prominent midrib, terminating in uncinata spine; inner bracts more or less appressed, with 3 distinct veins. Corolla purple; its limb irregularly incised, distinctly exceeding involucral bracts. Achenes small, about 3.0–3.5 mm long, light-brown with darker longitudinal striations and inconspicuous transverse zigzags between lines; pappus longer than involucral bracts. Flowering June to August.

Dry meadows, steppes, on stony and calcareous, sunny slopes.—*European Part*: Black Sea Region, Upper Dnieper, Middle Dnieper, Upper Dniester; Bessarabia, Lower Don, Lower Volga, Crimea; *Caucasus*: Ciscaucasia, Southern Transcaucasia (occasional). *General distribution*: Central Europe. Described from southwest European Part of USSR. Type in Kiev.

13. *C. transcaspicus* Gand. in *Bull. Soc. Bot. France*, LXV (1918) 37; Tamamsch. in *Fl. Turkm. VII*, 237.—*C. uncinatus* var. *transcaspicus* Rech. f. in *Ann. Nat. Mus. Wien*, 14–15 (1943) 16.

Perennial. Stem up to 1 m high, sometimes even taller; branched almost from base, cylindrical, slightly sulcate, subglabrous below, narrowly winged in middle. Lower leaves to 10–15 cm long, gradually tapering below, slightly decurrent, glabrous above or with isolated hairs, somewhat tomentose-pilose beneath, irregularly pinnately lobed with inconspicuous spinules on margin; middle and upper leaves gradually reduced, narrowly lanceolate, slightly pilose above, white-tomentose beneath, more prickly than lower leaves. Peduncles to 18–20 cm long, narrowly winged below, slightly sulcate, white-tomentose, terminating in large, solitary capitula to 4 cm long. Involucre almost cylindrical, strongly spinose, longer than florets in young capitula, more than 1/2 as long as corolla at flowering; outer and middle bracts stiff, narrow, uncinately recurved, somewhat carinate outside, grooved inside, glabrous or sometimes weakly arachnoid-pubescent at base, with pseudo-glandular yellowish hairs outside, finely ciliate inside, spinescent, pinkish at base; inner bracts with gradually less stiff and less recurved spinule, colored; innermost bracts carinate outside like preceding ones, violet. Florets pink; corolla lobes irregularly incised. Pappus snow-white, with hairs longer than corolla tube. Achenes oblong, light- or dark-brown, 1/2 as long as receptacular bristles. Flowering August. (Plate II, Fig. 4.)

Slopes and in subalpine zone.—*Soviet Central Asia*: mountainous Turkmenia. Endemic. Described from Kyzyl-Arvat. Type in Paris.

Economic Importance. It can be recommended as an ornamental plant because of the pink flowers in rather large capitula, nice color of the involucre, and bright white peduncles.

14. *C. hamulosus* Ehrh. Beitr. Naturk. VII (1792) 166; Waldst. and Kit. Descr. et icon. pl. rar. Hung. III (1812) 258; MB. Fl. taur.-cauc. II, 268; Bess. Enum. pl. Volhyn. 31; DC. Prodr. VI, 623; C. Koch in Linnaea, XVII, 42; Ldb. Fl. Ross. II, 720; Boiss. Fl. or. III, 517; Grossh. Fl. Kavk. IV, 175; Klok. in Vizn. Rosl. URSR, 566; Kapeller in Fl. Gruzii, VIII, 466.— **Ic.:** Rechb. Ic. Fl. Germ. XV, tab. 875, II.— **Exs.:** Fl. exs. austr.-hung. No. 1782.

Biennial or perennial. Plant to 60–70 cm high. Stems 2–3, branched, cylindrical, sulcate, winged to very tip, less often wings not reaching to capitula; wings narrow, interrupted, pubescent together with stem, with long articulate hairs. Lower leaves with winged petioles crowded at stem base; all leaves dull grayish-green from long hairs, particularly dense on veins and small pseudo-glandular hairs; upper leaves oblong-ovate with 5–7 pinnate lobes, spinulose-ciliate; peduncles often narrowly winged, spinose, white-tomentose. Capitula large, 3–4(5) cm in dia, subglobose or somewhat oblong. Involucre subglabrous or with small pseudo-glandular hairs; involucre bracts narrow, lanceolate, more

or less deltoid, very stiff; outermost bracts more or less appressed middle (particularly in unopened capitula) uncinately recurved in upper half, dark inside, with prominent midrib, on outer side covered with fine pseudo-glandular hairs; innermost bracts subulately narrowed, membranous, green in lower part, purple above, somewhat pubescent, with 3 distinct veins, like middle uncinately recurved. Corolla purple, irregularly incised into lobes. Achenes lustrous, olive-reddish-brown, oblong, slightly compressed; at base indistinctly ribbed, with fine, transverse, pilose striations and quite large-lobed tubercle at tip; pappus longer than inner involucre bracts, to $2/3$ as long as corolla. Flowering June to August.

Dry, often weedy places, dry shrubby thickets, in lower and middle mountain zones.—*European Part*: Bessarabia, Black Sea Region, Crimea; *Caucasus*: almost all regions particularly the southern ones. *General distribution*: southern and Central Europe, Balkans-Asia Minor. Described from southern Europe. Type in Berlin(?).

Series 2. Crispi Tamamsch.—Involucre bracts stiff but not hard, divergent, sometimes clearly uncinately recurved or curved in middle at wide angle and obliquely upright.

The species of this series are widely distributed throughout Europe, Asia, and Africa.

15. *C. crispus* L. Sp. pl. (1753) 821; DC. Prodr. VI, 623; Ldb. Fl. Ross. II, 721; Boiss. Fl. or. III, 520; Schmalh. Fl. II, 97; Hegi, Ill. Fl. VI, 2, 860; Grossh. Fl. Kavk. IV, 176; Klok. in Vizn. Rosl. URSR, 567; Kappler in Fl. Gruzii, VIII, 471.—*C. crispus* var. *albiflora* Bordz. in Izv. Kievsk. Bot. Sada, XII–XIII (1931) 141.—*C. crispus* var. *comosus* M. Pop. Fl. Sredn. Sib. II (1959) 752, diagn. ross.—*Ic.*: Hegi, Ill. Fl. VI, 2, Taf. 270, fig. 4.

Perennial. Plant 50–120 cm high, dark green. Stem cylindrical, sulcate, finely pubescent, winged to very apex and sharply spinulose, branched from middle, above or only at apex. Leaves ovate or oblong-ovate, sparsely pilose above, grayish-tomentose or more sparsely pubescent beneath; lower leaves to 20 cm long and 10–15 cm wide, with winged petiole, to 10–12 cm long, sometimes less pubescent than upper leaves, unevenly and sinuately emarginate-lobed-toothed and pinately lobed; lobes deltoid or ovate, ciliate-spinulose; middle and upper leaves gradually reduced, oblong or lanceolate, ciliate-spinose with distinct veins and larger terminal lobe; peduncles axillary, usually 10–15 cm long, white-tomentose or less densely pubescent, mostly to very tip prickly-winged or simply spinose. Capitula 2–3 cm long, in terminal clusters of 3–4, usually densely clustered, very rarely 2 or

solitary and sessile in leaf axils, ovate or more or less globose. Involucre mostly broadly ovate, shorter than florets; bracts in young capitula straight, divergent, outer bracts linear-subulate at flowering, slightly recurved, more or less hard, appressed at bend, other bracts unequal, highly recurved, as a result involucre looking shaggy; inner bracts thin, almost membranous, appressed. Corolla usually purple, very rarely lighter or white. Achenes small, about 3 mm long, grayish, with thin, longitudinal darker striations and lacking stalk; tubercle slightly lobed; pappus shorter than corolla, scarcely exceeding involucre. Flowering July to September.

Weed—in fields, among low shrubs, in forests in moist shady places.—*European Part*: almost all regions; *Caucasus*: all regions; *Western and Eastern Siberia*: almost all regions; *Far East*: all regions; *Soviet Central Asia*: rarely. *General distribution*: all of Europe, Armenia and Kurdistan, Iran, North America (introduced). Described from Northern Europe. Type in London.

Note. A highly polymorphic species. The variation of the characters is particularly striking in the vegetative parts: length of stem; form of lamina which sometimes is almost entire, other times deeply pinnately lobed, with the upper surface almost glabrous or roughly to finely pilose; spines sometimes strong, other times weak; involucre bracts with veins distinct or indistinct. However, in Mongolia, Japan and China this species is so different in appearance that it can hardly be considered *C. crispus*; in the future, plants from these regions referred to in the literature as *C. crispus* probably should be treated as separate races, which I have already done for Mongolia (see *Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XV). Possibly, the form reported by M.G. Popov from Central Siberia under the name var. *comosus*, should be treated as a separate race.

Economic Importance. It is nectariferous plant.

16. *C. acanthoides* L. Sp. pl. (1753) 821; DC. Prodr. VI, 623; Ldb. Fl. Ross. II, 719; Boiss. Fl. or. III, 518; Grossh. Fl. Kavk. IV, 175; Klok. in Vozn. Rosl. URSS, 567; Kapeller in Fl. Gruzii, VIII, 467.—*C. acanthoides* β . *thessalus* Boiss. Fl. or. III (1875) 518.—*C. thessalus* Boiss. and Heldr. in Boiss. Diagn. pl. or. ser. II, 3 (1856) 46; Grossh. Fl. Kavk. IV, 175.—**lc.**: Rchb. Ic. Fl. Germ. XV, tab. 873.

Perennial. Plant to 60–70 cm high, light green. Stem cylindrical, finely sulcate, narrowly spiny winged to very tip, simple or branched at apex, sparsely pubescent with long articulate hairs. Lower leaves early deciduous, middle and upper decurrent, oblong or oblong-ovate, 15–20 cm long, with very sparse hairs on both surfaces, pinnately lobed, in turn with unequal 3 or 5, quite remote lobes bearing sharp

yellow spines, usually with larger, lanceolate, shallow emarginate terminal lobe. Peduncles short, usually narrowly winged to capitula, spinose, with solitary capitula, very rarely capitula few. Capitula average sized, 3 cm in dia, subglobose. Involucre subglabrous, considerably shorter than florets; involucre bracts basally somewhat broad, later gradually becoming linear-subulate, spinescent, with prominent midrib, slightly divergent in upper part, sometimes outer bracts horizontal; 25 inner scarious, somewhat colored, sometimes with curved, acute apex, with 3 distinct veins. Corolla pink or dark-pink, at tip irregularly incised, in ray florets corolla tube bent. Achene small, 3 mm long, 1 mm wide, slightly compressed, grayish-olive, lacking prominent longitudinal striations, but with weak transverse lines and a rather persistent tubercle; pappus bristles lacking distinct serration, longer than inner involucre bracts and covering $\frac{3}{4}$ of corolla. Flowering July to August.

Fields, roadsides, in desert and stony places.—*European Part*: almost all regions, except the northernmost ones; *Caucasus*: almost all regions; *Western Siberia*: Upper Tobol. *General distribution*: northern Europe, Atlantic Europe, Mediterranean, Balkans-Asia Minor. Described from western Europe. Type in London.

Economic Importance. Young stems cleared of spines are used as raw vegetable in some countries.

17. *C. navaschirii* Bordz. in *Izv. Kievsk. Bot. Sada*, XII–XIII (1931) 141; *Grossh. Fl. Kavk.* IV, 176.

Biennial. Stem to 75–100 cm high, ascending, branched from middle, finely sulcate, with long, multicellular hairs or arachnoid-hairy, winged; wings deeply lobed with spiny-toothed lobes. Leaves arachnoid-pubescent above, rarely beneath, particularly on veins; middle leaves sessile, oblong or oblong-elliptical, pinnately lobed; lobes ovate or deltoid-ovate, in turn 2–4 lobed or toothed, spinescent, with up to 3.5 cm-long spine, decurrent, semiamplexicaul; upper leaves acute with highly spiny lobes. Capitula subglobose, to 2–3 cm long, in clusters of 2–3, rarely solitary or many (7); peduncles short, white-tomentose, often lacking wings at tip. Involucre bracts densely arachnoid-hairy, imbricate, appressed or divergent-recurved in upper part, very narrow, with prominent midrib extended into thin spine; outer bracts oblong-lanceolate; innermost bracts membranous, oblong. Corolla white, to 15 cm long, significantly longer than involucre. Achenes olive, slightly compressed, oblong, narrowed downward, 4.5 mm long, to 1.5 mm wide; pappus white, to 12–14 mm long. Flowering July to August.

High-mountain plant growing up to 3000 m.—*Caucasus*: Southern Transcaucasia. Endemic. Described from slopes of Aragats (Alagez) Mountain. Type in Kiev; paratype in Leningrad.

Note. This species was described by E.I. Bordzilovsky from his own collections. The species was collected again by the author of these lines from the same and other adjoining places in 1933. Bordzilovsky connected this species with *C. flavescens* C. Koch, which was described from Turkish Armenia from the vicinity of the town of Ardagan. Koch, comparing *C. flavescens* with *C. hamulosus* and *C. acanthoides*, considered that the difference of *C. flavescens* lies in its yellowish flowers. But Boissier linked *C. flavescens* with *C. collinus* and *C. adpressus*, noting that it is distinguished from the first species by short peduncles, winged almost up to capitula, and from the second species by the nature and size of the involucre bracts. From a more comprehensive study of *C. navaschinii*, based on the specimens available in Erevan and identified by Bordzilovsky himself, and from the specimens of *C. flavescens* of Koch in the General Herbarium of Botanical Institute of the Academy of Sciences of the USSR, one can conclude that these species are very close to each other and are certainly related to *C. crispus*, but they also show some similarity with *C. uncinatus* and *C. hamulosus*. In the herbarium of the Botanical Institute of the Academy of Sciences of the USSR, there are two sheets from the collection of Meyer, which had been referred to *C. uncinatus*. Both specimens were collected by Frick in 1847 from Alagez Mountain, i.e., in the same region from which *C. navaschinii* was also described. On one sheet there is a label where in Meyer's handwriting is written "*C. crispus* flore albo," then "*crispus*" had been crossed out and "*uncinatus*" written in by Meyer. In fact, both specimens should be referred to Bordzilovsky's *C. navaschinii*.

In this way, the species established by Bordzilovsky in 1931 was, for the first time, collected more than 100 years ago, and even at that time was cited by Meyer as a puzzling form, conforming neither to *C. crispus* nor to *C. uncinatus*.

18. ***C. uncinatus*** MB. Fl. taur.-cauc. III (1819) 553; DC. Prodr. VI, 623; Ldb. Fl. Ross. II, 720; Boiss. Fl. or. III, 518; Grossh. Fl. Kavk. IV, 175; Klok. in Vozn. Rosl. URSR, 567.—*C. uncinatus* var. *eu-uncinatus* Rech. f. in Ann. Nat. Mus. Wien. 14–15 (1943) 16.

Biennial. Stem straight, branched above or simple, ribbed-sulcate, arachnoid-hairy-pubescent, narrowly winged, wings interrupted, with small ovate lobes, strongly spinose along margin. Leaves arachnoid-hairy-pubescent above, tomentose beneath; lower leaves with winged petioles, 20–25 cm long, broad, pinnately lobed; lobes deltoid, reducing downward; middle and upper leaves oblong, oblong-linear or linear, slightly emarginate, with short sharp spine; peduncles usually long, tomentose-lanate, discontinuously winged almost to capitulum, less often wingless below capitula. Capitula solitary, large, 3.5–4.0 cm in dia,

subglobose. Involucre hemispherical, constricted in middle, grayish-arachnoid-hairy; outer bracts considerably shorter than others, appressed, somewhat broader than middle; middle bracts linear-subulate, appressed in lower half, uncinately recurved in upper half, but not stiff, with short spine; innermost bracts not spiny, some erect, some slightly recurved. Corolla dark pink or orange-pink, less often pinkish-purple. Pappus of white hairs, shorter than corolla. Achenes to 2.0–2.5 mm long, grayish-olive, slightly angular, with thin, longitudinal, brown and transverse sinuate striations, with unsegmented, indistinctly angular tubercle. Flowering May to August. (Plate II, Fig. 1.)

27 Steppes, hill-steppes, sometimes in lower mountain zone.—*European Part*: Crimea, Lower Don, Lower Volga; *Caucasus*: Ciscaucasia, Dagestan, Western Transcaucasia. *General distribution*: Central Europe, Asia Minor. Described from Crimea. Type in Leningrad.

Note. In the Herbarium of the Botanical Institute of the Academy of Sciences of the USSR, there is one specimen of this species from Karpinsky's collection, borrowed from Wilhelms' collection from Abkhazia. This species is not reported from Abkhazia; however its presence there is not ruled out.

Economic Importance. An ornamental plant because of the beautiful color of the capitula.

19. *C. stenocephalus* Tamamsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI (1954) 468.—*C. uncinatus* var. *parviceps* Iljin in schedis.

Biennial. Stem ribbed, between ribs sulcate, slightly pubescent below along grooves, densely grayish-tomentose above, strongly branched, more or less uniformly winged. Lower leaves early deciduous, upper linear lanceolate, pinnately lobed, lobes deltoid, 3–5 toothed, terminating in sharp, short spine, bright green above with sparse, long, flexuous hairs, grayish-tomentose beneath, with prominent midrib; peduncles and upper part of stem densely white-tomentose, wingless, but often with cluster of spines below capitulum or with very narrowly lanceolate, prickly subtending leaf. Capitula not large, 2.5–3.0 cm long, 1.5 cm in dia. Involucre basally roundish, more or less narrowly oblong, shorter than florets; involucre bracts subglabrous or slightly arachnoid-pubescent, mainly in distal half; outer bracts linear-lanceolate or subulate, terminating in stiff spine bent at right or wide angle, with prominent midrib and scarcely visible lateral veins; inner bracts appressed, subulately spinescent, sparsely ciliate, pale with very distinct, sparsely pubescent midrib. Corolla limb intensely pink or lighter, irregularly incised. Achenes oblong, to 6 mm long, somewhat angular, slightly oblique, white, with brownish longitudinal striations but

lacking transverse pattern, with sessile, cylindrical, usually 5-lobed tubercle at apex; pappus much shorter than corolla. Flowering June to August.

Steppes and low-lying areas.—*European Part*: Trans-Volga, Lower Volga; *Western Siberia*: Upper Tobol (southwestern part); *Soviet Central Asia*: Aralo-Caspian Region (northwestern part). Endemic. Described from Krasnoarmeisk (former Sarepta). Type in Leningrad.

20. **C. personata** (L.) Jacq. Fl. Austr. IV (1776) 25; Gaertn. De fruct. II, 378.—*C. arctioides* Vill. Hist. pl. Dauph. III (1789) 22, non Willd.—*Arctium personata* L. Sp. pl. (1753) 816.—**lc.**: Jacq. 1. c. tab. 348.

- 28 Perennial. Stem ribbed-sulcate, up to 100 cm high, grayish-brown, narrow-winged on ribs; wings spinulose along margin; somewhat pubescent. Lower leaves 20–25 cm long, on equally long petioles; middle leaves 10–15 cm long, 11–12 cm wide; upper leaves gradually reduced; lamina thin, dark green and subglabrous above, grayish-tomentose beneath over a larger part, less often gray from scattered arachnoid pubescence, pinnately veined with many thin veins, entire, less often pinnately parted, ovate, coarsely sinuate-toothed, sometimes serrate; teeth ciliate and prickly; peduncles terminal and axillary, spinulose to capitula, white-tomentose, ciliate, bearing many (3–4), rarely 1 capitulum, 1–3 subtending leaves below capitulum. Capitula medium-sized, 2.5 cm long, more or less clustered. Involucre shorter than florets, glabrous; outer involucral bracts subulately extended upward from broader base, ciliate; middle and innermost bracts linear, gradually narrowed into subulate tips; all bracts with distinct veins on inner side, slightly recurved, with slightly twisted non-prickly cusp. Corolla pinkish-violet or pale purple, limb irregularly incised, 1.0–1.5 cm long, slightly longer than pinkish-white anthers. Achenes 4 mm long, 1 mm wide, erect or slightly oblique, tapering toward base, often around tubercle with scar representing fallen corolla tube; pappus considerably shorter than corolla. Plant resembling burdock in appearance. Flowering July to August. (Plate II, Fig. 2.)

Shady places, in spruce forests, among mountain shrubs.—*European Part*: Upper Dniester. *General distribution*: northern Europe, Atlantic Europe. Described from western Europe. Type in London.

Note. This species is highly variable in the shape of the lower leaves. Some European authors denote the forms with entire leaves as f. *simplicifolius*, and with pinnately lobed leaves as f. *pinnatisectus*.

Series 3. Deflorati Tamamsch.—Almost nonprickly plants; peduncles long, wingless, lacking spines, densely grayish- or pinkish-

white pubescent; capitula medium-sized, 2.0–2.5–3.0 cm in dia, more or less flat-globose or oblong-globose.

This series is richly represented in Western Europe; some species are characteristic only of the flora of the Caucasus.

21. **C. glaucus** Baumg. Enum. stirp. Transsilyv. II (1816) 58; Klok. in Vozn. Rosl. URSR, 565.—*C. defloratus* var. *glaucus* Beck, Fl. Nied. Osterr. II (1893) 1233, Gugler in Mitteil. Bayer. Bot. Ges. II, 139.—*C. defloratus* ssp. *glaucus* (Baumg.) Hegi, Ill. Fl. VI, 2 (1929) 851.—**lc.:** Hegi, loc. cit. fig. 545.

Perennial. Stem 15–75 cm high, erect, usually simple below, some-
 29 times 2–3 times branched from middle, with narrow, usually unlobed wings, almost lacking leaves for more than 2/3 height or with small leaves. Lower leaves thick, grayish-green on both sides, with bluish tinge, obovate, obtuse, undivided, covered with sharp-pointed, thin, stiff cilia at apex; upper leaves small, undivided, less often slightly lobed, linear-lanceolate; peduncles not ribbed, cylindrical, somewhat virgate, appressed grayish-tomentose with 1, less often 2–3 capitula. Capitula drooping at flowering. Involucre 1.0–1.5 cm in dia below, hemispherical; outer involucral bracts small; middle much longer, 4 times as long as wide, abruptly narrowed at apex to cartilaginous spinule. Corolla lilac or pinkish carmine, apically irregularly incised. Achenes 4 mm long, slightly compressed laterally, yellowish-brown, with distinct transverse striations, obovate; pappus considerably shorter than corolla. Flowering June to September.

Mountains from 600 to 2,000 m, on stony limestone soils.—*European Part:* Upper Dniester. *General distribution:* central and southern Europe. Described from Austria. Type in Vienna.

22. **C. adpressus** C.A.M. Verzeichn. (1831) 71; DC. Prodr. VI, 627; Ldb. Fl. Ross. II, 722; Boiss. Fl. or. III, 518 p. p.; Grossh. Fl. Kavk. IV, 176.

Biennial. Stem finely sulcate, white-arachnoid-hairy, weakly branched, winged almost to tip; wing lobes small, deltoid, spinulose, arachnoid-hairy-lanate. Leaves decurrent, oblong, slightly and irregularly lobed, lobes finely spinose; lamina thin, light-green, lanate-tomentose beneath, with distinct veins; peduncles 2–3, not winged, white-tomentose, each with solitary medium-sized capitulum. Involucre not prickly; involucral bracts distinctly imbricate, appressed, unequal; outer bracts short, ovate, abruptly terminating in inconspicuous spinule; inner long, linear, scarious in upper part, with slightly divergent tip; all bracts arachnoid-hairy gray-pubescent along margin. Corolla pink or light-purple. Achenes grayish or light brown, 4 mm long,

with 5-angled tubercle at apex, sometimes with remnants of style, more or less obovate; pappus $1/2$ as long as corolla. Flowering August to September.

Mountain plant of alpine meadows and pastures.—*Caucasus*: Glavnyi [Main] Range (Eastern, Central). Endemic. Described from Kaishaur from Gutgora. Type in Leningrad.

Note. This is quite a rare plant. The report that this species is widely distributed is based on the fact that it is easily confused with *C. multijugus*, from which it is well distinguished by the appressed, imbricate, arachnoid-pubescent involucre bracts.

- 30 23. *C. multijugus* C. Koch in Linnaea, XXIV (1851) 392.—*C. laciniatus* Ldb. Fl. Ross. II (1846) 722; Tamamsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XV, 385; Kapeller in Fl. Gruzii, VIII, 468, non Lam. (1817).—*C. colchicus* Alb. Prodr. Fl. Colch. (1895) 142.—*C. kolakovskiyi* Sosn. in Vestn. Tifl. Bot. Sada, XLIX (1920) 37.—*C. innocuus* Kolak. Fl. Abkhazii IV (1949) 267 descr. ross. et auct. georg. non C.A.M. in schedis.

Biennial. Stem ribbed-sulcate, thickened below with very sparse arachnoid pubescence, corymbosely branched above, broadly winged almost to tip; lobes 1–2 toothed, deltoid, with thin sharp spinules. Leaves oblong-ovate, deeply pinnately parted, terminal lobe thrice, pinnately parted, spinose-ciliate, short-spinescent, glabrous or finely arachnoid-pubescent above; peduncles mostly with solitary capitulum wingless, finely, sparsely or densely pubescent. Capitula medium-sized, with subglabrous involucre. Outer and middle involucre bracts linear, cuspidate, with distinct midrib, in upper half recurved; inner bracts acute, with scarious, colored tip, midrib distinct only in lower half. Corolla light purple. Achenes gray, with darker, fine, longitudinal striations and small 5-angled sessile tubercle; pappus of white hairs, $1/2$ as long as corolla or longer. Flowering July to August.

Low-lying areas to mountain meadows and forest glades.—*Caucasus*: almost all regions. Endemic. Described from Makharadze (Ozurgeta). Type in Leningrad.

Note. The *C. innocuus* of Kolakovskiy and Kapeller belongs to this species. The specimens cited by these authors from Panyutin's collections completely confirm this fact. However, the real *C. innocuus*, whose authentic specimen, also preserved in Leningrad, was carefully examined by me, is a quite unusual specimen. Collected once in Karabakh (Southern Transcaucasia) by Sovich, this bristle-thistle gives the impression of an anomalous or hybrid form. This specimen has a rosette of quite large (about 17 cm) oblong basal leaves; cauline leaves, 7–8 cm long, hardly up to 6 mm wide in the middle; a lamina slightly

crenate with hard cilia on the margin, which generally are not characteristic of bristle thistles or are quite rare; stem simple, single, with solitary capitulum. The specimens collected by Panyutin from Western Transcaucasia have well developed spines; leaves characteristic for the genus, the width of the smallest leaves exceeding 2 cm; a basal rosette of leaves absent, and stem branched near tip; involucre bracts and capitulum as a whole quite similar to those in *C. multijugus*.

C.A. Meyer proposed the name *C. innocuus*, but refrained from publishing this species; his description was appended to Sovich's herbarium sheet. On the basis of the character of the more or less glaucous leaves, particularly the upper, entire linear ones with cilia, *C. innocuus* can be united with the European species *C. glaucus* Baumg.

24. *C. seminudus* MB. apud Willd. Sp. Pl. III, 3 (1803) 1657; ej. Fl. taur.-cauc. II, 271, III, 554; DC. Prodr. VI, 623; Ldb. Fl. Ross. II, 720; Boiss. Fl. or. III, 520; Grossh. Fl. Kavk. IV, 176; Kapeller in Fl. Gruzii, VIII, 471; Isaev in Fl. Azerb. VIII, 385.—**lc.**: MB. Cent. II, tab. LXXV.

Biennial. Plant to 50–60 cm high. Stem slender, simple and slightly ribbed below, finely sulcate, pubescent, slightly winged, wing lobes small with thin spines, branched above; branches straight, long. Leaves lanceolate, crenate-toothed, spinose-small-toothed, decurrent; lower leaves broad, their lamina thin, subglabrous above, tomentose-pubescent beneath; peduncles very long, more than 1/2 as long as entire stem, not winged, slender, cylindrical, finely sulcate, densely white-tomentose when young, later becoming irregularly spinose-pubescent. Capitula solitary, to 3 cm in dia and 2.0–2.5 cm long. Involucre subglabrous; involucre bracts very sparsely arachnoid-pubescent along margin, often purple; outermost bracts shorter, middle longer, subulate, more or less spinescent; inner-most linear, acute, finely ciliate, purple outside, pearl-pink inside, with distinct midrib and pseudo-glandular hairs in upper part. Corolla pink or pale-purple, irregularly incised. Achenes grayish-yellow, with thin longitudinal brown striations, and distinctly 5-lobed tubercle at apex; pappus shorter than corolla and equal to or slightly longer than involucre bracts. Flowering July to August.

Dry places, among xerophytic shrubs.—*European Part*: Crimea, Lower Don; *Caucasus*: all regions; *Soviet Central Asia*: Karakum (rarely). *General distribution*: Balkans-Asia Minor, Iran. Described from Kizlyar. Type in Leningrad.

Note. Like most of the species of this genus, it is a fairly polymorphic species, widespread throughout the Caucasus. A particularly

interesting form is found in Pirchevan in the Zangelansk Region, with broad thin leaves (var. *foliosus*).

25. *C. kernerii* Simk. in Term. fuz. × (1886) 181; Klok. in Vozn. Rosl. URSR, 565.—*C. nigrescens* Baumg. Enum. stirp. Transsilv. II (1816) 56; Fuss, Fl. Transsilv. excurs. 362, non Willd.—*C. hamulosus* Czetz. in Erd. Mus. VI (1872) 12, non Ehrh.—*C. transilvanicus* Borb. in Oest. bot. Zeitschr. XXXV (1886) 274.—*C. defloratus* var. *kernerii* Gugler in Mitteil. Bayer. Bot. Ges. II (1908) 139; Hegi, Ill. Fl. VI, 2, 854.

32 Biennial or perennial. Plant to 50–60 cm high stem ascending, straight, cylindrical, finely sulcate, almost always simple, leafy in lower 2/3, slightly pubescent, narrowly winged; wings spiny, merging with decurrent leaf. Basal leaves long-petiolate, 6–10 cm long, 3–4 cm wide, ovate or oblong; upper leaves reduced, to 2–3 cm long, narrowly lanceolate, often with long, almost linear terminal lobe; lamina pinnately lobed or pinnately dissected into lanceolate lobes; lobes entire in lower part of leaf and unevenly crenate in upper part with short and thin spines, sometimes slightly incurved, glabrous, finely arachnoid-pubescent beneath, particularly on midrib; peduncles long, not winged, pinkish-white-tomentose, densely lanate above and less so beneath. Capitula medium-sized, 2.5–3.0 cm long, subglobose. Involucre considerably shorter than florets; involucre bracts glabrous, sometimes pubescent only on margin on inner side; outer bracts lanceolate, with short cusp and distinct midrib; middle and innermost bracts linear, acute, pinkish, lacking spiny cusp, with dark midrib. Corolla pink, to 2 cm long; limb irregularly incised. Achenes to 0.5 cm long, light-brown, with distinct, darker, transverse striations, and small apical tubercle; pappus hairs lacking distinct barbs, considerably shorter than corolla. Flowering July to August.

Meadows and pastures.—*European Part*: Upper Dniester (Eastern Carpathians). *General distribution*: southern and Central Europe. Described from Carpathians. Type in Budapest.

Economic Importance. A very elegant plant that can be used as an ornamental.

Section 3. Stenocephalus Rouy, Fl. Fr. IX (1905) 70.—Capitula 1.2–1.7 cm, less often 2.0–2.5 cm long; involucre oblong, cylindrical, narrowly campanulate or narrowly obconical. Annuals, usually with readily falling capitula and small, slightly and almost uniformly incised lobes of narrow corolla.

Type of section: *C. pycnocephalus* L.

Series 1. Pycnocephali Tamamsch.—Involucral bracts pubescent, appressed or recurved, never lustrous, usually lacking scarious margin, sometimes with thicker tip, abruptly narrowed to short spine.

26. *C. pycnocephalus* L. Sp. pl. ed. 2 (1763) 1151; Geideman, Opred. Rast. Mold. SSR, 286.—*C. pycnocephalus eupycnocephalus* Jacq. Hort. Vindob. I (1770) 17.—*C. tenuiflorus* γ . *pycnocephalus* DC. Prodr. VI (1837) 626.—*l.c.*: Jacq. loc. cit. tab. 44.

Annual. All plants light-green; stem 90–100 cm high, usually straight, branched, less often simple, white-tomentose, narrowly winged, discontinuously spiny-winged. Leaves pinnately lobed or sinuate-pinnate, with palmate or deltoid lobes and small divergent secondary lobes, terminating in subulate spine, spinose-ciliate with spines to 1 cm long, slightly arachnoid-pubescent above, more densely pubescent beneath; upper leaves decurrent. Capitula readily falling, on white-tomentose, narrowly winged peduncles in clusters of 2–5, almost cylindrical, 2.0–2.5 cm long, 1–2 cm in dia. Outer involucral bracts lanceolate, gradually and indistinctly extended into triangular, recurved spine, dorsally yellowish because of small pseudo-glandular hairs, ventrally greenish, with not so prominent midrib; middle and inner-most bracts narrowed to short spine, 3–5 veined, light-colored on margin, narrowly scarious, short-ciliate all over surface and margin. Florets purple; corolla 16.0–16.5 mm long, limb almost uniformly incised, 5–6 mm long, exceeding inner involucral bracts and pappus; stamens including appendages 5–6 mm long. Achenes 5–6 mm long, 1.5–2.0 mm wide, yellowish-gray, with indistinct, darker, longitudinal striations, lustrous, with round or slightly angular, sessile tubercle; pappus white, its bristles serrate, 2–3 times as long as achene. Flowering May to July.

Sunny places, on uncultivated and fallow fields.—*European Part*: Upper Dniester (rarely), Bessarabia. *General distribution*: southern Europe. Described from southern Europe. Type in London.

27. *C. beckerianus* Tamamsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XV (1953) 383.—*C. cinereus* var. *amblyolepis* Trautv. in Tr. Peterb. Bot. Sada, I, 1 (1871) 19.—*C. knorringianus* Tamamsch. loc. cit. 384 and in Fl. Turkm. VII (1960) 238.

Annual. Plant to 70–80 cm high. Stem ribbed, slightly angular, on ribs discontinuously spiny-winged; on edges slightly sulcate, glabrous below or sparsely arachnoid-hairy or pubescent to tip, sometimes not winged at apex but with solitary long spines. Lower leaves decurrent, subsessile or on winged petioles, deeply and pinnately to sinuately lobed, oblong; lobes remote, deltoid, 3-toothed, with thin sharp spines; lamina thin, somewhat sparsely puberulent or subglabrous above, finely

grayish arachnoid-pubescent beneath; peduncles white or grayish-tomentose to capitula but always with small leaves below capitulum, sometimes modified into acute lanceolate cusp. Capitula small, 2.5 cm long, 1.0–1.5 cm in dia, ovate till flowering, more or less cylindrical at dehiscence, in clusters of 3(2–4), readily falling. Involucre lacking long gray hairs, appearing glabrous; involucre bracts with colored tips, with somewhat raised, violet, purple, brownish or bright spot, and brighter and prominent midrib; outermost bracts ovate, abruptly narrowed to short spine, less often narrowly lanceolate, except in upper part covered with yellow pseudo-glandular hairs; inner bracts longer, with lighter scarios appendage at tip, slightly fimbriate along margin. Corolla pink, scarcely exceeding involucre. Achenes small, lustrous
 34 white or light-gray, 1.0–1.5 (2.0) mm long, 1 mm wide, more or less flat, with indistinct, very sparse, longitudinal striations and transverse zigzags, with small tubercle lacking distinct lobes or edges; pappus hairs barely scabrous, longer than involucre bracts and equaling or exceeding corolla. Flowering May to August. (Plate III, Fig. 2.)

Dry wastelands, in ravines, old cotton fields.—*Caucasus*: Eastern Transcaucasia; *Soviet Central Asia*: mountainous Turkmenia; *General distribution*: northern Iran. Described from Lenkoran. Type in Leningrad.

28. *C. cinereus* MB. Fl. taur.-cauc. II (1808) 270, III (1819) 554; DC. Prodr. VI, 624; Ldb. Fl. Ross. II, 721; Grossh. Opred. Rast. Kavk. 479.—*C. pycnocephalus* δ . *cinereus* Boiss. Fl. or. III (1875) 521.—*C. pycnocephalus* γ . *cinereus* Schmalh. Fl. II (1897) 98; Grossh. Fl. Kavk. IV, 174.

Annual. Stem sulcate, short-grayish-pubescent, more or less winged and spiny below, not winged above, branched. Leaves slightly pubescent above, sometimes subglabrous, finely grayish-tomentose beneath; lower leaves to 20 cm long, 6–7 cm wide, on winged petioles, pinnately-sinuate lobed, lower lobes acute deltoid, increasing in size, with long cusp; middle and upper leaves to 10–12 cm long, oblong, often with lanceolate upper lobe, usually less lobed, thin. Peduncles long, almost always not winged, densely white-tomentose, bearing 1, less often 2–3 capitula, but then middle capitulum usually larger than others. Involucre almost equaling florets, grayish-pubescent; capitula cylindrical, often on much longer secondary peduncles, involucre bracts erect, appressed in flowering and fruiting capitula, slightly divergent, but not recurved, lanceolate-linear, with indistinct midrib; inner bracts scarios, with short pseudo-glandular pubescence in lower part. Corolla pink, its limb uniformly incised. Achenes obovate, almost white or light gray, with or without fine, indistinct, longitudinal striations,

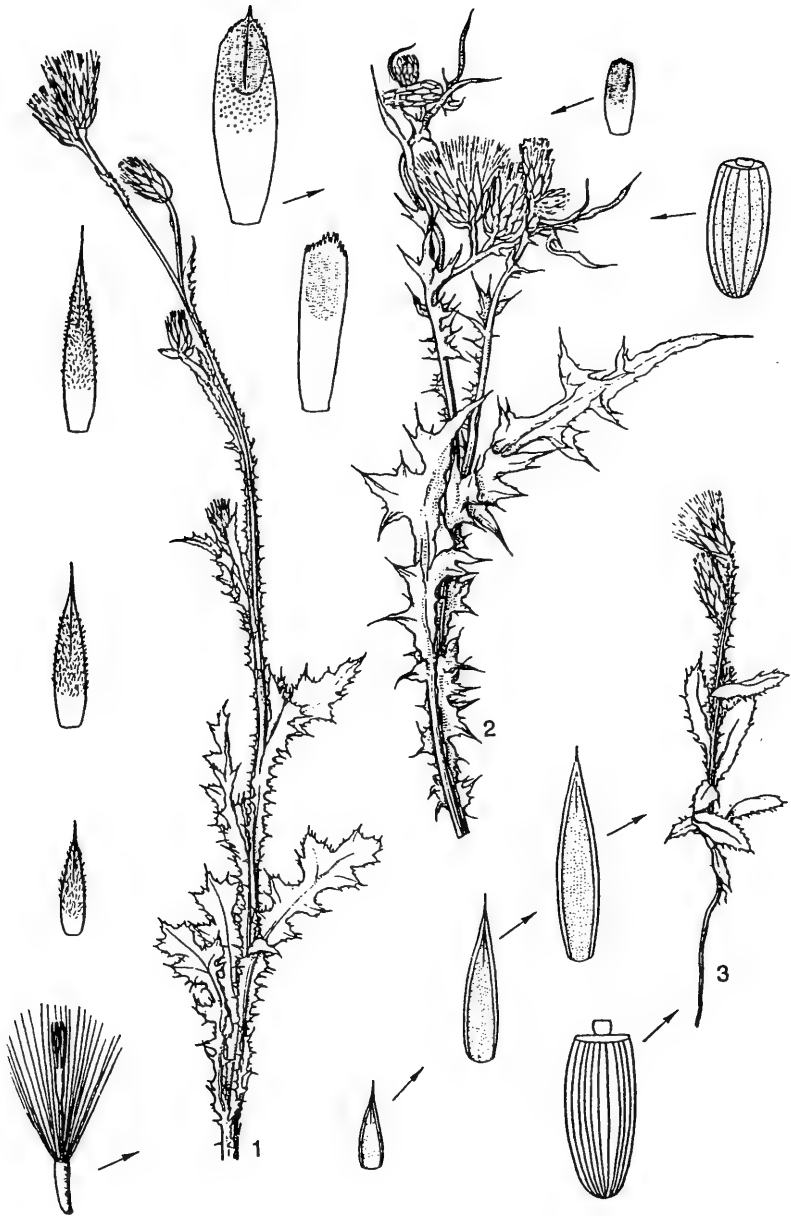


Plate III.

1—*Carduus cinereus* MB.; 2—*C. beckerianus* Tamamsch.; 3—*C. nikitinii* Tamamsch.

very small, 3–4 mm long; pappus equaling or longer than inner involucre bracts and equaling corolla. Flowering June to July. (Plate III, Fig. 1.)

Fallows fields and uncultivated places.—*European Part*: Lower Volga, Crimea; *Caucasus*: Ciscaucasia, Eastern and Southern Transcaucasia; *Soviet Central Asia*: mountainous Turkmenia. *General distribution*: Iran. Described from Kizlyar. Type in Leningrad.

29. *C. arabicus* Jacq. apud. L. Syst. ed. 14 (1784) 724; Collect. I, 56; Willd. Sp. pl. III, 3, 1647; DC. Prodr. VI, 626; Grossh. Opred. Rast. Kavk. 479.—*C. arabicus* var. *albidus* Grossh. Fl. Kavk. IV (1934) 174.—*C. albidus* MB. Fl. taur.-cauc. II (1808) 269, III (1819) 554 p. p.; C.A.M. Verzeichn. 71; Grossh. Opred. Rast. Kavk. 479; Kapeller in Fl. Gruzii, VIII, 473.—*C. pycnocephalus* C. Koch in Linnaea, XVII (1843) 42, non L.—*C. pycnocephalus* γ . *arabicus* Boiss. Fl. or. III (1875) 521.—*C. pycnocephalus* β . *albidus* Boiss. 1. c.—*C. tenuiflorus* β . *albidus* DC. Prodr. VI (1837) 626.—*C. cinereus* Arènes in Not. Syst. Paris, XV, 4 (1959) 396, non MB.

Annual. Stem slender, ribbed and slightly sulcate, grayish- or whitish-pubescent, almost not winged below, continuously broadly winged in upper half; wings with stiff spines along margin, 3–10 mm long. Leaves decurrent, 15–20 cm long, somewhat reduced upward but present up to apex; lamina thin, pubescent above with long, gray hairs or denser white hairs; finely grayish-arachnoid-hairy or densely white-pubescent beneath, unevenly pinnately lobed; lobes distinct, broadly deltoid, reduced toward base, irregularly sinuate-toothed, 5–7 toothed, with prominent midrib extended into spine, 2–3 cm long in subtending leaves; peduncles densely tomentose, winged or densely spinose, axillary with 2–5 small capitula clustered at base, sometimes readily falling; immature capitula borne racemosely on short secondary peduncles. Involucre narrowly conical-campanulate; involucre bracts in unopened capitula erect or slightly recurved, imbricate at flowering, somewhat sparsely or densely white-pubescent; outer bracts ovate or more or less oblong-ovate, mucronate, with short, straight or slightly recurved spine and prominent midrib; middle bracts obtuse, terminating in spine; inner bracts oblong, narrowed into cuneate tip, with or without weak spine, white-scarious along margin, with 3–5 thin but distinct veins, darker in upper half than lower, covered, like outer bracts, with pseudo-glandular hairs. Corolla pink or bright purple, 11–12 mm long; corolla tube 6.5–7.0 mm long including limb, lobes 4–5 mm long. Achenes creamish or light-brown, lustrous, with thin longitudinal striations, 5–6 mm long, 1.0–1.5 mm wide, with small deciduous tubercle. Flowering May to July.

Weedy places, long-fallow fields, dry habitats.—*European Part*: Crimea, Trans-Volga, Lower Don, Lower Volga (rarely); *Caucasus*: Ciscaucasia, Dagestan, Eastern and Southern Transcaucasia; *Soviet Central Asia*: mountainous Turkmenia (rarely). *General distribution*: Atlantic Europe (eastern part), Armenia and Kurdistan, Iran. Described from Arabia. Type in Paris.

Note. J. Arènes (1959) considers that the species *C. albidus* and *C. cinereus*, described by Bieberstein, should be regarded as forms of *C. pycnocephalus* belonging to ssp. *pycnocephalus*. Furthermore, he thinks it is possible to refer the first species (*C. albidus*) to var. *pycnocephalus* and the second to var. *arabicus*. Having at my disposal the type specimens of Bieberstein, I cannot agree with such an interpretation. *C. albidus* MB. and *C. cinereus* MB. are well distinguished from each other not only by the pubescence of the involucre bracts and the structure of the peduncles, but also by the relative proportions of the corolla parts, to which great taxonomic importance is accorded by Arènes himself, and also by the achenes, to which he did not pay attention. In *C. cinereus* the achenes are little more than 1/2 as long as in *C. albidus*, not only in the type specimens of Bieberstein, but also in the numerous specimens examined by me in the Caucasian Herbarium. Only in one specimen of *C. cinereus*, collected in the Nakhichevan ASSR, did I find achenes almost as long as in *C. albidus*. Without entirely supporting Arènes and his broad interpretation of *C. pycnocephalus*, I agree with him in one respect that the separate species status of *C. albidus* is not justified. Therefore, I combine this species with *C. arabicus* Jacq., but do not refer it to *C. pycnocephalus* ssp. *pycnocephalus* var. *pycnocephalus*, as Arènes did. So far as *C. cinereus* is concerned, it is hardly possible to include it in var. *arabicus*, because it differs in many characters from both *C. pycnocephalus* s. str. and *C. arabicus* sensu Jacquin. Rather, it could be identified with the Mediterranean species *C. argentatus* L., which is widely distributed in the eastern Mediterranean region. The forms found in Nakhichevan, although close to this species, however, give the impression of hybrid forms that have arisen, possibly, as a result of the crossing of *C. cinereus* with *C. nervosus*.

Series 2. Tenuiflori Tamamsch.—Involucre bracts subglabrous or slightly pubescent, often green after flowering, lustrous, with narrow, more or less scarious margin.

This series includes 4–5 species from Western Europe and two species in the USSR—in the Caucasus and Soviet Central Asia.

30. *C. nikitinii* Tamamsch. in Addenda XXVII, 600.—*C. cinereus* var. *pusilla* Tamamsch. in Fl. Turkm. VII (1960) 238, diagn. ross.

Annual. Plant 5–15 cm high; stem slightly angular, covered with small leaves and spines to capitula, grayish-pubescent below, simple or occasionally with few branches. Leaves 2–4 cm long, on decurrent, winged, prickly petioles, grayish-pubescent on both sides with long flexuous hairs and prominent, riblike, whitish midrib beneath, irregularly and weakly crenate, with shorter as well as longer spines; peduncles cylindrical, white-tomentose, with 1 or 2 sessile capitula. Capitula few-flowered (8–9 flowers), truncate, turbinate. Involucre 4–5-seriate, distinctly imbricate; outer involucral bracts broadly ovate, with distinct midrib in upper half, narrowed into short spine; middle bracts oblong-ovate, inner longer, linear-lanceolate, darker at tip, with 3 distinct veins; all bracts greenish, glabrous, lacking long hairs in lower part, covered with short pseudo-glandular hairs, narrowly membranous along margin. Corolla 10–11 mm long, pale purple, slightly zygomorphic; corolla tube including limb 7–8 mm long. Achenes 5–6
38 mm long, 1.0–1.5 mm wide, obovate, slightly compressed, somewhat oblique in lower part, dull-white, with fine, darker, longitudinal striations in upper part and large, up to 1.0–1.5 mm-long, cylindrical, long persistent, indistinctly 5-angled, brownish tubercle; pappus dull white, 2–2.5 times longer than achene, exserted from involucral bracts and longer than corolla. Flowering April to June. (Plate III, Fig. 3.)

Dry talus slopes.—*Soviet Central Asia*: mountainous Turkmenia, Kara-Kum. Endemic. Described from Kopetdag. Type in Leningrad.

31. *C. nervosus* C. Koch in Linnaea, XVII (1843) 42, XXIV (1851) 391; Ldb. Fl. Ross. II, 722; Boiss. Fl. or. III, 521; Grosch. Fl. Kavk. IV, 175; Oprod. Rast. Kavk. 479, p. p.

Annual. Plants 30–40 cm high; stem ribbed, irregularly winged, narrowly winged above, wings broader and prickly below. Leaves linear or oblong, with narrowly winged petiole, pinnately lobed, spiny along margin, lobes deltoid, 3–5-toothed, spiny, light green, with prominent midrib beneath. Peduncles long, bearing 3–6-capitula at tip, less often capitulum 1. Involucre more or less broad, cylindrical, in early stages bracts contiguous with short erect cusp; involucral bracts imbricate, subglabrous, ovate-lanceolate; outer bracts shorter, mucronate; inner acute, colored; all bracts covered all over, except midrib, with fine, yellowish pseudo-glandular hairs; innermost bracts very long, equaling pinkish corolla. Achenes 6 mm long, gray, oblong, slightly compressed and oblique, with quite distinct 5-angled tubercle; pappus of more or less silky grayish or dull-white, finely scabrous hairs, as long as inner involucral bracts and corolla. Flowering June to July.

Semidesert arid areas.—*Caucasus*: Southern Transcaucasia.
General distribution: Iran. Described from Echmiadzin. Type was in Berlin.

Note. This species has been interpreted quite differently by Caucasian botanists. There are specimens in the Caucasian herbaria with a completely different habit and characters, which are identified by D.I. Sosnowsky and A.A. Grossheim as *C. nervosus* C. Koch. Initially, Koch himself (1843) reported that this species occupied an intermediate position between *C. onopordioides* Fisch. ex MB. and *C. tenuiflorus* DC., but is much closer to the first species. In the addendum to "K Izucheniyu Flory Vostoka" [The Study of Flora of the East] (1851) he noted that the capitula of *C. nervosus* are considerably larger than those of *C. onopordioides* and compared them with the capitula of *C. confertus* and *C. fasciculiformis* from the affinity of *C. pycnocephalus* L. Boissier related *C. nervosus* to the annual bristle-thistles of the *C. pycnocephalus* type. In the Caucasian Herbarium of the Botanical Institute of the Academy of Sciences of the USSR, there is a specimen with a label on which in Meyer's handwriting is written "*C. onopordioides*, Echmiadzin legit et determinavit Koch 1837," and at the bottom, "*C. nervosus*." I took this specimen as the basis for clarifying the species *C. nervosus*. It must be stated that in this specimen, the capitula are really similar in size and form (more or less cylindrical) to those of the European species *C. tenuiflorus*, but they are not larger than those of *C. onopordioides* Fisch. ex MB.

The presence of a large number of intermediate forms between the species, particularly in the last section, testifies to the extensive hybridization occurring in the genus *Carduus*. Below I cite a number of the intermediate forms found in the USSR, but it undoubtedly is possible to find hybrids between other species too. The genera *Galactites* and *Cirsium*, close to the genus *Carduus*, apparently also have species that cross with bristle-thistle species. Attempts to erect the genus *Carduicirsium* are well-known in the literature. Sennen described three species that were later transferred to the genus *Carduus* by Fournier (1940). Arènes, in 1942, described *Cirsiicarduus lutetianus*—a hybrid between *Cirsium vulgare* (Savi) Ten. ssp. *savianum* and *Carduus tenuiflorus*. The hybrid between *Carduus* and *Galactites*, described as *Carduiga-lactites ludoviciana*, was transferred to the genus *Galactites* by Fournier.

Natural hybrids found in our flora are as follows:

1. *C. acanthoides* L. × *C. crispus* L.
2. *C. acanthoides* L. × *C. nutans* L.
3. *C. acanthoides* L. × *C. personata* (L.) Jacq.
4. *C. cinereus* MB. × *C. nervosus* C. Koch.

5. *C. crispus* L. × *C. nutans* L.
6. *C. crispus* L. × *C. personata* (L.) Jacq.
7. *C. hamulosus* Ehrh. × *C. nutans* L.
8. *C. hamulosus* Ehrh. × *C. onopordioides* Fisch. ex MB.
9. *C. nervosus* C. Koch × *C. onopordioides* Fisch. MB.
10. *C. nutans* L. × *C. onopordioides* Fisch. ex MB.
11. *C. nutans* L. × *C. personata* (L.) Jacq.

GENUS 1590. **Alfredia** Cass.^{1,2}

Cass. in Bull. Soc. Philom. Paris (1815) 175.

Capitula homogamous, large, many-flowered. Involucral bracts with more or less coriaceous or membranous, marginal, incised appendages, spinescent in outer bracts, spatulate in inner ones, or outer bracts spinescent and inner with toothed, acute-tipped appendage. Receptacle densely covered with bristles. All florets tubular, actinomorphic, bisexual, with short tube and short almost equally 5-parted limb; corolla long, narrowly tubular with short tapering lobes distinctly incurved. Basal appendages of anthers setose, truncate, in lower part, short; filaments free, glabrous or slightly tuberculate. Style exerted, unbranched almost to tip, covered with short papillae. Pappus many-rowed; pappus bristles connate at base in ring, unequal, fragile, mostly pale yellow, barbed, inner bristle longer, slightly flattened apically; achenes obconical, 6 mm long, compressed, straight, glabrous, dull, with basal or slightly oblique hilum. Perennial herbs with long-petiolate lower leaves.

Type of genus: *A. crenua* (L.) Cass.

1. All involucral bracts broad, membranous, golden, short, spinescent, toothed; leaves undivided, ovate-cordate; cauline leaves with winged petiole, basally expanded, amplexicaul.....1. **A. cernua** (L.) Cass.
- + Involucral bracts coriaceous; outer bracts entire or spiny-ciliate, acuminate-spinescent; middle bracts discontinuously ciliate on margin with scarious appendages.....2.
2. Cauline leaves sessile, oblong-lanceolate, more or less semi-amplexicaul, mostly pinnately lobed.....3. **A. nivea** Kar. and Kir.
- + Leaves lyrate with large terminal lobe.....2. **A. acantholepis** Kar. and Kir.

¹Treatment by M.M. Iljin and G.L. Semidel.

²Named after Alfred.

Section 1. Alfredia.—Sect. *Malacolepis* Ldb. Fl. Ross. II (1846) 754.—Involucral bracts with membranous appendages; outer bracts spinescent, spatulate; middle with orbicular, inner with spatulate apical appendage; bracts with undeveloped apical spines.

Type of section: type of genus.

1. *A. cernua* (L.) Cass. in Bull. Soc. Philom. Paris (1815) 175; Iljin in Izv. Glavn. Bot. Sada, XXIII, 2, 127.—*Cnicus cernuus* L. Sp. pl. (1753) 826.—*Silybum cernuum* Gaertn. De fruct. II (1791) 378.—*Alfredia squarrosa* Tausch in Flora, XIX (1836) 396.—*A. stenolepis* Kar. and Kir. in Bull. Soc. Nat. Mosc. XIV (1841) 452.—*Carduus cernuus* Patr. in Fl. alt. IV (1833) 43.— *Ic.:* Gmel. Fl. sibirica, II (1749) tab. XIX; Gaertn. loc. cit. tab. 162. fig. 2; Iljin, loc. cit. Plate III, Fig. 1.

Perennial. Plant 1–3 m high; rhizome very short, with septa inside as in water hemlock, with numerous adventitious roots. Stem single, highly branched at tip, thick, sulcate, pale purple, hollow, slightly arachnoid-hairy, sparsely pubescent with crisped hairs. Lower leaves long-petiolate, 25–50 cm long, 15–30 cm wide; petioles basally thickened, narrowly winged, spiny on sides; lamina ovate-cordate or oblong, acute, crenate-finely toothed, with small spine-like teeth, green, 41 subglabrous, scabrous, with occasional crisped hairs above, gray- or white-tomentose beneath with greenish veins. Capitula numerous, terminal, drooping, 40–50 mm long; involucre many-rowed, with numerous bracts, narrow below, linear, on inner side with blackish hairs, expanded above into membranous golden-yellow, more or less fimbriate, appendage; innermost bracts to 25 mm long, with smaller oblong-ovate, obtuse appendage; inner bracts with appendages 5–10 mm wide; middle bracts with smaller appendages terminating in flat tubercle, outermost small, lanceolate, acute, with narrow, sometimes fimbriate, mostly recurved appendages. Corolla yellow, glabrous, about 18 mm long, with limb to 2 mm long. Pappus many-rowed, with slightly unequal, scabrous, fragile, pale yellow bristles; inner ones longer, apically somewhat flattened. Achenes 6–7 mm long, compressed narrowed below, glabrous, entirely striate. Flowering July; fruiting August to September.

Montane taiga, larch-birch-aspen forests, thickets of shrubs.—*Western Siberia:* Altai, Irtysh (eastern part); *Soviet Central Asia:* Dzhungaria-Tarbagatai. *General distribution:* Dzhungaria-Kashgaria. Described from Siberia. Type—Illustration by Gmelin.

Section 2. Acantholepis Kar. and Kir. in Bull. Soc. Nat. Mosc. XV (1842) 394.—All involucral bracts coriaceous, lanceolate or

oblong-linear; outer bracts basally spiny-ciliate, narrowed into short spine; middle bracts with fimbriate margin, spiny; inner ones entire at base, with toothed scarious appendage and slightly enlarged apex.

Type of section: *A. acantholepis* Kar. and Kir.

2. *A. acantholepis* Kar. and Kir. in Bull. Soc. Nat. Mosc. XV (1842) 394; Iljin in Izv. Glavn. Bot. Sada, XXIII, 2, 130.—*A. karelini* Ldb. Fl. Ross. II (1846) 754.—*A. tianschanica* Rupr. in Mem. Acad. Sc. Petersb. ser. VII, XIV, 4 (1869) 56.—*Carduus acantholepis* Benth. in Benth. and Hook. f. Gen. pl. II (1873) 468.—*C. tianschanicus* B. Fedtsch. Rast. Turk. (1915) 754.—**lc.**: Iljin, loc. cit. Plate III, Fig. 3.

Perennial. Plant 40–50 cm high, usually with many stems. Stems erect, simple or weakly branched, sulcate, mostly pale purple, covered, particularly at base, with flexuous hairs. Leaves bright green above, slightly rough, usually covered with flexuous hairs, grayish- or whitish-tomentose beneath; lower leaves long-petiolate, with petioles expanded at base and spiny below along margin, 15–40 cm long, lyrate, with very large, ovate or oblong-ovate, obtuse terminal lobe, 5–12 cm wide, crenate-toothed, with short, spinulose teeth, lateral lobes gradually disappearing nearer to base of lamina; middle leaves short-petiolate, petioles broadly-winged, amplexicaul, upper leaves acuminate, sessile. Capitula numerous, 4–6 cm long; involucre many-rowed, slightly floccose-arachnoid-hairy, with numerous stiff strongly spinescent bracts; outer bracts covered with black hairs; outermost spinose-ciliate, usually recurved; middle bracts with fimbriate margin or entire below but fimbriate above; inner bracts entire, lacking appendage, small-toothed at apex. Corolla glabrous, 20–23 mm long, with tube 7–10 mm and limb lobes 3–4 mm long, latter slightly recurved. Basal appendages of anthers 2–4 mm long, broadly setose; apical appendages 1.5–2.0 mm long; filaments glabrous, slightly tuberculate. Pappus many-rowed with unequal, fragile, toothed, pale yellow bristles; innermost bristles apically somewhat flattened. Achenes about 6 mm long, turbinate, compressed, glabrous, slightly wrinkled. Flowering July; fruiting August.

Spruce-fir forests, forest and subalpine meadows, rocks.—*Soviet Central Asia*: Tien Shan, Dzhungaria-Tarbagatai. *General distribution*: Dzhungaria-Kashgaria. Described from Dzhungarian Alatau. Type in Moscow.

3. *A. nivea* Kar. and Kir. in Bull. Soc. Nat. Mosc. XV (1842) 395; Iljin in Izv. Glavn. Bot. Sada, XXIII, 2, 133.—*A. suaveolens* Rupr. in Mém. Acad. Sc. Pétersb. Sér. VII, XIV, 4 (1869) 56.—*A. dolicholepis* Schrenk ex Iljin, *ibid.* pro syn.—*Carduus karelini* B. Fedtsch. Rast. Turk. (1915) 754.—*C. suaveolens* B. Fedtsch. *ibid.* 754.—*Cousinia*

trautvetteri Rgl. in Tr. Peterb. Bot. Sada, V, 1 (1877) 257.—*Arctium niveum* O. Ktze. Rev. gen. I (1891) 307.—**lc.**: Iljin, loc. cit. Plate III, Fig. IV, VI, VIa, VIIIc, IX.

Perennial. Plant 20–100 cm high, erect; stem erect, weakly branched, sulcate, usually pale purple, floccose-arachnoid-hairy. Leaves coriaceous, oblong-lanceolate, pinnately lobed, rarely toothed, lobes and teeth strongly spinescent with yellowish spines, greenish, glabrous, or subglabrous above, most often sparsely arachnoid-hairy, with yellowish, somewhat prominent veins terminating in spines, white-tomentose, rarely grayish-tomentose beneath, with prominent veins; lowermost leaves petiolate, 15–45 cm long and 4–10 cm wide; petioles flat, narrowly winged, spiny above on margin, at base slightly enlarged; lamina narrowed toward base; middle and upper leaves acuminate, sessile, often amplexicaul. Capitula drooping, 4–7 cm long; involucre many-rowed, with quite numerous, almost coriaceous, linear-lanceolate spinescent bracts, covered on outer side with black hairs; outermost bracts spiny-ciliate at base, entire above, less often entire throughout, dorsally often more or less arachnoid-hairy and somewhat divergent; 43 middle bracts scariously fimbriate in middle, terminating in acute short spine; inner bracts long, narrowly-linear, almost lacking appendages or slightly ciliate only at apex. Corolla purple, very rarely yellowish, glabrous, 21–26 mm long; tube 7–10 mm, with limb lobes 2–4 mm long. Basal appendages of anthers strongly incised, broad, usually 3(1–3) mm long; apical appendages about 2 mm long. Pappus many-rowed, of unequal, fragile, barbed, pale yellow bristles; inner bristles longest, flattened at tip. Achene 6–7 mm long, obconical, compressed, entirely striate, often transversely rugose. Flowering July; fruiting August to September.

Mountain steppes, spruce forests, rocks; subalpine and alpine zones.—*Soviet Central Asia*: Tien Shan, Dzhungaria-Tarbagatai. *General distribution*: Dzhungaria-Kashgaria. Described from Dzhungarian Alatau. Type in Leningrad.

Note. The species is quite polymorphic; *f. macrantha* Iljin is particularly distinct by its large size and longer, stiff involucral bracts.

GENUS 1591. *Olgaea* Iljin^{1,2}

Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, III, (1922) 141.

Capitula homogamous, with coriaceous spiny bracts. Receptacle

¹Treatment by M.M. Iljin.

²The genus named in honor of Olga Aleksandrovna Fedtschenko (1845–1921).

covered with bristles. Florets numerous, all bisexual, with tubular 5-parted corolla; lobes at tip somewhat uncinat. Basal appendages of anthers setaceous; stamen filaments glabrous. Style branches obtuse, short, slightly divergent, covered with papillae, branched below, with tuft of bristles at base. Pappus bristles many, connate at base in ring, unequal, fragile, barbed; innermost bristles longer, slightly sulcate above. Achenes oblong or obpyramidal, glabrous, longitudinally finely sulcate, with basal hilum. Perennials with coriaceous leaves.

Type of genus: *O. baldshuanica* (Winkl.) Iljin.

1. Involucral bracts arcuately or uncinately recurved; leaves almost always glabrous above, sometimes downy mainly on veins, green, lustrous.....2.
- + Involucral bracts not arcuately recurved, erect, or spreading-erect....4.
2. Outer and, in part, middle involucral bracts with lateral prickles at base and on spines (western Tien Shan and Karatau).....8. **O. pectinata** Iljin
- + All involucral bracts lacking lateral prickles.....3.
- 44 3. Involucral bracts coriaceous, abruptly broadened in lower part, in outer and, in part, middle bracts terminating in stiff and arcuate spine. Cauline leaves sparse, with roundish auricles at base (Tadzhikistan).....9. **O. baldshuanica** (Winkl.) Iljin
- + All involucral bracts, except innermost, distinctly arcuate, with thin spines. Cauline leaves dense, lacking roundish auricles surrounding on stem, subtend capitulum (Fergana Ridge).....3. **O. vvednskyi** Iljin
4. Basal leaves exceeding stem and capitula together; leaves pectinately cut into narrow lobes.....4. **O. longifolia** (Winkl.) Iljin
- + Basal leaves never reaching capitula; leaves larger, mostly with deltoid lobes.....5.
5. Leaves green and glabrous above, rarely somewhat arachnoid along veins; white arachnoid-tomentose beneath.....6.
- + Leaves on both sides green and slightly floccose-arachnoid. Outer involucral bracts arcuately recurved.....8.
6. Capitula on very short peduncles, but not in compact, globose heads; involucre loosely tomentose such that all outer bracts entirely visible.....2. **O. nivea** (Winkl.) Iljin
- + Capitula in compact heads, occasionally lower capitula solitary on short branches; involucre always densely tomentose, only spines exerted from tomentum.....7.
7. Plants not branched, capitula always in heads (Eastern Tien Shan).....5. **O. lanipes** (Winkl.) Iljin

- + Plants often branched above in inflorescence; capitula on short peduncles, sometimes upto 10 cm long (Central Tien Shan)6. **O. nidulans** (Rupr.) Iljin
- 8. Involucre glabrous or subglabrous.....7. **O. spinifera** (Winkl.) Iljin
- + Involucre densely arachnoid-tomentose.....1. **O. eriocephala** (Winkl.) Iljin

1. **O. eriocephala** (Winkl.) Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, III (1922) 142; in Izv. Glavn. Bot. Sada, XXIII, 2, 141.—*Carduus eriocephalus* Winkl. in Tr. Peterb. Bot. Sada, IX, 2 (1886) 520.—*C. lanipes* O. and B. Fedtsch. Perech. Rast. Turk. IV (1911) 276 p. p. non Winkl.

45 Perennial. Plants 5–10 cm high. Stem branched, particularly in upper part, sulcate throughout, arachnoid-hairy, to capitula leafy. Leaves on both sides green, subglabrous, with sparse, loosely arachnoid-hairy bristles, more prominently arachnoid-hairy beneath, particularly along veins; lower cauline and basal leaves short-petiolate, petiole spinulose, oblong or oblong-lanceolate, about 20 cm long and up to 4 cm wide, pinnately parted, with 3-toothed lobes narrowed into spine, middle lobes larger; middle leaves sessile, semiamplexicaul with basal auricles, broadly oblong-lanceolate, gradually reduced upward; upper leaves almost oblong-ovate, 3–4 cm long and 1 cm wide, often recurved below capitula, cordate, auriculate, pinnately lobed, coarsely toothed or even undivided; lobes 3-toothed, teeth spiny with larger middle tooth. Capitula hemispherical, less often almost ovoid, 6–8 cm in dia and about 6 cm long, densely arachnoid-tomentose, solitary terminal on branches. Involucre many-rowed, with linear-lanceolate bracts, strongly narrowed into spine, outer bracts broader, distinctly carinate at base, strongly attenuated into long and stiff spine, in lower part arachnoid-tomentose; inner bracts gradually attenuated into spine, glabrous below, serrulate, spiny, covered with short hairs; receptacle densely covered with smooth, yellowish bristles to 5 mm long. Corolla glabrous, to 33 mm long, purple narrowed up to middle, tube 4–6 mm long and limb irregularly incised at tip, somewhat uncinat. Basal appendages of anthers spiny, very narrow, to 7 mm long, incised or almost entire, more or less equaling anthers; filaments glabrous, only slightly tuberculate (under hand lens!). Achenes obconical, to 7 mm long, about 2 mm wide at tip, about 1 mm at base, ribbed on each side or throughout with parallel striations and transverse fine wrinkles; pappus many-rowed, of unequal, fragile, barbed bristles, densely tuberculate at tip and pale yellow at base. Flowering August to September; fruiting September to October.

Mountains, mostly subalpine zone, on moraines, talus, rocks, dry sandy-clay places.—*Soviet Central Asia*: Pamiro-Alai Region. Endemic. Described from Altyn-Mazar from Nevessky's collections. Type in Leningrad.

2. *O. nivea* (Winkl.) Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, III (1922) 142; in Izv. Glavn. Bot. Sada, XXIII, 2, 142.—*Carduus niveus* Winkl. in Tr. Peterb. Bot. Sada, XI, 2 (1892) 378.

Perennial. Stem single, 50–60 cm high, 0.5–10 mm thick in middle, deeply sulcate, arachnoid-pubescent, simple, branched in inflorescence, less often with few slender shoots at base. Basal leaves numerous, about 25 cm long, narrowed into flat petiole 3–5 cm long, oblong, pinnately parted, terminating in stiff spine, or pinnately lobed, with ternate lobes (middle ones largest), apically with spines, veins prominent; glabrous, bright green, and somewhat lustrous above, densely white-tomentose beneath; cauline leaves sessile, somewhat surrounding stem, auriculate, gradually reduced toward inflorescence. Capitula many on main stem, pedunculate, solitary on second- and third-order ⁴⁶ branches, ovate or nearly so, to 5 cm long and 4–5 cm in dia including involucre. Involucral bracts many, loose arachnoid-tomentose, bracts gradually narrowed from lanceolate, appressed, finely toothed base, to longer arcuate spine; innermost bracts linear, acuminate erect, small-toothed throughout; receptacle covered with long, linear, sharp bristles; florests pinkish-purple(?), 35–38 mm long, narrowed up to 17–20 mm, expanded part 15–18 mm long, with unequal lobes, somewhat uncinate; basal appendages of anthers filiform. Achenes oblong, immature; pappus 20–22 mm long, irregularly setose, toothed-barbed, teeth wide set, finely sulcate at apex. Flowering July to August; fruiting August to September (?).

Dry hills.—*Soviet Central Asia*: Pamiro-Alai Region. Endemic. Described from Pamir from collections of Kushakevich. Type in Leningrad.

Note. The species is closest to the Kuenlun's *O. roborovskyi* Iljin, from which it is distinguished by being twice as tall and having a considerably more leafy rosette, large leaves that do not wither at flowering and fruiting time, large capitula on distinct peduncles, a corolla almost twice as long, equally long peduncles, and a pappus almost twice as long as the corolla.

3. *O. vvedenskyi* Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 359, Figs. 1, 2.

Perennial. Stem 80 cm or more high, single, thick sulcate, with arachnoid-floccose pubescence. Basal leaves oblong, 20–30 cm long,

arachnoid-hairy above with prominent vein, pinnately lobed, acute; lobes coarsely and crenately 3–5-toothed, teeth terminating in very stiff, yellowish spines; basal leaves with flattened petiole; cauline leaves sessile, somewhat amplexicaul, longer than internodes, 1–3, toothed, with similar spines but shorter than in basal leaves, extending to base of capitula. Capitula relatively numerous, oblong-ovate, about 4–5 cm long and 3–4 cm in dia (including spines) at flowering. Involucral bracts numerous, outer and middle bracts gradually narrowed into short spine, sharply recurved; innermost bracts with spreading-erect, thin, spiny, ochreous tip; involucral bracts arachnoid-pilose. Corolla glabrous, brownish when dry, 30–35 mm long, tube 10–12 mm, with uncinatate lobes about 3 mm long; apical appendages of anthers lilac; basal ones colorless, about 6–7 mm long, throughout deeply lobed.

47 Pappus 20–25 mm long, smoky because of fine deciduous bristles, with barbs twice as thick as bristles in middle, toothed below, in upper thinner part 3–4 times as thick as bristles; bristles acicular. Flowering August.

High mountains.—*Soviet Central Asia*: Tien Shan. Endemic. Described from Fergana Range. Type in Tashkent; cotype in Leningrad.

Note. This species is close to *O. nivea* (Winkl.) Iljin and *O. longifolia* (Winkl.) Iljin, but is well distinguished by its uncinatate, recurved involucral bracts as well as the form of its capitulum.

4. ***O. longifolia*** (Winkl.) Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, III (1922) 142; in Izv. Glavn. Bot. Sada, XXIII, 2, 138.—*Carduus longifolius* Winkl. in Tr. Peterb. Bot. Sada, XI, 2 (1892) 378.

Perennial. Plants about 25 cm high, with woody root; stem erect or barely ascending at base, densely arachnoid-tomentose, many-headed. Basal leaves numerous, as long as or slightly exceeding stem, to 30 cm long, narrowed into flat petiole, not spiny along margin; cauline leaves, like rosette leaves, sessile, subglabrous above, sometimes along veins loosely floccose-arachnoid-hairy, densely grayish-arachnoid-pubescent beneath, oblong, odd-pinnate; about 16 lobes on each side, narrow deltoid, 2–3-toothed, teeth unequal, narrowed into small spine, revolute like leaf tip. Capitula hemispherical, 4–5 cm long, at tip about 6 cm in dia, in clusters of 6–7, almost sessile or on very short peduncles. Involucre densely arachnoid-hairy-tomentose, with numerous bracts, imbricate; innermost bracts glabrous, linear-lanceolate, acute narrowed into small spine, others reduced outward finely toothed, particularly in lower part; receptacle densely covered with yellowish, to 5–6 mm long, smooth bristles. Corolla slightly exerted from involucre, about 28 mm long, glabrous, with expanded upper part 17–18 mm and limb 5–7 mm long, limb lobes incurved. Basal appendages of

anthers spinose, 5–6 mm long, slightly incised or undivided, almost as long as anthers; apical appendages about 4 mm long; filaments highly sulcate at tip (visible under binocular microscope). Pappus dull-white, irregularly spinose, many-rowed, of fragile barbed bristles, inner bristles longer, at tip almost sulcate; immature achenes obpyramidal, glabrous. Flowering July to August.

Mountains.—*Soviet Central Asia*: Pamiro-Alai Region. Endemic. Described from Archata Gorge. Type in Leningrad.

5. *O. lanipes* (Winkl.) Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, III (1922) 143; in *Izv. Glavn. Bot. Sada*, XXIII, 2, 140.—*Carduus lanipes* Winkl. in Tr. Peterb. Bot. Sada, IX, 2 (1886) 519; O. and B. Fedtsch. Perech. Rast. Turk. IV, 276 p. p.

- 48 Perennial. Plants 30–40 cm high, with 1–2 stems. Stems erect, simple, thick, strong, sulcate, arachnoid-pubescent, with many-leaved rosette, leafy up to capitula. Leaves oblong-lanceolate, gradually reduced upwards, glabrous above or sometimes along veins slightly arachnoid-pubescent, pinnately parted; lobes with 3–5 coarse teeth, bearing yellowish, relatively long spines; lower-most cauline leaves with flat petioles and, as in basal leaves, lacking spines on margin; middle and upper leaves sessile or subsessile; uppermost leaves subtending inflorescence; basal leaves amplexicaul, with dark petioles. Capitula hemispherical, about 5 cm in dia, sessile, clustered in globose heads. Involucre many-rowed, densely tomentose-lanate, with linear-lanceolate bracts, finely toothed on margin and narrowed into thin, smooth, flexible spine; inner bracts scarious, acute, covered outside with very fine appressed hairs and sometimes with scattered sessile glands; bracts glabrous inside, outer ones slightly shorter, at base slightly broader and carinate; receptacle densely covered with stiff, smooth and yellowish bristles. Corolla whitish(?) 25–30 mm long, glabrous, tube 12–15 mm long, with unequal, 4–5 mm long lobes, somewhat uncinat. Filaments glabrous (under microscope slightly tuberculate); basal appendages of anthers spinose, throughout more or less incised, 2–3 mm long and 1/4–1/2 as long as anthers. Pappus many-rowed, of unequal yellowish, fragile, barbed bristles; inner bristles longest, at tip whitish and sulcate. Achenes 6–7 mm long, obconical, entirely glabrous, with linear striations and transverse wrinkles. Flowering April to beginning of May; fruiting May to June.

Dry mountain habitats.—Not yet found in USSR, but may be discovered here. *General distribution*: Eastern Tien Shan (Sinkiang). Described from Irenkhabirg Mountains, from Talda River, from collections of A. Regel. Type in Leningrad.

6. *O. nidulans* (Rupr.) Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, III (1922) 143; in Izv. Glavn. Bot. Sada, XXIII, 2, 139.—*Carduus nidulans* Rupr. in Mém. Acad. Sc. Pétersb. VII, sér. XIV, 4 (1869) 55, non Petrak.

Perennial. Plants 25–60 cm high. Stem simple or branched only in inflorescence, erect, thick, strong, sulcate, usually densely arachnoid-pubescent, very densely leafy with basal rosette. Leaves hard, oblong-lanceolate, pinnately parted with deltoid and 3–5-toothed lobes (middle lobe the largest), terminating in stramineous-yellow stiff spines, spiny along margin, glabrous, green and somewhat lustrous above, arachnoid-tomentose with prominent veins beneath; basal leaves numerous, 20–35 cm long, short-petiolate, petiole flat, spiny on edges; 49 cauline leaves sessile, amplexicaul, auriculate; uppermost leaves reduced. Capitula hemispherical or broadly ovate, 5–6 cm in dia, on very short peduncles or sessile, in clusters of 6–10, less often few lower ones on longer (up to 10 cm) peduncles. Involucre many-rowed, densely tomentose-lanate with linear-lanceolate bracts, toothed; inner bracts thin-scarious, acute, appressed-pubescent, sometimes with sessile glands; outer bracts somewhat smaller, basally expanded and single-keeled, densely lanate above, yellowish-white, narrowed into chestnut-colored smooth spine; receptacle densely covered with stiff, yellowish, smooth bristles, with 4–6 mm long limb and slightly uncinately incurved lobes. Basal appendages of anthers spinose, incised throughout, 3–5 mm long, 1/2 as long as anthers; filaments glabrous (under microscope slightly tubercular). Immature achenes 6–7 mm long, carinate, obconical, glabrous, with 6–8 longitudinal striations and transversely slightly wrinkled; pappus to 30 mm long, many-rowed, with numerous, unequal, chestnut-colored or yellowish, fragile, barbed bristles, inner ones the longest, at tip whitish and densely sulcate. Flowering July to September; fruiting September to October.

Dry stony mountain slopes, on varicolored substrates.—*Soviet Central Asia*: Tien Shan. Endemic. Described from Central Tien Shan from collections of Osten-Saken. Type in Leningrad.

7. *O. spinifera* Iljin in Izv. Glavn. Bot. Sada, XXIII, 2 (1924) 145.—*Chamaepeuce macrantha* O. and B. Fedtsch. Perech. Rast. Turk. IV (1911) 287, non Schrenk.

Perennial. Plants tall. Stem thick, strong, branched, sulcate, glabrous or subglabrous. Leaves hard, almost coriaceous, on both sides glabrous or subglabrous, lustrous above, along midrib slightly arachnoid-hairy, green, slightly arachnoid-hairy beneath, oblong-lanceolate; petioles of lower leaves flattened; middle and lower leaves sessile,

somewhat covering stem; all leaves pinnately parted, with oblong-deltoid, stiff spinescent lobes, with prominent veins beneath; subtending leaves highly reduced. Capitula numerous, globose, 6–8 cm in dia (including spines), long-pedunculate. Involucre many-rowed, glabrous; involucre bracts numerous, basally expanded, carinate, gradually narrowed into very long, up to 1.5–2.5 cm, stiff, smooth, erect spine; outer and middle bracts with highly divergent spines; innermost bracts thin, linear, acute, with almost erect cusp; peduncle densely covered
 50 with smooth scales. Corolla about 35 mm long, narrowed to a half or slightly less, its limb 5–7 mm long, with unequal lobes, at tip slightly expanded and incurved. Basal appendages of anthers spinose; slightly incised, filaments glabrous. Achenes 5–6 mm long, oblong-obovate, somewhat compressed; with longitudinal striations and light transverse wrinkles; pappus about 30 mm long, its bristles almost equaling corolla, only at base dull-chestnut colored, with almost equally long divergent teeth, densely short barbate at tip. Fruiting October to November.

Stony mountain slopes.—*Soviet Central Asia*: Pamiro-Alai Region. Endemic. Described from Alai Range of Kara-Shur. Type in Leningrad.

8. **O. pectinata** Iljin in *Izv. Glavn. Bot. Sada*, XXIII, 2 (1924) 146.—*Carduus pectinatus* M. Pop. and Vved. in herb.

Perennial. Plant 30–70 cm high. Stem usually single, thick, erect, sulcate, white-tomentose, leafy, branched above. Leaves almost coriaceous, green and glabrous above, densely tomentose, with prominent veins beneath, oblong or lanceolate, acute, narrowed into short spine, pinnately lobed or pinnately parted, with ovate-deltoid spiny-toothed lobes; basal and lower cauline leaves gradually narrowed into petiole, basally expanded, with or without solitary lateral spinules; other leaves sessile, auriculate; uppermost leaves pectinate-spinose. Capitula large, solitary, terminal on branches. Involucre ovate or at flowering oblong-ovoid, spinose, slightly archnoid, subtended by reduced apical leaves; involucre bracts numerous, narrowed into short spine; outer bracts with arcuate spines, spiny on margin; middle bracts with spreading-erect spines, lacking spines on margin and somewhat abruptly expanded in lower part; inner bracts lanceolate, thin, acute, geniculate at tip, sparingly archnoid-pubescent outside. Corolla 35–50 mm long, tube 20–30 mm long, with limb lobes 8–10 mm long. Pappus dull-yellowish, with unequally toothed, apically short-barbate bristles. Achenes about 10 mm long, oblong-linear, somewhat compressed, with fine longitudinal striations. Flowering August to September; fruiting August to September.

Stony and rubbly mountain slopes in dry steppe zone.—*Soviet Central Asia*: Western Tien Shan. Endemic. Described from Talass Alatau and Dzhebogly-Su River. Type in Leningrad.

9. **O. baldshuanica** (Winkl.) Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, III (1922) 142; in Izv. Glavn. Bot. Sada, XXIII, 2, 143.—*Carduus baldshuanicus* Winkl. in Tr. Perterb. Bot. Sada, IX, 2 (1886) 521.

51 Perennial. Plants 70–150 cm high, with strong woody root, producing caudices, densely covered with leaf bases and lanate between scales. Stems many, at base lanate-tomentose, erect, not very thick, branched, finely sulcate, usually slightly pale purple, arachnoid-hairy with floccose pubescence or subglabrous. Leaves coriaceous, bright-light green, lustrous, glabrous or sometimes, at places, on veins slightly arachnoid-pubescent above, densely arachnoid-tomentose, white and grayish-white beneath; basal and lower leaves 30–50 cm long and 5–7 cm wide, on short, semicylindrical, basally slightly carinate and slightly expanded petioles, lacking spines; lamina pinnately lobed and coarsely toothed with prominent veins, undulate; teeth usually trifid, narrowed into short spine; middle leaves oblong to ovate, sessile, with roundish auricles and shorter lobes or only spiny-toothed; uppermost leaves small, narrowly lanceolate. Capitula ovate-campanulate or urn-shaped, 5–7 cm long and 3–4 cm in dia, on long peduncles. Involucre sparsely arachnoid-pubescent, sometimes at fruiting subglabrous; outer and middle bracts stiff, coriaceous, ovate-lanceolate at base narrowed into strong arcuately recurved spines, glabrous or slightly arachnoid-pubescent; inner bracts gradually narrowed into narrower, shorter and slightly curved spine; innermost row comprising straight, linear-lanceolate bracts terminating into thin and flexible, acute tips, slightly floccose outside; receptacle densely covered with smooth scales. Corolla bright pinkish-purple, violet when dry, glabrous, 25–35 mm long, narrowed over half, with limb 6–7 mm long, and lobes slightly incurved. Basal appendages of anthers spinose, 4–5 mm long, almost 1/2 as long as anthers; apical appendages to 3 mm long; filaments smooth (under microscope somewhat tuberculate at tip). Achenes oblong, slightly compressed, glabrous, 10–12 mm long and 2.0–2.5 mm wide, throughout longitudinally ribbed; pappus pale yellow, about 30 mm long, many-rowed, of unequal, fragile bristles, toothed-serrate in lower part and flattened, densely short-barbate in upper part. Flowering July to September; fruiting August to October.

Varicolored substrates (outcrops of red clays, red sandstones), conglomerates, sandy outcrops, alluvial clays in mountains.—*Soviet Central Asia*: Pamiro-Alai Region. Endemic. Described from three specimens: first specimen collected from ravine between Tevildara and Sagridasht rivers. Type in Leningrad.

GENUS 1592. *Cirsium* Mill. emend. Scop.^{1,2}

Mill. Gard. Dict. Arb. ed. 4 (1754) emend. Scop. Fl. Carn. (1760) 355; Adans. Fam. II (1763) 116 p. p.; DC. in DC. and Lam. Fl. Fr. ed. 3, IV (1805) 110; V (1815) 463; Cass. in Dict. Sc. nat. XXVII (1823) 185, XXXVI (1825) 178, XLI (1826) 332; DC. Prodr. VI (1837) 634; Endl. Gen. pl. (1836–1840) 477; Boiss. Fl. or. III (1875) 523 p. p.; O. Hoffm. in Pflanzenfam. IV, 5 (1893) 322 p. p.; Nakai in Tokyo Bot. Mag. XXVI (1912) 351; Petrak in Beih. Bot. Centralbl. XXXV (1918) 223 p. p.; Kitam. in Acta Phytot. et Geobot. III, 1 (1934) 1; Comp. Japon. I (1937) 33 p. p.—*Cnicus* L. Sp. pl. (1753) 826 p. p.; Willd. Sp. pl. III, 3 (1803) 1662; Benth. in Benth. and Hook. f. Gen. pl. II (1873) 468; Maxim. in Bull. Acad. Sc. Pétersb. XIX (1874) 489 and in Mém. Biol. IX, 301.—*Carduus* L. Sp. pl. (1753) 820 p. p.; Less. Syn. Comp. (1832) 9 p. p.—*Serratula* L. Sp. pl. (1753) 816 p. min. p.—*Ascalea* Hill. Veg. syst. IV (1762) 14 p. p.—*Cephalonoplos* Neck. Elem. Bot. I (1790) 68.—*Breea* Less. Syn. Comp. (1832) 9.—*Echenais* Cass. in Bull. Soc. Philom. Paris (1818) 33, (1820) 4, in Dict. Sc. nat. XIV (1819) 170, XXV (1822) 226; DC. Prodr. VI (1837) 660; Endl. Gen. pl. (1836–1840) 479.—*Orthocentron* Cass. in Dict. Sc. nat. XXXVI (1825) 480.—*Eriolepis* Cass. in Dict. Sc. nat. XXXVI (1825) 146.—*Ontrophe* Cass. in Dict. Sc. nat. XXXVI (1825) 145.—*Lophiolepis* Cass. in Dict. Sc. nat. XLI (1826) 313.—*Spanioptilon* Less. Syn. Comp. (1832) 10; DC. Prodr. VI (1837) 621; Endl. Gen. pl. (1836–1840) 477.—*Epitrachys* C. Koch in Linnaea, XXIV (1851) 336.—Subgen. *Evcirsium* Rouy in Rev. Bot. Syst. Geogr. Bot. (1904) 28.

Capitula globose-ovate-oblong, small to large (10)12–60(70) mm in dia, terminal or axillary, solitary, erect or drooping, in clusters of 2–3 on short peduncles or aggregated in capitata, often short-racemose inflorescence. Involucre glabrous, sparsely arachnoid-hairy or more or less densely arachnoid-pubescent, many-rowed, often imbricate; outer bracts ovate-lanceolate or lanceolate, terminating in short or long spines surpassing them in length, divergent or recurved; inner bracts scarious, linear-lanceolate, attenuate into more or less soft cusp; bracts on margin smooth, short- or long-ciliate, spinulose or fimbriately-incised, rarely with broad, membranous, more or less toothed, apical appendage. Receptacle densely covered with long yellowish scales. Florets

¹Treatment by A.L. Charadze.

²Name derived from the Greek word *kirsos*, meaning disease of the veins. Tournefort, citing Dioscorides, reports that the roots of this plant, according to ancient authors, were used for treating venous disorders.

bisexual, less often unisexual, red, rarely yellowish or almost white, numerous, exerted from involucre bracts or acute tips of outer bracts exceeding them. Corolla usually erect or in ray florets often geniculate; corolla tube almost as long as limb, sometimes shorter, less often several times as long; limb often 5-parted to $1/3$ or $1/2$, sometimes almost to base. Filaments more or less pilose or with scattered papillate pubescence, less often subglabrous; anthers with more or less filiform, incised, basal appendages. Style bifid, with ring of hairs at base of its branches. Achenes glabrous, usually compressed (2.5) 3.0–5.0 (6.0) mm long, yellowish or with brownish striations, often with 4 longitudinal stripes, apically truncate, terete, with somewhat elongated, persistent apical tubercle somewhat constricted and obliquely truncate at base. Pappus usually shorter than florets, less often almost equal or slightly longer, many-rowed, with more or less long plumose hairs, connate in ring and falling off together; outer hairs usually somewhat shorter than inner, to tip plumose; inner ones with scabrous, slightly flattened or thin and acute tips. Monoecious, less often dioecious plants. Biennials or perennials, almost stemless to large branched, densely or sparsely leafy stem. Leaves subglabrous or pubescent, often tomentose, with spiny margin; upper surface smooth or covered with small prickles and bristles.

Lectotype of genus: *C. heterophyllum* (L.) Hill.

Note. The genus *Cirsium* Mill. comprises more than 200 species distributed in Europe, North Africa, Siberia, Soviet Central Asia, West Asia, East Asia, North and Central America. Of these 111 species grow in the territory of the USSR.

The majority of researchers have considered Adanson as the author of the genus *Cirsium*. Despite this, a number of authors consider it possible to retain the priority for Miller. I also share this view, as propounded in the work of Mansfeld (Mansfeld in *Fedde, Repert.* XLIV [1938] 320).

It has been proposed to consider *C. anglicum* Mill., corresponding to *C. pratense* (Huds.) Druce, non DC., as the type of the genus (Druce in *Repert. Bot. Exch. Club. Brit. Isl. Suppl.* 1914, 430).

Recently, (K. Jones in *Taxon*, IX No. 6 [1961] p. 175), it has been recommended that *C. heterophyllum* (L.) Hill. be considered as the type of the genus *Cirsium*.

As is well known, Linnaeus, who described a number of species of *Cirsium*, referred them to different genera: *Carduus*, *Cnicus* and *Serratula*. Most of the earlier authors of species of *Cirsium* considered them as constituents of the genus *Cnicus*, but lately some American authors consider it possible again to unite *Cirsium* with *Carduus*.

Cassini, an authority on the Cynareae, split off a number of separate genera from *Cirsium*. Later, some of Cassini's genera were proposed by De Candolle as sections of the genus *Cirsium*. De Candolle's system (*Prodromus*, VI), the best for its time, was taken as the basis for subsequent systems proposed by Boissier, Hoffmann, Maximowicz, and others. A major contribution toward understanding the genus was made by Petrak, who described a large number of species, particularly from the Caucasus, Central America and Asia Minor. To Petrak also goes the credit for a detailed treatment of the section *Epitrachys* and of North American *Cirsium*. The Japanese-Manchurian species were studied by Maximowicz; in later years, the works of the Japanese botanists Nakai and Kitamura were devoted to the systematics of the eastern Asian species. The sectional division proposed by the latter author deserves special attention. Kitamura (1934), unlike the European authors (Rouy, Petrak, Arènes, and others) split off the genus *Cephalonoplos* Neck. from *Cirsium*.

In resolving the problem of the circumscription of this genus, I have considered the structure of the florets and achenes, which has allowed me to define the sections more naturally. Based on the work of S.G. Tamamschian (1954), I consider it correct to split off a number of small, mainly Mediterranean and Soviet Central Asian genera from the genus *Cirsium*. On the other hand, I have retained *Echenais* Cass. and *Cephalonoplos* Neck. in the genus. These conclusions have been confirmed by the researches of I.S. Shtep (1958, 1961), who has studied the pollen morphology of *Cirsium* and closely related genera.

A large number of hybrid forms described mostly from the Caucasus have been specially studied palynologically. In this treatment they have been included without detailed descriptions but with indication of the characters distinguishing them from the parental forms.

Some species of the genus are invasive weeds in crops and gardens. Among them mention must be made of *C. arvense*, *C. setosum*, *C. incanum*, *C. ochrolepideum*, and others. Many species of the genus are widespread in mountain meadows, degraded as a result of cattle grazing. Among them, particularly widespread are *C. obvallatum*, *C. pugnax*, and *C. rhizocephalum* in the Caucasus, *C. cosmellii* in the Lesser Caucasus, and others. Widely distributed in the mountain pastures of the Pamiro-Alai Region are *C. glabrifolium* and *C. badakhschanicum* and in Siberia and the Lake Balkhash Region—*C. esculentum*.

Some species of the genus are tall herbs and possess ornamental features, for example, *C. kuznetzowianum* and *C. sychnosanthum* in the Caucasus, *C. kamtschaticum* in Kamchatka and Sakhalin, *C. weyrichii* in Sakhalin, *C. helenioides* in Eastern Siberia, and others.

Cirsium species are reported as good honey-producing plants by a number of authors.

1. Corolla limb deeply 5-parted or almost to base; corolla tube several times as long as limb. Pappus with achene longer than florets..... 7.
- + Corolla limb 5-parted to middle, less often slightly deeper; corolla tube usually almost as long as, slightly shorter than, or longer than limb. Pappus shorter than florets, less often almost equal.....2.
2. Leaves on upper surface more or less densely covered with fine spiny bristles, less often bristles scattered over entire surface of lamina, less often bristles small, hardly noticeable, and then leaf surface scabrous.....3.
- + Leaves above smooth, glabrous or more or less densely arachnoid-hairy, sometimes with scattered crispate hairs, never setose.....4.
3. Capitula drooping or deflected downward. Outer involucre bracts with long, usually recurved spines. Leaves broad, more or less deeply incised pinnately parted, less often lobed (Sect. 1. *Caucasigena* Charadze).....8.
- + Capitula erect, sometimes surrounded, involucre-like, by apical leaves. Outer involucre bracts narrowed from middle or above, into more or less hard spines. Leaves usually coriaceous, more or less deeply pinnately parted, with lobes more or less long-spinescent (Sect. 2. *Epirachys* DC.).....24.
- 55 4. Outer involucre bracts more or less sharp-pointed with short spines or abruptly spinescent (Sect. 5. *Cirsium*).....5.
- + Outer involucre bracts tapered to long cusps, usually longer than inner bracts or with scarious, more or less fimbriate appendage.....6.
5. Involucre not many-rowed, outer involucre bracts elongated, somewhat shorter than inner. Capitula on more or less elongated, drooping peduncles.....65.
- + Involucre imbricate, usually many-rowed, with more or less small bracts; if not many-rowed, then capitula erect.....67.
6. Cluster of reduced apical leaves with long, thin spines subtending capitula. Involucre bracts tapered to long membranous cusps or with broad scaly appendage. Leaves thin, sparsely pilose to whitish-tomentose [Sect. 4. *Echenais* (Cass.) Petrak].....59.
- + Capitula short pedunculate, rising above apical leaves. Outer involucre bracts longer than inner ones, coriaceous, narrowed into herbaceous, acuminate, hard, spine. Leaves coriaceous, lobed, snow-white beneath (Sect. 3. *Lamyropsis* Charadze).....58.
7. Plants monoecious. Florets bisexual. Corolla-tube 3–5 times as long as limb. Capitula in racemose inflorescence; cauline leaves large

- [Sect. 6. *Pseudo-Eriolepis* (Nakai) Kitam.]..... 107. **C. pendulum** Fisch.
- + Plants dioecious. Capitula homogamous, with unisexual florets. Corolla tube 2–3 times as long as limb [Sect. 7. *Cephalonoplos* (Neck.) DC.].....108.
8. Capitula in terminal cluster forming capitate inflorescence. Involucral bracts subulately narrowed into upward-directed prickles..... 1. **C. aggregatum** Ldb.
- + Capitula solitary on tips off stems and branches, less often in clusters of 2–3, but never forming capitate inflorescence.....9.
9. Outer involucral bracts spinose-ciliate along margin or over entire surface 10.
- + Involucral bracts without small spines along margin or with single scattered cilia 17.
10. Capitula 1.0–2.0 cm in dia. Involucre with spreading spines11.
- + Capitula 2.0–3.5 cm in dia, globose-ovate, lower involucral bracts usually with recurved spines.....12.
11. Capitula subglobose, numerous, arachnoid-hairy. Involucral bracts long-spinose-ciliate on margin, abruptly narrowed into long, spreading yellowish spines. Leaves deeply pinnately incised, white-tomentose beneath 17. **C. caput-medusae** Somm. and Lev.
- 56 + Capitula oblong, few. Involucral bracts spinose-ciliate in upper part, tapering to spreading spines. Leaves soft, slightly and deeply pinnately cut, glabrous or grayish-arachnoid beneath.....
-4. **C. czerkessicum** Charadze
12. Lower involucral bracts usually elongate, recurved, with surface more or less densely covered with spiny bristles. Involucre densely floccose-arachnoid-hairy.....16. **C. fominii** Petrak
- + Lower involucral bracts small, with short recurved or long spreading spines. Involucre arachnoid-pubescent.....13.
13. Capitula oblong. Involucre purple below, arachnoid-pubescent above. Lower involucral bracts shorter than middle ones, falcately recurved, with small spines. Leaves deeply cut into elongate, 2-lobed segments.....10. **C. erythrolepis** C. Koch
- + Capitula globose-ovoid. Leaves more or less deeply cut into almost entire, usually with broader segments 14.
14. Involucre arachnoid-hairy only in upper part; outer involucral bracts narrowed into long, more or less recurved and short prickly-ciliate spines. Leaves thinly grayish-arachnoid beneath 12. **C. osseticum** (Adams) Petrak
- + Involucre entirely arachnoid hairy; lower involucral bracts falcately recurved, finely pilose. Leaves more densely arachnoid-pubescent

- or white-tomentose beneath.....15.
15. Involucral bracts spinose-ciliate along margin, tapering to long, purple, recurved spines. Leaves deeply cut into oblong segments.....11. **C. tricholoma** Fisch. and Mey.
- + Outer involucral bracts recurved, tapering into short, less often elongate, yellowish spines. Leaves with broader segments 16.
16. Capitula generally up to 2.5 cm in dia. Lower cauline leaves almost entire, middle ones more or less incised, velutinous above because of thick spiny bristles, snow-white beneath.....
-14. **C. sosnowskyi** Charadze
- + Capitula up to 3.5 cm in dia. Lower cauline leaves pinnately cut, upper pinnately lobed, with sparser and thinner pubescence.....
-13. **C. buschianum** Charadze
17. Capitula oblong, 1.0–2.0 cm in dia, solitary or in clusters of 2–3. Outer involucral bracts subulately narrowed from middle to somewhat spreading spines, carinate on outer side, glabrous, sparsely arachnoid-hairy, finely toothed.....18.
- + Capitula usually larger, globose-ovate or ovate. Outer involucral bracts extended in more or less long, thin or thickened spines.....19.
18. Leaves thin, glabrous beneath or slightly arachnoid-pubescent, sinuately-pinnately parted to middle into broad segments with sharply spinose teeth; subtending leaves close to base of capitulum, somewhat surpassing it.....2. **C. gagnidzei** Charadze
- 57 + Leaves somewhat coriaceous, deeply sinuately-pinnately cut into narrower segments tapering in sharp, hard spines, white-tomentose beneath. Capitula numerous, slightly rising above subtending leaves.....3. **C. longiflorum** Charadze
19. Involucral bracts densely covered with yellowish arachnoid hairs almost to spiny tips..... 20.
- + Involucre covered with whitish or grayish arachnoid hairs, usually with projecting smooth, spiny tips.....21.
20. Florets white or slightly pinkish. Involucre pitcher-shaped, enlarged at base, constricted toward apex.....
-7. **C. chlorocomos** Somm. and Lev.
- + Florets purple-red. Involucre globose-ovate.....
-6. **C. kemulariae** Charadze
21. Involucre covered with thin grayish-arachnoid hairs, with thin recurved spines. Leaves broad, not deeply incised, thinly spinose on margin, white-tomentose beneath.....
-15. **C. abkhasicum** (Petrauk) Grossh.
- + Leaves deeply sinuately-pinnately cut, white-tomentose beneath. Involucre more or less arachnoid-pubescent, with harder recurved spines.....22.

22. Involucre finely arachnoid-hairy. Outer involucre bracts terminating in elongate, usually purple spines.....5. **C. imereticum** Boiss.
 + Involucre densely arachnoid-hairy, often floccose; involucre bracts with yellowish, hard spines.....23.
23. Outer involucre bracts abruptly narrowed to long, hard, recurved, yellowish spine. Leaves deeply sinuately-pinnately cut, long-spiny.....8. **C. caucasicum** (Adams) Petrak
 + Lower involucre bracts purple, abruptly narrowed from broad base to greenish, falcately recurved tip, tapering to hard spine. Leaves with broader, long-spiny segments, besides thin spinose bristles scattered over entire surface.....9. **C. adjaricum** Somm. and Lev.
24. Stem winged. Involucre sparsely arachnoid-hairy; involucre bracts lanceolate, spinescent, outer ones more or less recurved.....52. **C. vulgare** (Savi) Ten.
 + Leaves sessile or somewhat encircling stem, auriculate.....25.
- 58 25. Involucre ovate, imbricate; involucre bracts scarious, appressed; outer bracts with short filiform apical spine.....24. **C. bornmülleri** Sint. ex Bromn.
 + Involucre globose-ovoid, less often oblong; involucre bracts narrowed to short or more or less elongate, hard spine.....26.
26. Capitula aggregated in terminal capitate inflorescence. Involucre bracts scarious, more or less narrowed to hard spines. Leaves stiff, coriaceous, glabrous or sparsely hairy.....27.
 + Capitula solitary or in clusters of few at tips of stems or branches, not in capitate inflorescence.....28.
27. Outer involucre bracts subulately narrowed to elongate, yellowish spines; [Capitula] in terminal clusters in compact heads of 6–15.....18. **C. congestum** Fisch. and Mey. ex DC.
 + Outer involucre bracts abruptly narrowed to short, hard spines. Capitula in capitate inflorescences of 6–10, subtended by apical leaves.....19. **C. sorocephalum** Fisch. and Mey.
28. Outer involucre bracts entire, subglabrous or more or less arachnoid-hairy.....28.
 + Outer involucre bracts fimbriate or ciliate.....54.
29. Leaves coriaceous, glabrous or sparsely arachnoid-pubescent. Capitula usually numerous, medium-sized or smaller. Involucre glabrous or slightly arachnoid-pubescent 30.
 + Leaves more or less arachnoid-hairy to tomentose beneath, less often also grayish-arachnoid-hairy above. Capitula large- or medium-sized. Involucre usually densely arachnoid-hairy, less often thinly arachnoid-hairy.....33.
30. Stem many-branched. Capitula small or to 2.5 cm in dia, numerous.

- Involucral bracts terminating in slightly recurved or squarrose spines. Leaves stiff with hard spines.....31.
- + Stem few-branched. Capitula medium-sized, usually 2.5–3.5 cm in dia. Involucral bracts with straight or falcately recurved spines. Leaves bluish, subglabrous.....32.
31. Upper cauline leaves more or less surpassing capitula. Capitula elongate. Involucral bracts yellowish, acuminate. Leaves glabrous or thinly arachnoid-hairy on both sides, with elongate segments..... 20. **C. bracteosum** DC.
- + Capitula globose-ovate, rising above upper cauline leaves. Involucral bracts small, abruptly narrowed to short, more or less recurved spines. Stem sinuately branched..... 23. **C. aduncum** Fisch. and Mey ex DC.
32. Outer involucral bracts narrowed to falcately recurved spine. Capitula short-pedunculate.....21. **C. strigosum** (MB.) MB.
- + Outer involucral bracts imbricate, numerous, narrowed to short, hard, straight spines. Capitula on elongate, glabrous peduncles..... 22. **C. rigidum** DC.
33. Florets yellow. Capitula to 3.5 cm in dia. Involucre arachnoid-hairy. Leaves deeply pinnately incised into more or less narrow segments 30. **C. cosmellii** (Adams) Fisch. ex Hohen.
- + Florets red or pink.....34.
34. Capitula subtended by apical leaves surpassing them. Leaves coriaceous, stiff, green above, snow-white-tomentose beneath, with appressed silky pubescence, shallowly sinuate-toothed, long spinose.....44. **C. argillosum** V. Petr. ex Charadze
- + Leaves less stiff, subglabrous, grayish-arachnoid-hairy or loosely white-tomentose beneath, usually pinnately parted.....35.
35. Leaves shallow-pinnately parted, scabrous above, with both sides subglabrous or thinly arachnoid-hairy. Involucral bracts with long, articulate hairs, scale-like at base..... 43. **C. macrocephalum** C.A.M.
- + Leaves on upper surface more or less densely covered with spiny bristles. Involucral bracts thinly arachnoid-hairy.....36.
36. Capitula large- or medium-sized or smaller. Apical cauline leaves subtend capitula and usually surpass them.....37.
- + Capitula medium-sized, usually short-pedunculate, projecting above upper leaves.....50.
37. Capitula solitary, few, surrounded with apical leaves more or less surpassing capitula.....38.
- + Capitula clustered in short-racemose or racemose-paniculate inflorescence.....40.
38. Leaves with both sides more or less thickly grayish-arachnoid-hairy

- to white-tomentose and with scattered thin spines above.....
36. *C. cephalotes* Boiss.
- + Leaves green above, sparsely or thickly covered with bristles, beneath sparsely or densely arachnoid-pubescent to white-tomentose, rarely with both sides thinly arachnoid-pubescent.....39.
39. Plants green or grayish-pubescent on dorsal surface of leaves. Capitula subtended by numerous apical leaves, surpassing them.....
37. *C. pugnax* Somm. and Lev.
- + Plants white-tomentose. Capitula subtended by few apical leaves, scarcely surpassing them.....38. *C. balkharicum* Charadze
40. Lower involucre bracts small, numerous; outer bracts to inner ones gradually becoming longer.....41.
- + Lower involucre bracts numerous, narrower and longer than middle ones, usually linear-lanceolate.....44.
41. Capitula scarcely arachnoid-hairy, numerous, in corymbose racemes, slightly projecting above apical leaves. Leaves broad, white-tomentose beneath.....40. *C. daghestanicum* Charadze
- 60 + Capitula in clusters of 2–3, terminal, less often solitary. Apical leaves considerably surpassing capitula.....42.
42. Leaves narrow, more or less tomentose on both sides.....
39. *C. tomentosum* C.A.M.
- + Leaves tomentose only beneath or with both sides subglabrous.....43.
43. Leaves tomentose beneath, spiny-setose above. Capitula thinly arachnoid-hairy, terminal in clusters of 2–3 or solitary.....
41. *C. ketzkhovellii* Charadze
- + Plants subglabrous. Leaves thinly arachnoid-hairy beneath on veins. Capitula clustered at tips of stems, in short-racemose or corymbose inflorescence.....42. *C. tindaicum* Charadze
44. Leaf segments large, broadly deltoid-ovate or deltoid-lanceolate, attenuated into long, hard spines.....45.
- + Leaf segments narrower, oblong or linear-oblong, less often deltoid-ovate.....46.
45. Capitula large, densely arachnoid-hairy, sessile, in racemes. Leaves with obtuse lobes.....45. *C. turkestanicum* (Rgl.) Petrak
- + Capitula 2–4 cm in dia, sparsely floccose-pilose, in short racemes. Leaf lobes attenuated into hard, elongated spines.....
46. *C. pseudolappaceum* Charadze
46. Capitula terminal in racemes, densely arachnoid-hairy, terminal capitula usually 3–5 cm in dia. Leaves deeply sinuate-pinnately lobed.....47.
- + Capitula to 3 cm in dia, in elongate racemose- or corymbose-paniculate inflorescence. Involucre more or less floccose-pilose or thinly arachnoid-hairy.....48.

47. All capitula more or less large, 3–5 cm in dia. Cauline leaves narrowed toward base and abruptly expanded in semiamplexicaul auricles.....29. **C. macrobotrys** (C. Koch) Boiss.
 + Terminal capitula larger than axillary, to 4 cm in dia; axillary capitula to 2 cm in dia. Cauline leaves numerous, recurved.....
28. **C. schelkownikowii** Petrak
48. Capitula 1.5 cm in dia, sessile, clustered in axils of upper leaves. Involucre subglabrous or thinly arachnoid-hairy.....
27. **C. megricum** Charadze
 + Capitula 1.5–3.0 cm in dia, usually solitary, terminal or on elongate lateral shoots, with narrow subtending leaves usually exceeding capitula.....49.
49. Capitula solitary on shortened branches, 2–3 cm in dia subglabrous or with scattered floccose hairs. Leaves with short segments.....
25. **C. lappaceum** (MB.) MB.
- 61 + Capitula 1.5–2.0 cm in dia. Involucre more densely arachnoid-hairy in upper part. Leaves with elongate narrow segments.....
26. **C. anatolicum** (Petrak) Grossh.
50. Leaves spiny-setose above, glabrous or thinly arachnoid-hairy beneath, with remote segments. Capitula 15–20 (25) mm in dia, sparsely arachnoid-hairy.....31. **C. arachnoideum** (MB.) MB.
 + Leaves more or less densely white-tomentose beneath. Capitula floccose-arachnoid-hairy.....51.
51. Capitula ovate. Outer involucre bracts sparsely spinose on margin, terminating in long, yellowish spreading spines.....
33. **C. laniflorum** (MB.) MB.
 + Capitula globose-ovoid, 2–3(5) cm in dia. Outer involucre bracts terminating in thinner and shorter spines.....52.
52. Capitula up to 5 cm in dia, floccose-lanate. Outer involucre bracts sparsely spinose on margin, terminating in elongate, recurved short-spiny tip.....34. **C. sublaniflorum** Soják.
 + Capitula up to 3 cm in dia, arachnoid-hairy. Involucre bracts terminating in thin, divergent or recurved spines.....53.
53. Involucre in upper part densely arachnoid-hairy; involucre bracts small, imbricate, abruptly narrowed to recurved thin spines.....
32. **C. euxinum** Charadze
 + Involucre densely grayish-arachnoid-pubescent; outer involucre bracts abruptly narrowed from middle, into spines; inner bracts terminating in longer, thinner, curved spines
 35. **C. tauricum** Soják
54. Involucre arachnoid-hairy; involucre bracts scarious at tip with fimbriately notched margin, terminating in thin, short spines.....
47. **C. polonicum** (Petrak) Iljin

- + Invulcre glabrous or scattered-pilose. Invulcral bracts more or less spinose-ciliate, terminating in hard spines.....55.
55. Invulcral bracts narrowly lanceolate, spinose-ciliate; lower bracts falcately recurved or spreading.....56.
- + Invulcral bracts broadly lanceolate, strongly spinescent, in upper part with notched, more or less long-spiny-ciliate margin; lower bracts recurved.....57.
56. Lower involucral bracts short, falcately recurved. Capitula ovate.....48. *C. serrulatum* (MB.) MB.
- + Lower involucral bracts terminating in elongate spreading spines. Capitula globose-ovate.....49. *C. ukranicum* Bess.
57. Invulcral bracts broadly lanceolate, coriaceous, long-ciliate, gradually tapered to long hard spines. Capitula large, usually to 5 cm in dia.....51. *C. szowitsii* (C. Koch) Boiss.
- + Invulcral bracts lanceolate or ovate-lanceolate more thinly short-ciliate, strongly tapered to long hard spines.....50. *C. ciliatum* (Murr.) Moench.
- 62 58. Capitula ovate, numerous, solitary, 2–3 cm in dia. Outer involucral bracts scarious, purple, narrowed from middle into greenish, elongate, lanceolate-subulate, more or less recurved, attenuate, sharp-pointed, hard spines. Leaves broadly and sinuately lobed, with strongly spinescent lobes, green above, snow-white below from appressed silky hairs.....53. *C. sinuatum* (Trautv.) Boiss.
- + Leaves not pinnately divided, into crenately 5-toothed lobes, grayish-tomentose beneath. Capitula globose-ovate, to 3 cm in dia; outer involucral bracts narrowed into long, divaricate or recurved, sharp points, prolonged into yellowish spines.....54. *C. lamyroides* Tamamsch.
59. Invulcral bracts broadened-scarious above, on margin more or less fimbriately toothed.....60.
- + Inner involucral bracts apically more or less broadened, scarious; outer bracts tapered to more or less long, sharp points.....61.
60. Invulcral bracts with more or less broadened, scarious appendage, spinose-fimbriate-ciliate on margin, terminating in more or less short spines. Capitula numerous, drooping.....41. *C. echinus* (MB.) Hand.-Mazz.
- + Invulcral bracts scarious, broadened at tip, along margin fimbriate, cuspidate, Capitula in clusters of few at tip of stem and long branches.....60. *C. sieversii* (Fisch. and Mey.) Petrak
61. Inner involucral bracts scarious, more or less broadened at tip, fimbriate or toothed on margin.....62.
- + Inner involucral bracts at apex scarcely broadened, terminating in short, scarious cusp.....63.

62. Outer involucrel bracts almost as long as inner, narrowed from middle to sharp tips, as long as capitulum; inner bracts scarious-broadened at tip, fimbriate.....57. **C. glabrifolium** (Winkl.) O. and B. Fedtsch.
- + Outer involucrel bracts narrowed from middle to thin spines, slightly shorter than capitulum, with divaricate thin spines at apex along margin; inner bracts gradually tapered to scarious-toothed tip.....58. **C. badakhshanicum** Charadze
63. Outer involucrel bracts terminating in sharp short points, somewhat shorter than inner bracts; inner bracts scarious-acuminate at tip, recurved 59. **C. alberti** Rgl. and Schmalh.
- + Outer involucrel bracts tapered to long, sharp points, almost as long as florets or longer 64.
- 63 64. Outer involucrel bracts with cusps, gradually reduced inward slightly longer than inner. Capitula in terminal clusters.....53. **C. semenovii** Rgl. and Schmalh.
- + Outer involucrel bracts with long, sharp points, 2–3 times as long as inner ones. Lower cauline leaves usually longer than numerous terminal and axillary capitula.....56. **C. sairamense** (Winkl.) O. and B. Fedtsch.
65. Leaves deeply pinnately cut into narrow segments, with narrow wings or spines, decurrent. Outer involucrel bracts linear-lanceolate, acuminate, more or less curly- and arachnoid-hairy.....85. **C. pectinellum** A. Gray
- + Leaves large, broadly pinnately lobed; upper leaves sessile, lower more or less encircling stem.....66.
66. Capitula in short-corymbose inflorescence. Upper leaves entire, more or less coarsely toothed; lower leaves broad-lobed. Outer involucrel bracts distinctly shorter than inner ones.....83. **C. kamtschaticum** Ldb. ex DC.
- + Capitula in lax paniculate-corymbose inflorescence. Leaves at top acuminate; middle cauline leaves falcately recurved, pinnately divided. Outer involucrel bracts almost as long as inner.....84. **C. weyrichii** Maxim.
67. Plants stemless; capitula clustered in basal rosette, less often exerted from rosette, on more or less long peduncles, or with short simple stem.....68.
- + Plants usually with branched and leafy stems.....74.
68. Plants with numerous, usually 5–12 capitula in center of rosette, or stem short, strongly thickened, with few terminal capitula in clusters. Involucrel bracts elongate, obtuse, with short apical spine. Pappus as long as florets or slightly longer.....102. **C. esculentum** (Sievers) C.A.M.

- + Plant acaulescent or with more or less elongated stem. Capitula solitary or in clusters of 2–5. Pappus shorter than or equaling florets.....69.
69. Plant usually acaulescent or with short stem.....70.
- + Plant with simple stem.....72.
70. Capitula sessile or short-pedunculate. Outer involucre bracts shorter than inner ones, with short spines. Rhizome slender.....106. **C. acaule** (L.) Scop.
- + Capitula sessile in center of basal rosette, less often on short stems. Involucre bracts gradually becoming longer from outer bracts to inner ones, more or less strongly spinescent. Rhizome thick.....71.
71. Pappus almost equaling florets; florets pale pink or whitish. Leaves shallowly sinuately-pinnately lobed, with more or less long-spinescent teeth. Outer involucre bracts terminating into hard spines.....103. **C. rhizocephalum** C.A.M.
- 64 + Pappus shorter than florets; florets red. Leaves up to base sinuately pinnately parted, with thin spines along margin. Involucre bracts somewhat obtuse, spinescent.....105. **C. brevipapposum** Tschern.
72. Leaves pinnately lobed, with unequal, more or less hard spines on margin. Stems simple, with large, solitary terminal capitula. Involucre bracts terminating in more or less short, hard spines. Florets yellowish.....104. **C. frickii** Fisch. and Mey.
- + Leaves entire or more or less sinuate-toothed, ciliate from long, thin spines. Stem with 2–3 capitula clustered at apex. Involucre bracts scarcely spinescent. Florets red or yellowish.....73.
73. Florets red. Leaves entire.....100. **C. simplex** C.A.M.
- + Florets yellowish. Leaves longer, pinnately lobed.....101. **C. armenum** DC.
74. Stem more or less winged to apex or only in lower part.....75.
- + All leaves sessile or only with somewhat decurrent auricles.....88.
75. Capitula small, up to 15 mm in dia, in terminal clusters. Outer involucre bracts very small, imbricate, slightly obtuse with barely noticeable spine. Leaves deeply pinnately divided into narrow lobes; basal leaves numerous; cauline leaves with decurrent wings.....86. **C. palustre** (L.) Scop.
- + Capitula medium-sized or smaller. Outer involucre bracts usually more or less strongly spinescent. Leaves shallowly lobed, with broader lobes, or almost entire.....76.
76. Stems more or less winged throughout. Capitula more or less in terminal clusters, less often solitary.....77.
- + Stems winged only in lower part or lower leaves more or less decurrent into internodes. Capitula solitary, antrorse; involucre subglabrous, imbricate.....86.

77. Leaves on lower or both sides more or less grayish-arachnoid, less often white-tomentose beneath.....78.
 + Leaves usually elongate, glabrous or very thinly arachnoid-pubescent on both sides.....81.
78. Plants tall, with large leaves. Leaves more or less grayish-arachnoid-hairy on both sides or beneath. Capitula 18–25 mm in dia.....79.
 + Plants short. Leaves white-tomentose beneath or grayish-tomentose on both sides. Capitula small, to 15 mm in dia.....80.
79. Stem winged throughout. Leaves grayish-tomentose on both sides, less often greenish and thinly arachnoid-hairy above. Capitula in clusters of 2–3 on stem top, sometimes solitary, projecting above leaves.....95. *C. svaneticum* Somm. and Lev.
 + Stem more winged in lower part. Leaves grayish-arachnoid beneath, subglabrous above. Capitula smaller, solitary or in clusters of few.....96. *C. uliginosum* (MB.) MB.
- 65 80. Plants grayish-arachnoid. Leaves entire or pinnately lobed. Capitula in terminal clusters on stem and branches.....97. *C. subinermis* Fisch. and Mey.
 + Stem and lower side of leaves white-tomentose-pilose. Leaves deeply pinnately cut into crowded segments....98. *C. rhabdotolepis* Petrak
81. Capitula 15–25 mm in dia, in terminal clusters of few or solitary. Roots usually string-like.....82.
 + Capitula small, to 15 mm in dia, solitary, usually crowded at stem tips. Rhizome producing more or less tuberously, thickened, less often string-like roots.....84.
82. Leaves broadly decurrent on stem, more or less deeply pinnately lobed; lobes and teeth of leaves and wings strongly spinescent. Capitula in terminal clusters.....90. *C. elbrusense* Somm. and Lev.
 + Stem more or less broadly winged. Capitula solitary or in terminal clusters of few.....83.
83. Plants glabrous with branched stem. Capitula solitary with single subtending, terminal leaf; leaves decurrent.....91. *C. albowanum* Somm. and Lev.
 + Stem unbranched. Capitula solitary or few at stem tip. Leaves with acuminate spiny lobes; terminal leaves usually somewhat surpassing capitula.....89. *C. hygrophilum* Boiss.
84. Stem with lobed, long-spinose wings. Leaves stiff, with lobes tapered to long, yellowish spines. Involucral bracts pale yellow, terminating in thin spines. Florets pale pink.....92. *C. apiculatum* DC.
 + Leaves and wings with smaller spines. Involucral bracts dark purple, terminating in short spine.....85.
85. Involucral bracts floccose on margin, terminating in very short spine. Leaves almost entire or sinuately lobed; upper cauline leaves strongly

- reduced, subglabrous or sparsely arachnoid-hairy.....
94. **C. alatum** (S.G. Gmel.) Bobr.
- + Involucral bracts subglabrous, narrowed to thin small spine. All
 cauline leaves glabrous, gradually reduced toward stem tip.....
93. **C. elodes** MB.
86. Leaves entire or finely toothed, glabrous above, bluish beneath,
 sparsely pilose along veins; lower cauline leaves with narrow decur-
 rent wings.....80. **C. serratuloides** (L.) Hill.
- + Leaves usually pinnately lobed. Stem winged in lower part.....87.
87. Cauline leaves oblong, more or less acuminate, shallowly pinnately
 lobed, usually glabrous.....81. **C. schischkinii** Serg.
- 66 + Leaves broadly linear or linear-lanceolate, more or less arachnoid-
 hairy beneath; sinuately-pinnately lobed; lower internodes
 winged.....82. **C. komarovii** Schischk.
88. Cauline leaves sessile, usually semiamplexicaul.....89.
- + Cauline leaves auriculate or with narrow, short, decurrent wing....104.
89. Leaves entire, more or less toothed or slightly incised, with broad,
 short segments.....90.
- + All or only lower cauline leaves deeply pinnately divided into more
 or less elongate, broad or narrow segments.....99.
90. Plants with tall stem and large cauline leaves. Involucral bracts
 imbricate. Capitula in terminal clusters or solitary, more or less
 projecting above subtending leaves.....91.
- + Plants with short stem, densely leafy. Leaves small, entire, grayish-
 arachnoid-hairy beneath. Capitula solitary, terminal on stem and
 branches; subtended by apical leaves as long as capitula or
 longer.....98.
91. Leaves glabrous above, green or thinly arachnoid-hairy in places,
 white-tomentose beneath. Involucre dark purple.....95.
- + Leaves on both sides glabrous or grayish-arachnoid beneath. In-
 volucral bracts gradually becoming longer inward.....92.
92. Leaves glabrous above, thinly grayish-arachnoid-hairy beneath,
 broadly ovate; lower leaves lobed, long-petiolate. Capitula short-
 pedunculate, solitary or in clusters of 2-7
65. **C. waldsteinii** Rouy.
- + Leaves on both sides glabrous or curly-pilose beneath on veins.
 Capitula in terminal clusters, less often solitary.....93.
93. Leaves oblong-elliptic, glabrous, sessile, semi-amplexicaul. Involuc-
 ral bracts more or less broadened, scarious in upper part on mar-
 gin, terminating in short spine.....64. **C. oblongifolium** C. Koch
- + Leaves broadly ovate, spinulose along margin; involucral bracts
 gradually tapered to small, thin spines.....94.

94. Cauline leaves entire, crenate-toothed.....62. *C. kusnetzowianum* Somm. and Lev.
 + Cauline leaves pinnately divided up to middle; into more or less broad segments.....63. *C. sychnosanthum* Petrak
95. Leaves broad, entire or divided, short-acuminate or obtuse. Capitula solitary or in clusters of few on long, sparsely leafy branches; involucre bracts blackish-purple; outer bracts triangular-ovate, inner linear-lanceolate.....66. *C. hypoleucum* DC.
 + Leaves broad, more or less acuminate.....96.
96. Lower cauline leaves palmately or more or less pinnately divided or all leaves entire, lyrate at base. Capitula solitary on elongate peduncles.....72. *C. heterophyllum* (L.) Hill.
- 67 + All leaves entire or very rarely lower leaves lobed.....97.
97. Leaves more or less thin, sharply sinuate-toothed, spinescent. Capitula usually in terminal clusters, less often solitary on crowded branches.....73. *C. helenioides* (L.) Hill.
 + Leaves coriaceous, toothed. Capitula solitary terminal on highly elongated, leafless branches.....74. *C. dealbatum* MB.
98. Leaves finely toothed or entire, spinose-ciliate. Apical leaves subtending capitula narrow, 1–2, rarely larger, usually not surpassing capitula.....78. *C. vlassovianum* Fisch.
 + Leaves erose-toothed, spinulose on margin, spinules considerably shorter on lateral, elongate shoots than on lower and middle cauline leaves. Apical leaves more numerous, more or less surpassing capitula.....79. *C. coryletorum* Kom.
99. Apical leaves close to base of capitula like involucre and more or less surpassing them.....100.
 + Apical leaves not surpassing capitula, or capitula on long almost leafless peduncles.....101.
100. Capitula in terminal clusters of few. Apical leaves ovate, yellowish-green like cauline leaves, finely spinose along margin. Florets yellowish.....69. *C. oleraceum* (L.) Scop.
 + Capitula solitary terminal on stem and branches, surrounded by numerous whitish, deeply pinnately divided bracteal leaves, with long and thin spines along margin 99. *O. obvallatum* (MB.) MB.
101. Leaves more or less crisp-pilose beneath, or grayish-arachnoid, deeply pinnately divided, sinuately-acutely toothed. Capitula on tomentose-pilose peduncles.....102.
 + Leaves thin, glabrous, green above, bluish-beneath or pilose along veins, more or less pinnately divided. Capitula on long, sparsely pilose peduncles.....103.

102. Capitula erect or on drooping peduncles. Involucral bracts with dark resinous-glandular band on outer side. Leaves thick, with small lobes.....67. **C. maackii** Maxim.
 + Capitula drooping from base. Involucral bracts without resinous band. Leaves thinner, usually with more or less broad lobes.....68. **C. schantarense** Trautv. and Mey.
103. Capitula usually solitary. Outer involucral bracts with dark resinous-glandular bands on outer side. Florets lemon yellow.....71. **C. erysithales** (Jacq.) Scop.
 + Capitula terminal in clusters of 2–5. Outer involucral bracts without resinous band. Florets purple.....70. **C. rivulare** (Jacq.) All.
- 68 104. Leaves entire or more or less toothed, somewhat grayish-arachnoid-hairy beneath or on both sides; cauline leaves with somewhat decurrent auricles.....105.
 + Leaves glabrous, toothed or shallowly lobed; lower cauline leaves with narrow, somewhat decurrent wings.....107.
105. Leaves broadly ovate or broadly elliptical, coarsely toothed, with both sides also densely grayish-arachnoid-hairy. Outer involucral bracts tapered to recurved, short-spinescent tip.....76. **C. biebersteinii** Charadze
 + Lower cauline leaves narrower, lanceolate or linear-lanceolate, thinly arachnoid-hairy.....106.
106. Leaves entire, thinly covered with small, basally torulose hairs above, arachnoid-hairy beneath, densely spinose-ciliate. Capitula solitary on long leafless peduncles.....77. **C. pannonicum** (L. fil.) Link.
 + Leaves entire, sometimes lower leaves pinnately divided, with few segments, more or less thinly arachnoid-hairy, spinose-ciliate; upper leaves usually reduced. Capitula solitary or in clusters of 2–3 on long, few-leaved peduncles.....75. **C. canum** (L.) All.
107. Florets red. Capitula solitary on short peduncles, usually in lax panicles. Cauline leaves broadly oblong-ovate or ovate, slightly lobate-toothed; middle and upper cauline leaves broadly amplexicaul, lower scarcely decurrent.....87. **C. depilatum** Boiss. and Bal.
 + Florets purple-red. Capitula solitary or in clusters of 2–3 in corymbose-paniculate inflorescences. Leaves oblong, elliptical, pinnately lobed; middle and upper cauline leaves sessile, semiamplexicaul, lower somewhat decurrent.....88. **C. hygrophiloides** Charadze
108. Leaves on both sides glabrous, very rarely floccose-arachnoid, usually entire, more or less elongate, less often remotely pinnately toothed, sessile, with small, appressed spines along margin. Stems not winged, less often lobately winged below.....108. **C. setosum** (Willd.) MB.

- + Leaves more or less pinnately parted, sessile, sometimes with more or less decurrent prickles. Stem not winged, less often with narrow-winged, long-spinose internodes below.....109.
109. Stem and leaves, particularly beneath, densely, grayish and almost tomentosely hairy; leaves shallowly sinuate-lobed, sometimes almost entire.....109. *C. incanum* (S.G. Gmel.) Fisch. ex MB.
- + Leaves on both sides glabrous or thinly arachnoid beneath.....110.
110. Leaves more or less small and stiff, with elongate lobes and teeth more or less strongly spinescent; lower cauline leaves sometimes decurrent on internodes, with long, thin spines. Involucral bracts purple-violet.....111. *C. arvense* (L.) Scop.
- 69 + Leaves stiff, coriaceous, with both sides glabrous or thinly grayish-arachnoid, shallowly sinuate-lobed, with teeth abruptly narrowed into small, hard spines. Involucral bracts usually stramineous.....
.....110. *C. ochrolepidium* Juz.

Section 1. Caucasigena Charadze in Addenda XXVII, 600.—Sect. *Epitrachys* auct. non DC. in Duby, Bot. Gall. I (1828) 286; Boiss. Fl. or. III (1875) 523 p. p.; C. Koch in Linnaea, XXIV, 396 p. p., pro gen.—*Eriolepis* Cass. in Dict. Sc. nat. XXV (1825) 172 p. min. p., pro gen.; DC. Prodr. VI (1837) 635 p. min. p., pro sect.—*Lophiolepis* Cass. in Dict. Sc. nat. XXVII (1823) 180 p. min. p., pro subgen., XXXV (1825) 71, pro gen.; DC. Prodr. VI (1837) 634 p. p., pro sect.—Capitula drooping. Involucre more or less arachnoid-hairy; involucral bracts entire or spinose-ciliate along margin, oblong-ovate or lanceolate in lower part, linear-lanceolate above, strongly narrowed into long, hard spine. Florets red, less often whitish; corolla tube narrow usually more or less surpassing limb. Achenes 5–6 mm long. Leaves large with broad lamina, more or less deeply sinuately-pinnately divided or lobed, densely covered above with spiny bristles. Mostly perennials with ascending, apically branched stems and more or less numerous capitula clustered in paniculate, less often capitate common inflorescence.

Type of section: *C. caucasicum* (Adams) Petrak.

Note. The species with drooping but not erect capitula and long-spinose involucral bracts are somewhat isolated, exhibiting definite genetic affinity with the ancient Colchid subsection *Aggregata* Petrak, which we include [as a series] in section *Caucasigena*. The range of the section if confined mainly to the Caucasus; only a few of the species grow in the adjoining areas of Asia Minor.

The majority of the species belong to the xerophilous representatives of forest vegetation, which grow in open forests, in tall herb vegetation, and along forest edges from the mid-montane to subalpine

zone. Of these species, *C. sommieri* Petrak from Asia Minor is particularly distinguished by its more xerophilous habit.

Series 1. Aggregata (Petrak) Charadze comb. nova.—*Aggregata* Petrak in *Bibl. Bot.* 78 (1912) 6, pro subsect.—Leaves sessile, pinnately lobed or almost undivided. Capitula small, in capitate inflorescence on apices of stem and branches, oblong. Involucral bracts more or less appressed, outer ones attenuated into long hard spines, small-toothed.

1. *C. aggregatum* Ldb. *Fl. Ross.* II (1846) 737; Boiss. *Fl. or.* III, 537; Grossh. *Fl. Kavk.* IV, 180; Kolak. *Fl. Abkhazii*, IV, 272; Charadze in *Fl. Gruzii*, VIII, 490; Dmitr. *Opred. Rast. Adzh.* 275.—*C. aggregatum* var. *macrophyllum* Alb. *Prodr. Fl. Colch.* (1895) 143.—*Ic.*: Dmitr. *op. cit.* Fig. 31.

Perennial. Stem up to 1 m high, robust, ascending, dark green or somewhat purple, slightly angular, sulcate, scatteredly crisped hairy, leafy up to tip, with terminal capitate inflorescence of small capitula, weakly branched, with 1–2 slender axillary shoots bearing few undeveloped capitula at apex. Cauline leaves green, densely covered above with long, thin, spiny bristles, densely grayish-arachnoid-hairy beneath; lower leaves oblong-ovate, deeply-pinnately divided into broadly ovate, sinuately biparted lobes, narrowed toward base to semiamplexicaul petiole, acute, spinose-ciliolate on margin, acuminate, with teeth terminating in yellowish spines; middle and upper cauline leaves usually like lower, 10–15 cm long, 5–7 cm wide, ovate, pinnately divided into broadly ovate lobes or almost undivided, sessile, amplexicaul. Lower leaves large, in var. *macrophyllum* Alb., with few lateral segments and 3-lobed terminal segment; middle and upper cauline leaves almost undivided or pinnately toothed; broadly lobate apical leaves at base of inflorescence surpassing it and usually recurved. Capitula terminal, 6–10 in capitate inflorescence, less often solitary or 2–3 at tip of short, axillary branches, globose-ovate, 12–17 mm in dia, 15–20 mm long. Involucre sparsely arachnoid-hairy, greenish or purple; outer involucral bracts glabrous or with scattered arachnoid hairs, carinate, small, lanceolate, finely serrate, gradually attenuated into elongate, green, linearly-subulate point with long spine; inner bracts oblong-lanceolate, with shorter spines; florets red, less often white, 13–15 mm long, with long, narrow tube, limb to 5 mm long, 5-parted almost to middle. Pappus slightly shorter than florets, sordid white, with hairs almost plumose up to tip; inner hairs slightly enlarged above; achenes brownish-reddish-brown, 5–6 mm long. Flowering July to August.

Upper forest and lower alpine zones, in meadows and tall herb vegetation.—*Caucasus*: Western Transcaucasia (Gornaya Racha, Adzharia, Guria). *General distribution*: Asia Minor (Lazistan). Described from Guria. Type in Leningrad.

Note. It stands somewhat isolated in the section, apparently being an ancient colchid species. It has not yet been well studied.

The variety *C. aggregatum* var. *macrophyllum* Alb., described from Abkhazia, is distinguished by the form of the leaves, purple-colored involucre bracts, and purplish florets. Similar specimens are also known from Adzharia.

- 71 *Series 2. Colchica* Charadze.—Capitula oblong, up to 20 mm in dia, in clusters of 2–3 or solitary, forming corymbose-paniculate inflorescence. Involucre bracts sharply serrate, scabrous or ciliate from thin spiny bristles.

2. *C. gagnidzei* Charadze in Addenda XXVII, 600.

Perennial. Stem erect, up to 1 m high, robust, ribbed, slightly sulcate, subglabrous, simple, with short branches near tip, purplish, leafy to apex. Leaves sessile, oblong, green above, with small dense bristles; bluish, more or less arachnoid-hairy beneath, with prominent subglabrous veins; lower leaves narrowed toward base into lobate long-spinose petiole, almost to base pinnately dissected into 2-lobed ovate-deltoid segments, on margin with thin appressed spines; lobes and teeth of segments terminating in hard, yellowish 5–7 mm-long spines; middle cauline leaves auriculate, semiamplexicaul, deflected, to 15 cm long, 7 mm wide, deeply sinuately pinnately divided into ovate-deltoid, 2-fid, toothed strongly spinescent lobes; upper leaves reduced, sinuately-pinnately lobed; apical leaf 1, at base of capitula small, recurved, lanceolate, pinnately toothed, somewhat surpassing capitulum. Capitula subsessile, in clusters of 2–3 or solitary terminal on stem and short branches, oblong at beginning of flowering, later ovate-globose, forming corymbose common inflorescence. Involucre 10–20 mm in dia, at base weakly, in upper part more or less densely arachnoid-hairy; involucre bracts greenish, lanceolate, carinate, attenuated from middle into upward directed or spreading, yellowish, thin spines; lower bracts small, subglabrous; middle elongate, in upper part arachnoid-hairy; inner bracts linearly lanceolate, with elongated, filiform, curved acute point. Florets purple; corolla 20 mm long, limb parted almost up to half, equaling narrow tube. Pappus sordid white, with long, scabrous tip of inner hairs; mature achene unknown. Flowering August.

Subalpine tall herb vegetation at 1,750–1,900 m.—*Caucasus*: Western Transcaucasia. Described from basin of Mzymta River (Psekakho Ridge). Endemic. Type in Tbilisi.

Note. It occupies a distinct position in the section. On the basis of its small capitula in clusters of 2–3 and upward-directed spines, it can only be close to *C. aggregatum* Ldb.

3. *C. longiflorum* Charadze in Addenda XXVII, 601.

Perennial. Stem to 150 cm high, more or less strongly branched from middle, leafy up to tip, weakly sulcate, purplish, slightly bluish, scatteredly arachnoid-hairy in upper part. Leaves elliptical or oblong-elliptical, gradually reduced toward stem apex, 4–17 cm long, 1.5–7.0 cm wide, broadly, deeply pinnately divided into more or less oblong-lanceolate or deltoid lanceolate 2–3(5)-parted segments; lobes of segments terminating in sharp, long, stiff, yellowish-white, 5–10 mm-long spines; all leaves dull-green above from somewhat scattered, yellowish-white bristles and very small scattered hairs, grayish-tomentose beneath, with prominent, thinly pubescent whitish veins; apical leaves near base of capitula, usually small, lanceolate, usually 2–3, shorter than involucre or almost as long. Capitula numerous, divergent or horizontal, on short peduncles, usually 1.5–2.0 cm in dia, with florets 3.0–3.5 cm long, 2–7, less often solitary at stem tip and on lateral leafy, usually more or less divergent branches surpassing stem apex, forming lax corymbose-panicles. Involucre subglabrous or with occasional scattered, arachnoid-hairs, usually more or less dark purple; outer bracts lanceolate, carinately convex, dorsally keeled in upper part, densely imbricate, narrowed from middle to long, upward directed, spreading, stiff, yellowish spines, ciliolate on margin, scabrous; inner bracts linear-lanceolate, scarious, acuminate, with thin, dark colored, curved filiform point, scabrous along margin, very finely, sharply serrate. Florets purple. Corolla 20–22 mm long, limb deeply 5-parted; corolla tube narrow, almost as long as or somewhat shorter than limb. Pappus 16 mm long, sordid white; inner hairs of pappus plumose, with somewhat thickened, scabrous tip; achenes 4.5 mm long, 2.3 mm wide. Flowering August to September.

Mid-montane zone, post-forest glades.—*Caucasus*: Western Transcaucasia (ravine of Mzymta River). Endemic. Described from Krasnaya Polyana. Type in Tbilisi.

Note. In the structure of its involucre this species is closer to *C. gagnidzei* Charadze and, possibly, is its xerophilized derivative. From the latter it is distinguished by leaves deeply incised into narrow segments and numerous elongated capitula.

4. *C. czerkessicum* Charadze in Addenda XXVII, 602.

Perennial. Stem up to 200 cm high, ascending, from middle branched above, blackish-purple, slightly sulcate, leafy to apex, with



upward directed, somewhat divergent branches, subglabrous, with sparse, scattered, crispate appressed hairs. Cauline leaves sessile, narrowed toward apex; lower leaves with long, semiamplexicaul auricles, somewhat densely covered above with appressed spiny bristles, and crispate hairs along veins, pale green beneath and with scattered floccose hairs or thinly grayish-tomentose, 25 cm long and 10 cm wide, deeply sinuately-pinnately lobed with distinct deltoid-ovate, 2–3(5)-lobed segments, thinly spinose-ciliate along margin, lobes terminating in sharp, thin, 4–8 mm long spines, with up to 12 mm-long yellowish spines at base of leaves, oblong elliptical; other leaves, like lower, gradually reduced toward stem apex; middle leaves 17 cm long and 8 cm wide, upper oblong-lanceolate; apical leaves 4–5 cm long, subtending and somewhat surpassing capitula. Capitula few, oblong, 15–22 mm in dia, with florets up to 3 cm long, nodding; terminal capitula solitary or 2 each on short, erect peduncles, axillary capitula undeveloped or strongly reduced; capitula crowded at stem apex and divergent branches in short corymbose-paniculate inflorescence. Involucre glabrous in lower part, sparsely arachnoid-hairy in upper, with somewhat recurved, small, yellowish spines; outer bracts small, oblong, convex, slightly carinate, yellowish-green, less often purple, terminating in sharp, falcately recurved, short spine, more or less densely spinose-ciliate on margin from upward directed, yellowish spines; inner bracts scarious, linear-lanceolate, terminating in sharp, thin, almost filiform, recurved cusp, on margin finely, sharply serrate-dentate, scabrous in upper part, slightly arachnoid-hairy or glabrous; florets lilac-red. Corolla to 22 mm long, with narrow tubes to 10 mm, limb parted up to 1/3. Pappus sordid-white with inner hairs plumose almost up to apex, with slightly enlarged scabrous tips. Flowering August to September.

Subalpine zone, in tall herb vegetation and in secondary semi-tall herb meadows.—*Caucasus*: Ciscaucasia (basin of Kisha and Urushten rivers), Western Transcaucasia (in upper reaches of Mzymta-Achishkho River). Described from basin of Kisha River. Endemic, Type in Tbilisi.

Note. It is distinguished from *C. gagnidzei* Charadze and *C. longiflorum* Charadze by ciliate outer involucre bracts with tiny spines on the margin and by shorter lower bracts tapered to short spines.

Specimens from the northern as well as the southern slopes of the Greater Caucasus that deviate from the type are distinguished by a purple-colored involucre and weakly developed small spines on the margin of involucre bracts.

Series 3. Caucasica (Petrauk) Charadze comb. nova.—Sect. *Epitrachys* DC. subsect. *Eriophora* Petrauk 4. *Caucasica* Petrauk in *Bibl. Bot.* 78 (1912) 6.—Capitula large- or medium-sized, ovate or globose-

ovate, nodding. Involucre more or less densely arachnoid-hairy to tomentose. Involucral bracts attenuated into long, erect or recurved spines.

5. **C. imereticum** Boiss. Fl. or. III (1875) 537; Somm. and Lev. in Nuov. Giorn. Bot. Ital. N. S. II, 1, 14; Petrak in Tr. Tifl. Bot. Sada, 75 XII, 1, 33; Grossh. Fl. Kavk. IV, 184; Charadze in Fl. Gruzii, VIII, 507; Dmitr. Opred. Rast. Adzh. 277; Kolak. in Rast. Mir. Kolkh. 204.

Perennial. Stems erect, slightly sulcate, purple or greenish, glabrous, finely arachnoid-hairy above, ascending, shortly-corymbosely branched near apex. Leaves oblong, deeply sinuately-pinnately divided into deltoid, lanceolate, irregularly 2-3-parted toothed segments; all lobes thinly spinose-ciliate on margin, tapered to 5-12 mm-long, hard spine; leaves densely covered above with small appressed bristles, grayish, loosely tomentose beneath; middle cauline leaves to 15 cm long, 9-10 cm wide, sessile, semiamplexicaul, upper ones reduced; subtending apical leaves small, remote from capitulum, linear-lanceolate, recurved. Capitula globose-ovate, nodding, terminal on stem and axillary branches, solitary or few, usually 2-5, subsessile. Involucre 2.5-3.5 cm in dia with long, reddish-purple spines, weakly arachnoid-hairy; outer and middle involucral bracts entire, lanceolate, slightly carinate, abruptly tapered to thin, long, purple, recurved spines, slightly arachnoid-hairy; inner bracts linear-lanceolate, scarious, tapered to long, thin, deflected spines; florets red. Corolla to 28 mm long, limb to 13 mm long. Pappus sordid-white with brownish, toothed tips of inner hairs. Achenes dark brown, 5.5 mm long. Flowering August to September.

Herb slopes, at upper limits of forest zone.—*Caucasus*: Western Transcaucasia (Imeretia, Adzharia, Abkhazia). Endemic. Described from Imeretia (between Olizmereti and Zekari). Type in Leningrad.

Note. It is an obscure species described from incomplete specimens collected by Ruprecht from Imeretia. It is distinguished from *C. adjaricum* Somm. and Lev., by narrow, weakly pubescent involucral bracts, terminating in long purple spines. We had no opportunity to examine the specimen from Adzharia cited by Petrak as *C. imereticum* Boiss. This specimen is likened by Petrak to *C. caucasicum* ssp. *cladophorum* Petrak.

6. **C. kemulariae** Charadze in Zem. po. Sist. i Geogr. Rast. Tbil. 23 (1963) 112.—**lc.**: Charadze *ibid.*

Perennial. Rhizome thickened, woody; stems ascending, erect, usually 1-3, 70-80 cm high, yellowish or reddish, slightly angular, sparsely arachnoid-hairy, simple or weakly branched above, leafy to tip. Leaves densely covered above with small, somewhat appressed,

76 spiny bristles, subglabrous beneath or on veins slightly arachnoid-hairy, less often scatteredly floccose, deeply pinnately divided, with more or less remote ovate-lanceolate or broadly lanceolate, unequally 2-fid, toothed segments, teeth and lobes tapered into spines 3.5–5.0 mm long, thinly spinose-ciliate; basal and lower cauline leaves on long, semiamplexicaul petioles, oblong-elliptical, almost up to base pinnately parted, petioles 21–25 cm long, lamina 9–10 cm wide; middle and upper cauline leaves sessile, semiamplexicaul, oblong-lanceolate to ovate-lanceolate, pinnately divided to middle or deeper into 2-parted lanceolate or deltoid-lanceolate lobes, up to 12 cm long, 5.5 cm wide, reduced to 2 cm in length toward apex. Capitula at beginning of flowering somewhat oblong, 1.5–2.0(2.5) cm in dia, solitary terminal on stem and its branches, short-pedunculate, few, more or less in compact corymbose-paniculate inflorescence. Involucre yellowish-floccose-arachnoid-hairy; involucre bracts narrowly lanceolate, carinate, gradually tapered into spines thin, basally arachnoid-hairy and purple; outer bracts small, 3–4 mm long, longer toward inner side; inner bracts linear-lanceolate with thin, curved spines; florets purple, 26–27 mm long. Corolla limbs to 14 mm long, parted almost to 2/3. Pappus 20–21 mm long, at base brownish, sordid-white above, with somewhat attenuated scabrous tips of inner hairs; achene dark brown, about 5 mm long. Flowering August to September.

Stony habitats in mid-montane zone, in chestnut forest clearings.—*Caucasus*: Western Transcaucasia (Imeretia). Endemic. Described from upper reaches of Kvirila River. Type in Tbilisi.

Note. So far it is known only from one locality on the basis of M.F. Sakhokia's collections. In the structure of involucre it shows much resemblance to the western Caucasian species *C. chlorocomos* Somm. and Lev., from which it differs mainly by having purple and not whitish florets, smaller capitula, and thinly spiny leaves. From *C. adjaricum* ssp. *nutans* Petrak, to which it is similar in its purple-colored involucre and florets, it is distinguished by smaller capitula and leaves with small prickles.

7. **C. chlorocomos** Somm. and Lev. in Tr. Peterb. Bot. Sada, XII, 1 (1892) 154, XVI (1900) 257; Grossh. Fl. Kavk. IV, 184; Kolak. Fl. Abkhazii, IV, 271; Charadze in Fl. Gruzii, VIII, 502.—**lc.**: Somm. and Lev. op. cit. (1900) tab. XXV.—**Exs.**: Fl. cauc. exs. No. 373.

Perennial. Stem up to 1 m high, slightly sulcate in upper part, with erect branches, more or less densely arachnoid-hairy or tomentose, with numerous capitula forming lax paniculate common inflorescence. Leaves more or less densely covered with small, appressed, spiny bristles above, snow-white beneath because of dense tomentose pubes-

cence; lower and middle cauline leaves large, ovate-lanceolate, to 20–25 cm long and 10–18 cm wide; all leaves deeply pinnately parted into
 77 broad, almost rhomboid, unevenly 5-fid, subacute lobes, of these shorter lobes toward leaf apex, bearing at apex yellowish, 5–10 mm-long spine; lower leaves narrowed toward base into elongated, spiny-toothed petiole; middle leaves sessile, auriculately expanded at base, with long spiny-toothed, semiamplexicaul; upper leaves on long axillary shoots strongly reduced, lanceolate, pinnately toothed, with long yellowish spines; apical leaves at base of capitula 1–2, subtending capitula, linear-lanceolate, not surpassing capitula. Capitula terminal on stem and branches, solitary or in clusters of 2–3, nodding, pitcher-shaped, expanded at base, slightly narrowed in upper part, 1.5–3.0 cm in dia. Involucre densely arachnoid-hairy, almost tomentose with yellowish hairs, usually reaching tips of falcately recurved spines, forming checkered pattern of involucre; involucre bracts lanceolate-linear, yellowish, terminating in recurved spines; spines considerably shorter, in lower bracts than middle ones, 10–11 mm, inner bracts almost linear, with acute point: florets pinkish-white, 25–28 mm long, with 12–15 mm-long limb. Pappus hairs yellowish-white, with brownish, toothed tips of inner hairs; achene brown, to 5 mm long. Flowering July to August.

Mainly in subalpine zone on talus, alluvial fans, occasionally in upper zone of dark coniferous forests along edges or in lower alpine zone up to 2,600 m.—*Caucasus*: Western Ciscaucasia (upper Kuban), Western Transcaucasia (Abkhazia, Svanetia). Endemic. Described from two specimens from Dzhodisvik Pass (between Svanetia and Abkhazia) and from Klukhor Pass. Syntypes in Florence, isotypes in Leningrad and Tbilisi.

Note. In the series *Caucasica*, *C. chlorocomos* Somm. and Lev. is distinguished by white or slightly pinkish florets. The snow-white pubescence of the leaves and yellowish-tomentose involucre impart to this plant quite an ornamental appearance. The range of this species is restricted to the upper regions of the Kuban River in the western part of the Greater Caucasus, and on its southern slope this species is known from the upper reaches of the Chkhaltá, Seken and Nenskrira rivers.

Specimens slightly differing from the type have been collected in Western Transcaucasia (Tsebelda). There we also find the hybrid forms annotated in the herbarium by Yu. N. Voronov as \times *C. tsebelidinum* Woron. (*C. lanceolatum* \times *C. chlorocomos*).

The hybrid specimens are close to *C. vulgare* (Savi) Ten. and are distinguished by short decurrent leaves and erect capitula in contrast with the drooping capitula of *C. chlorocomos* Somm. and Lev. Speci-

mens of the latter species from Tsebelda differ from the typical ones by involucre bracts with thinner apical spines, the somewhat spiny-ciliate margin of the lower involucre bracts, and the loose tomentose pubescence of the dorsal surface of the leaves. The pollen analysis to assess the hybrid nature of these specimens conducted by I.S. Shtepa 78 does not provide any basis to consider them as hybrids. Specimens deviating from *C. chlorocomos* Somm. and Lev. have been identified by Petrak as *C. chlorocomos* Somm. and Lev. *non typicum* or by the authors of the Flora of Caucasus as *C. tsebelinum* Woron.

8. ***C. caucasicum*** (Adams) Petrak in Tr. Tifl. Bot. Sada, XII, 1 (1912) 38; Grossh. Fl. Kavk. IV, 184; Charadze in Fl. Gruzii, VIII, 493.—*C. caucasicum* ssp. *cladophorum* Petrak in schedis p. p.; Grossh. Fl. Kavk., IV, 184 p. p.—*Carduus caucasicus* Adams in Web. and Mohr. Beitr. Naturk. I (1805) 64.—*Cnicus horridus* MB. Fl. taur.-cauc. II (1808) 278, non *Carduus horridus* Adams (1805).—*Cirsium horridum* MB. Fl. taur.-cauc. III (1819) 558; Spreng. Syst. veg. 3, 373; DC. Prodr. VI, 638; Boiss. Fl. or. III, 537, non Petrak (1912).—**Exs.:** Pl. or. exs. No. 223; Petrak, Cirsioth. Univ. Nos. 137, 138.

Perennial. Stems to 100 cm high, ascending, thick, sulcate, weakly branched above, arachnoid-hairy to whitish-tomentose. Leaves green above, densely covered with very small appressed spiny bristles, more or less densely grayish- or whitish-tomentose beneath; almost all leaves pinnately divided usually to middle or deeper, with distant segments and elongate, lanceolate terminal segment, lateral segments oblong-ovate, sparsely spinulose along margin; segments usually irregularly 2-lobed, with elongated ovate and short deltoid-ovate lobes, very sparsely toothed, lobes and teeth narrowed to somewhat long, hard, yellowish, 8–15 mm-long spines; lower cauline leaves short-petiolate, oblong, sinuately-pinnately divided, basally narrowed to lobate, long-spiny petiole, to 30 cm long, 14 cm wide; other leaves sessile, semiamplexicaul, sinuately pinnately divided to middle or deeper, oblong or elongated-broadly lanceolate, middle leaves to 20 cm long, 8 cm wide, apical leaves strongly reduced, linearly lanceolate, lamina pinnately parted almost up to base, reduced lateral lobes abruptly tapered to long, hard spines. Capitula solitary or in clusters of 2–3 on long axillary shoots, less often small ones undeveloped; peduncles shorter than involucre, nodding, with 1–2 small, recurved, bracteal leaves at base of drooping capitula. Involucre (2.5)3–5 cm in dia, densely tomentose, surrounded by spreading or downward directed elongate spines; outermost involucre bracts tapered from broad base to linear-lanceolate, more or less arachnoid-hairy, recurved spines; outer bracts broadly lanceolate, glabrous, tapering to sharp, long, somewhat

79 recurved spines, arachnoid-hairy in lower part; inner bracts linear-lanceolate with thin, curved, soft cusp. Florets purple-red, to 30 mm long, with limb slightly shorter than narrow tube, to 1/3 divided. Pappus yellowish-sordid-white, apically toothed tips of inner hairs longer, darker; achene blackish-brown, to 5 mm long. Flowering August to September (Plate IV, Fig. 1).

Forest edges, stony habitats on slopes of the mountain gorges and river terraces.—*Caucasus*: Eastern Transcaucasia, Western Transcaucasia (Imeretia, rarely). *General distribution*: Asia Minor. Described from Georgia (gorge of Aragvi River). Type in Leningrad.

Note. In southern Georgia (Bakuriani, Abastumani) this species varies considerably in the form of the leaves, length of the spines on the involucre bracts, their color and other characters. Forms transitional to *C. adjaricum* Somm. and Lev. are also observed. *C. caucasicum* ssp. *cladophorum* Petrak, described by Petrak from Adzharia, is closer to *C. adjaricum* in its involucre bracts and, in part, is referred by me to the latter species. The status of var. *wwedenskyi* Petrak [Petrak in *Vestn. Tifl. Bot. Sada*, No. 24 (1912) 4] reported from the former Artvin District remains unclear. The single specimen of this variety preserved in Tbilisi appears to be a teratological plant and is close to *C. adjaricum* in certain characters.

J. Sojak [in *Nov. bot. Hort. bot. Univ. Carol. Prag.* (1961) 34] proposes for *C. caucasicum* var. *wwedenskyi* Petrak the new-combination *C. wwedenskyi* (Petrak) Sojak. I feel it's premature to erect a new species on the basis of an undeveloped specimen.

9. ***C. adjaricum*** Somm. and Lev. in *Nuov. Giorn. Bot. Ital. N. S.* II, 1 (1895) 14, in adnot. nom. legit.; Petrak in *Tr. Tifl. Bot. Sada*, XII, 1, 34, descr. emend.; Grossh. *Fl. Kavk.* IV, 184; Charadze in *Fl. Gruzii*, VIII, 493; Dmitr. *Opred. Rast. Adzh.* 277.—*C. adjaricum* ssp. *nutans* Petrak in *Tr. Tifl. Bot. Sada*, XII, 1 (1912) 37; Grossh. loc. cit.; Charadze, loc. cit. 493, in adnot.—*C. noli-tangere* Somm. and Lev. in *Nuov. Giorn. Bot. Ital. N. S.* II, 1 (1895) 11, non Borb. diagn. brev.; in *Tr. Peterb. Bot. Sada*, XVI, 255, descr. emend.—*C. caucasicum* ssp. *nutans* Petrak in schedis. (1913).—*C. caucasicum* ssp. *cladophorum* Petrak in *Tr. Tifl. Bot. Sada*, XII, 1 (1912) 38, quoad p1. ex Adzharia.—*C. puniceum* Sojak in *Nov. bot. Hort. bot. Univ. Carol. Prag.* (1961) 37.—**lc.**: Kharadze in *Fl. Gruzii*, VIII, Fig. 414.

Perennial. Stem 30–100 cm high, sulcate, arachnoid-hairy, more or less branched above, densely leafy below but very sparsely above. Leaves green above, densely covered with small spiny bristles, and sparse, more or less remote, thin, yellowish, usually long spines scattered throughout, grayish-tomentose beneath with prominent veins,

deeply sinuately pinnately divided into somewhat approximate, broadly deltoid-ovate segments; lateral segments short, 2-3-parted into, divergent deltoid ovate lobes, attenuated in sharp, hard, to 15 mm-long spines, unevenly and remotely toothed with teeth bearing more or less long spines; lower cauline leaves oblong-ovate or oblong-elliptical, 80 repandly pinnately divided almost to base, segments pinnately toothed, acute, narrowed toward base into very short, semiamplexicaul, long-spiny petiole, terminal segment, elongated, acuminate, leaves usually 15-25 cm long, 5-10 cm wide; basal leaves petiolate, 35 cm long, 18 cm wide; upper leaves reduced, ovate or ovate-oblong, sessile, semiamplexicaul, deeply pinnately divided, 6-7 mm long, to 4 cm wide; apical leaves linear-lanceolate, long-plumose-spiny, subtending capitula, usually recurved, almost as long as involucre. Capitula 2.5-3.5 cm in dia, solitary terminal on stem and branches or on short axillary shoots near stem tip, nodding, purple, sparsely floccose in lower part, thinly arachnoid-hairy above, with black-purple or dark green spots at base of spines. Lower and middle bracts ovate, carinate, concave outside, with thick keel, abruptly narrowed to subulate tip falcately recurved at base, arachnoid-hairy or tomentose, terminating in long, yellowish, basally purple, usually recurved or erect spines; inner bracts lanceolate, with thinner, curved spines; florets purple, to 30 mm long; corolla limb divided to 1/3, almost as long as narrow tube or slightly shorter. Pappus more or less yellowish-sordid-white, with somewhat extended, apically scabrous inner bristles; achenes dark reddish-brown-brown, 5.5 mm long. Flowering August to September.

Ravines of rivers, stony habitats, mid-montane to subalpine zone.—*Caucasus*: Western Transcaucasia (Adzharia). *General distribution*: Asia Minor (Lazistan). Described from Caucasus (Adzharia). Type in Florence.

Note. In the Adzhar-Imeretin Range it replaces *C. caucasicum* (Adams) Petrak, which is common in Eastern Georgia and is reported in Bakuriani along the southern border of its range. From this locality, which is also the eastern boundary of the range of *C. adjaricum*, several forms transitional to *C. caucasicum* are known; some of them had been described as *C. adjaricum* ssp. *nutans* Petrak and were subsequently called *C. caucasicum* ssp. *nutans* Petrak. We cannot rule out the possibility that at the confluence of their ranges these two species freely hybridize. Apparently such is the origin of *C. adjaricum* ssp. *nutans* Petrak. This subspecies has much shorter, generally recurved spines on the involucre bracts, as in *C. caucasicum*, but is purple-colored and floccose, as in *C. adjaricum*; leaves less spiny than in *C. adjaricum*, approaching the type of *C. caucasicum*. This form deserves more careful study. We also consider it better to refer *C.*

caucasicum ssp. *cladophorum* Petrak to *C. adjaricum*. The type ssp. *cladophorum*, described from Adzharia (Beshumi), is preserved in the herbarium of the Tbilisi Institute of Botany and is almost indistinguishable from *C. adjaricum* in the structure of capitula; only the 81 leaves are less deeply incised, with short and thin spines, which differentiates this form from both *C. adjaricum* and *C. caucasicum*.

Apparently one of the deviating forms is the new species *C. puniceum* Soják (in Nov. bot. Hort. bot. Univ. Carol. Prag. [1961] 35), described recently from Southern Transcaucasia (Adzharia, Shavshetia) on the border with Turkey. In this species the author notes characters transitional from *C. adjaricum* Somm. and Lev. to *C. caucasicum* (Adams) Petrak and speculates on its hybrid origin.

Series 4. Fimbriata (Petrak) Charadze comb. nova.—Sect. *Epitrachys* DC. subsect. *Ciliata* Petrak 3. *Fimbriata* Petrak in Bibl. Bot. 78 (1912) 5 p. p.—Involucral bracts ciliate or with scattered short spines on margin, attenuate into spiny-ciliate apex with somewhat long spines, usually recurved in outer bracts. Leaves broadly elliptical to oblong-ovate, pinnatifid to pinnate.

This series includes species of Caucasian origin, which in the Caucasus are forming closely related vicarious species, partly penetrating Asia Minor (Lazistan) and Iran. In the series *Fimbriata*, Petrak included species with ciliate involucral bracts, but which belong to different sections according to our division. I confine the scope of this series to only those species that can be referred to section *Caucasigena* Charadze, which are characterized by dropping and not erect capitula.

10. *C. erythrolepis* C. Koch in Linnaea, XVII (1843) 41; Ldb. Fl. Ross. II, 726; Boiss. Fl. or. III, 528; Grossh. Fl. Kavk. IV, 180 p. p.; Charadze in Fl. Gruzii, VIII, 504; in Zam. po Sist. i Geogr. Rast. Tbil. 22, 71, descr. emend.—*Epitrachys erythrolepis* C. Koch in Linnaea, XXIV (1851) 398.

Perennial. Stem ascending, up to 1.5 m high, densely leafy, simple, branched only above, sparsely leafy, dark-gray, sulcate, with scattered arachnoid and crispate hairs. Leaves biocolorous, dark-green above, sometimes with grayish spots, not densely spinose-hairy, at places thinly arachnoid-hairy, grayishly, loosely tomentose beneath, with prominent yellowish veins, ligneous toward apex of lobes, terminating in hard short spines; lamina pinnately dissected into irregularly 2-fid, oblong segments, with lanceolate, toothed lobes, terminating in hard, 3–4 mm-long spines; terminal segments of leaf elongate, acuminate, with 1–2 teeth on each side; all cauline leaves cuneately narrowed toward base,

basally expanded to long-spiny, semiamplexicaul auricles; middle cauline leaves 15–20 cm long, to 8 cm wide; upper leaves 5–6 cm long, 3.5 cm wide, deeply pinnately divided; apical leaves small, lanceolate. Capitula oblong, terminal, nodding, solitary or 2 each on long peduncles forming corymbose-paniculate common in florescence. Involucre sparsely arachnoid-hairy, 2–3 cm in dia, elongate above, somewhat narrowed at apex, with recurved, densely arachnoid-hairy, acute tip; involucre bracts dark purple, spinose; outer bracts small, lanceolate, subulately narrowed into long, hard spines, sparsely spinose; middle bracts with long, somewhat falcately recurved, spiny-ciliate and arachnoid-hairy subulate tip, terminating in short spine; inner bracts greenish-membranous, glabrous, linear-lanceolate, arachnoid hairy above, tapering to thin, sharp, horizontal tip. Florets dark purple-violet; corolla to 21 mm long, limb up to 14 mm long. Pappus dull white, inner hairs terminating in dark, scabrous-clavate tip; achenes reddish-brown, to 5 mm long. Flowering August to September.

Forest glades in mid-montane zone.—*Caucasus*: Western Transcaucasia (Gornaya Racha), Eastern Transcaucasia (South-Ossetia). Endemic. Described from Ossetia. Type was in Berlin; isotype in Leningrad.

Note. A species with a localized range, distinguished from other species of the series *Fimbriata* by the form of the deeply incised leaves, with elongate, slightly retrorse segments, as well as by the oblong capitula with a purple-colored involucre narrowed near the apex and short lower involucre bracts. The authors of the Flora of the Caucasus have wrongly referred specimens of *C. buschianum* Charadze and *C. sosnowskyi* Charadze to this species, which are easily distinguished from *C. erythrolepis* C. Koch by the form of the broader leaves and their segments and also by the globose-ovoid capitula.

11. *C. tricholoma* Fisch. and Mey. in DC. Prodr. VI (1837) 637; Fisch. and Mey. ex Hohen. in Bull. Soc. Nat. Mosc. VI, 251, nomen; ej. Enum. pl. Talysch. 281, descr.; Boiss. Fl. or. III, 528 p. p.; Grossh. Fl. Kavk. IV, 528 p. p.; Charadze in Fl. Azerb. VIII, 408.—*C. dimorphum* Petrak ex Grossh. Fl. Kavk. IV (1934) 180, pro syn.

Perennial. Stem up to 100 cm high, ascending, purple above, branched, thinly arachnoid-hairy. Cauline leaves oblong; middle leaves up to 12 cm long, 3.5–5.5 cm wide, pinnately incised into long, 2–3 fid segments, with broad sinuses; lobes of segments ovate or oblong, obtuse, with hard, up to 8 mm-long spines at tip, basally expanded into semiamplexicaul auricles, with long terminal segment of leaf, thinly spinose above, grayish-, finely-tomentose beneath; spinose-ciliate on margin. Capitula solitary, terminal on stem and its branches, to 4 cm

in dia, projecting above leaves and nodding. Involucre finely arachnoid-hairy; outer involucral bracts narrowly lanceolate, spinescent; inner bracts linear-lanceolate, purple, spinescent. Florets purple, up to 17
83 mm long. Pappus yellowish-white, with longer inner hairs attenuate in toothed, somewhat flattened tip; achene to 5 mm long. Flowering July to August.

Meadows, from mid-montane to subalpine zones.—*Caucasus*: Eastern Transcaucasia (Sarial Mountain in vicinity of Kirovabad, Murovdag Range). Endemic. Described from Sarial Mountain. Type in Leningrad; isotype in Tbilisi.

Note. It is an inadequately studied species, known from the collections of Hohenacker from Sarial Mountain in Azerbaidzhan. This very species was later collected by A. Shelkovnikov from the Murovdag Range. De Candolle mistakenly indicated Darial instead of Sarial. Boissier in *Flora Orientalis* cited the specimens of Hohenacker thus: "Mons Sarial Georgiae." However, this species does not grow in Georgia, although Caucasian authors have referred to it some species of the affinity of *C. osseticum* (Adams) Petrak, mainly from Western Transcaucasia. *C. tricholoma* Fisch. and May. is distinguished from all the species of this affinity by having the leaves deeply cut into narrower segments and the involucral bracts sparsely pilulose.

12. *C. osseticum* (Adams) Petrak in Tr. Tifl. Bot. Sada, XII, 1 (1912) 3 p. p.; Grossh. Fl. Kavk. IV, 180; Charadze in Fl. Gruzii, VIII, 489; in Fl. Azerb. VIII, 406.—*C. osseticum* ssp. *eu-osseticum* Petrak, loc. cit.—*C. fimbriatum* Spreng. Syst. veg. 3 (1826) 373; DC. Prodr. VI, 635; Ldb. Fl. Rossi II, 726; excl. pl. ex Imeretia; Boiss. Fl. or. III, 528.—*Carduus osseticus* Adams in Web. and Mohr. Beitr. Naturk. I (1805) 75.—*Cnicus fimbriatus* MB. Fl. taur.-cauc. II (1808) 276.—**Ic.**: Kharadze in Fl. Gruzii, VIII, Fig. 413.—**Exs.**: Petrak, Cirsioth. Univ. No. 87.

Perennial. Stem ascending, to 1 m high, with purple spots, sulcate, branched above, finely arachnoid-hairy. Leaves large, lower petiolate, others sessile; middle cauline leaves to 25 cm long, 14 cm wide, obovate, lamina pinnately divided to middle into broad, 2-fid, ovate segments obtusely toothed with short-spinescent teeth, narrowed toward apex, auriculate, semiamplexicaul; all leaves with somewhat scattered, appressed, spiny bristles above, more or less thinly grayish- or whitish-tomentose beneath; upper leaves reduced; 1–2 small, usually recurved apical leaves subtending capitula. Capitula solitary, terminal, few, in corymbose-paniculate inflorescence, 2.5–3.5 cm in dia. Involucre sub-glabrous in lower part, arachnoid-hairy above; outer and middle involucral bracts lanceolate, gradually tapered to linearly lanceolate,

84 long-spiny-ciliate tip terminating in more or less thin recurved spine; inner bracts linear-lanceolate with recurved spiny tips, basally arachnoid-hairy. Corolla bright-purple, 26–28 mm long, limb 14–15 mm long. Pappus yellowish-white with long, apically scabrous, inner hairs; achenes to 4 mm long. Flowering July to September.

Forest and subalpine zones, among shrubs.—*Caucasus*: Dagestan, Eastern Transcaucasia (Kuba District, Kazbeg District), Southern Transcaucasia. Endemic. Described from Georgian Military Highway. Type unknown; isotype in Leningrad (?).

Note. It is a widely but sporadically distributed species in the eastern Caucasus and Southern Transcaucasia. *C. osseticum* ssp. *bornmulleri* Petrak, reported by Petrak from Crimea, is so different from *C. osseticum* that it should have been included in section *Epitrachys* DC. as the separate species *C. sublaniflorum* Soják.

C. osseticum (Adams) Petrak was described from the Georgian Military Highway as *Carduus osseticus* Adams, for which the habitat was indicated to be between Lars and Darial. A specimen of this species is preserved in the Herbarium of the Botanical Institute in Leningrad under the name *C. fimbriatum* MB. with the label: "Iberia. Herb. Mussin-Puschk. Acc. a D. Fischer 1835. Hb. Meyer." I am inclined to consider this specimen an isotype of *C. osseticum* (Adams) Petrak, which was redescribed by Bieberstein under the name *Cnicus fimbriatus*, also from the Georgian Military Highway ("Ex Iberia Schlegelmilch"). Subsequently, it has been known through new collections mainly from Transcaucasia.

13. ***C. buschianum*** Charadze in Addenda XXVII, 602; in Fl. Gruzii, VIII, 488, descr. georg.—*C. tricholoma* auct. p. p. non Fisch. and Mey.: Somm. and Lev. in Tr. Peterb. Bot. Sada, XVI (1900) 253; Grossh. Fl. Kavk. IV, 180 p. p.—*C. tricholoma* var. *aciculare* Somm. and Lev. in Nuov. Giorn. Bot. Ital. N. S. II, 1 (1895) 11; in Tr. Peterb. Bot. Sada, XVI, 253; Grossh. loc. cit.—*C. osseticum* ssp. *erythrolepis* Petrak in Tr. Tifl. Bot. Sada, XII, 1 (1912) 4 p. p. non *Cirsum erythrolepis* C. Koch.

Perennial. Stem to 100 cm high, somewhat sulcate, arachnoid-hairy, ascending, branched above. Lower and middle cauline leaves to 30 cm long, 13–15 (16) cm wide, broadly-elliptical, narrowed toward base; cauline leaves auriculate, semiamplexicaul, narrowed in upper part, acuminate, pinnately parted into ovate, less often biparted slightly antrorse segments, with usually large, spines 2–4 mm long, terminal on teeth, densely covered above with appressed spiny bristles, densely whitish-tomentose beneath; upper cauline leaves 4.5–9.5 cm long and 2–5 cm wide; apical leaves subtending capitula, linear. Capitula nod-

ding, terminal, solitary or in clusters of 2–4 at tips of elongated branches, globose-ovate, forming lax corymbose inflorescence. Involucre in lower part appressed, arachnoid-hairy, in upper part loosely arachnoid, to 4.5 cm in dia; outer involucre bracts usually strongly reduced, middle lanceolate, falcately recurved, more or less densely spiny-ciliate, tapered to sharp, short spines, less often spines long, hard, yellowish, recurved (f. *aciculare* (Somm. and Lev.) Charadze); inner bracts linearly lanceolate, scarious, tapered to long, recurved, spiny tip. Florets violet-red; corolla (23)25–27 mm long, limb to 17 mm long. Pappus sordid-white, inner hairs with elongate and toothed, somewhat enlarged tip; achenes to 5 mm long. Flowering August to September.

Upper forest and subalpine zones, often in dark coniferous forest zone, and in rubble areas among tall herb vegetation.—*Caucasus*: Ciscaucasia (Balkaria, Karachai), Eastern Transcaucasia (western part of South Ossetia), Western Transcaucasia (Racha, Svanetia). Endemic. Described from South Ossetia. Type in Leningrad.

Note. It is distinguished from the related species of the affinity *C. osseticum* (Adams) Petrak by comparatively larger and broader leaves and highly reduced, falcately recurved, almost tomentose, outer involucre bracts. Some specimens of this species are reported by authors of the Flora of the Caucasus as *C. tricholoma* Fisch. and Mey. or *C. erythrolepis* C. Koch, but *C. buschianum* Charadze is well distinguished from both species by the form of the leaves and involucre bracts and from *C. erythrolepis* also by globose-ovate and not oblong capitula.

14. *C. sosnowskyi* Charadze in Fl. Gruzii, VIII (1952) 488, descr. georg.; in Zam. po. Sist. i Geogr. Rast. Tbil. 22, 73, diagn.—*C. fimbriatum* var. *diversifolium* Somm. and Lev. in Tr. Peterb. Bot. Sada, XVI (1900) 251.—*C. osseticum* ssp. *tricholoma* Petrak in Tr. Tifl. Bot. Sada, XII, 1 (1912) 4, non *Cirsium tricholoma* Fisch. and Mey.—*C. erythrolepis* auct. non C. Koch; Grossh. Fl. Kavk. IV (1934) 180 p. p.; Kolak. Fl. Abkhazii, IV, 269.—*Epitrachys ossetica* C. Koch in Linnaea, XXIV (1851) 398, non *Cirsium osseticum* (Adams) Petrak.

Perennial. Stems 2–3, 50–60 cm high, simple or branched almost from base, ascending, more or less densely white-arachnoid-hairy. Leaves velvet-green above, densely covered with appressed, golden, more or less thin, spiny bristles, densely, grayish- and whitish-tomentose beneath; basal and lower cauline leaves elliptical or broadly lanceolate-elliptical, subacute, 15–16 cm long, 5.5–6.0 cm wide, narrowed in usually long, densely and thinly spiny-ciliate petiole, usually undivided, finely and sparsely toothed, less often pinnately parted, sparsely and thinly spiny-ciliate; cauline leaves sessile, auriculate,

semiamplexicaul, obtuse or acute, lower cauline leaves subentire, sinuate-toothed, orbicular-ovate, other leaves deeply pinnately divided, broadly elliptical, sometimes almost lyrate, (7)9–12(17) cm long, 4.5–7.5 cm wide, with somewhat elongate, deltoid-ovate, antrorse segments; apical leaves small, recurved. Capitula solitary, 2.0–2.5 cm in dia, nodding, in clusters of 2–5 in compact corymbose apical inflorescence. Involucre purple or greenish, glabrous below, arachnoid-hairy above; outer involucral bracts scarious, deltoid-ovate, glabrous, with somewhat elongate, falcately recurved spiny tip, purple or greenish, carinate apex, covered from base with dense, long spiny cilia, spinescent. Florets purple, to 21 mm long, limb 12–13 mm long. Pappus sordid-white, with elongate, almost to tip plumose, inner hairs, somewhat thickened and scabrous at tip; achene blackish-brown, up to 5 mm long. Flowering July to August. (Plate VI, Fig. 2.)

Mid-montane forest zone, on limestone rocks, stony alluvial deposits, and among scrubs.—*Caucasus*: Western Transcaucasia. Endemic. Described from Western Georgia (Nakeral Range). Type in Tbilisi.

Note. A unique species, easily distinguished from all other species of the series *Fimbriata* by having almost entire lower cauline leaves and more or less pinnately incised middle cauline leaves, velutinous and setose-hairy above and snow-white beneath. It is much closer to *C. buschianum*, from which it is distinguished by smaller capitula and acuminate, densely spinulose lower involucral bracts. Even Sommier and Levier, who described this species as a separate variety, paid attention to the peculiar structure of the leaves.

15. ***C. abkhasicum*** (Petrak) Grossh. Fl. Kavk. IV (1934) 184; Kolak. Fl. Abkhazii, IV, 270; Charadze in Fl. Gruzii, VIII, 502, excl. syn. *C. tsebelidinum* Woron.—*C. osseticum* ssp. *abkhasicum* Petrak in Tr. Tifl. Bot. Sada, XII, 1 (1912) 5.

Perennial. Stem up to 100 cm high, branched in upper half, more or less densely leafy to top, sulcate, reddish-brown, finely arachnoid-hairy or floccose. Leaves green above, scabrous, densely covered with small appressed bristles, grayish-tomentose beneath, shallowly pinnately-parted, lobes broadly ovate with 4–6 mm-long, thin spines on tips of teeth and lobes, narrowed toward base, auriculate, semiamplexicaul, terminal segment oblong, acuminate; lower cauline leaves to 25 cm long, 15 cm wide; slightly lyrate pinnately incised, oblong-elliptical; middle cauline leaves oblong-ovate, to 12 cm long, pinnatifid in broadly ovate, 2-, less often 3-parted, somewhat antrorse lobes with round-ovate sinuses; apical leaves subtending capitula, linear-lanceolate, shorter or almost equaling capitula. Capitula nodding,

87 solitary, in clusters of 2–4, or terminal on stems, 2.0–2.5 cm in dia. Involucre thinly grayish-arachnoid-hairy; lower involucre bracts strongly reduced, gradually elongating from outer to inner ones, glabrous, lustrous, abruptly narrowed in brownish-green or purple, falcately recurved, arachnoid-hairy tip, spinescent with more or less short spine; inner bracts linear-lanceolate, spinescent with thin recurved spine. Corolla red, to 24 mm long; limb to 13 mm long. Pappus brownish-white with brush-like spreading, toothed, somewhat elongate, inner hairs; achenes 4.5 mm long, dark brown, with thin yellowish stripes. Flowering August to September.

Forest zone on stony slopes.—*Caucasus*: Western Transcaucasia (Abkhazia). Endemic. Described from Achangvar Pass in basin of Bzyb River. Type in Tbilisi.

Note. The species was described from incomplete specimens collected by N. Albov in Abkhazia. An obscure species, known from the basin of the Bzyb River (Shvimpindzh, vicinity of Achangvar and other places). It is distinguished by involucre bracts that lack the spines, characteristic for species of this series. In spite of this, in the general appearance, form, and spiny nature of the leaves, this species must be referred to the series *Fimbriata*, although it occupies an intermediate position between it and the series *Caucasica*.

16. **C. fominii** Petrak in Tr. Tifl. Bot. Sada, XII, 1 (1912) 23; Grossh. Fl. Kavk. IV, 180; Kolak. Fl. Abkhazii, IV, 272; Charadze in Fl. Gruzii, VIII, 503.—*C. tricholoma* auct. non Fisch. and Mey.: Alb. Prodr. Fl. Colch. (1895) 143.—**lc.**: Kolak. Rast. Mir. Kolkh. (1961), Fig. 73.

Perennial. Stem dark-purple or greenish with purple spots, slightly angular and weakly sulcate, floccose-arachnoid-hairy, to 1 m high, slightly branched above. Middle cauline leaves to 10 cm long, to 4 cm wide, ovate-elliptical, deeply pinnately divided into 2-fid deltoid-ovate lobes with broad sinuses; lamina tapered toward apex, narrowed at base, semiamplexicaul, covered above with appressed, yellowish, spiny bristles, grayish-tomentose beneath, with prominent, subglabrous veins, lobes acute, spinescent with hard spines 7–9 mm long, unequally spiny-ciliate; apical leaves 1–2, linearly lanceolate, spiny-ciliate, toothed, recurved. Capitula solitary, terminal on stem and short branches, nodding, 3–4 cm in dia. Involucre more or less densely grayish-arachnoid-hairy; outer involucre bracts lanceolate, spinescent with short recurved spine; middle bracts spinescent with sharp, elongate, recurved spine, 88 sparsely spiny-ciliate; inner bracts linear-lanceolate, spinescent with recurved, thin spine. Florets purple; corolla to 27 mm long, limb almost equaling narrow tube or somewhat shorter. Pappus sordid-white,

inner bracts somewhat longer and apically somewhat enlarged, scabrous; mature achenes unknown. Flowering July to August.

Meadows in subalpine zone, forest edges.—*Caucasus*: Western Transcaucasia (Abkhazia; Yaps-Khu, Atsgyrkha, Mamdzyskha, Dzishra mountains). Endemic. Described from Abkhazia. Type in Tbilisi.

Note. The species was described from an incomplete specimen preserved in the herbarium of the Institute of Botany, Academy of Sciences of the Georgian SSR. Material similar to the type was later collected in Abkhazia by various authors. We have supplemented the description of the species from the collections of A.A. Kolakovskiy from Yaps-Khu (Bzyb Range). Petrak allies this species with *C. caucasicum* (Adams) Petrak and *C. osseticum* (Adams) Petrak, hypothesizing a hybrid origin of *C. fominii*. However, the first of these species does not grow in Western Georgia, and the presence of abundant, well developed pollen in *C. fominii*, which was reported for the first time by A. Kolakovskiy in *Flora Abkhazii* [Flora of Abkhazia], casts doubt on a hybrid origin of this species. The habit characters and presence of spiny cilia on the involucre bracts bring *C. fominii* close to species of the series *Fimbriata*, although the presence of hard spines and the form of its leaves put this species in a somewhat isolated position rather closer to the series *Caucasica*.

17. **C. caput-medusae** Somm. and Lev. in Nuov. Giorn. Bot. Ital. N. S. II, 1 (1895) 10; in Tr. Peterb. Bot. Sada, XVI (1900) 253; Petrak in Tr. Tifl. Bot. Sada, XII, 1, 6; Grossh. Fl. Kavk. IV, 179; Kolak. Fl. Abkhazii, IV, 270; Charadze in Fl. Gruzii, VIII, 507.—**lc.**: Somm. and Lev. loc. cit. (1900) tab. XXIV; Charadze in Fl. Gruzii, VIII, Fig. 415.—**Exs.**: Petrak, Cirsioth. Univ. No. 88.

Perennial. Stem 40–100 cm high, sulcate, greenish, with purple spots, thinly arachnoid-hairy, highly branched above with spreading branches and numerous small capitula in corymbose-paniculate common inflorescence. Leaves more or less densely covered above with appressed spiny bristles, usually with scattered, solitary, long spines, thinly grayish-tomentose beneath, with more or less prominent veins; all leaves oblong or broadly lanceolate, acute; basal leaves to 20 cm long, 10 cm wide, petiolate; cauline leaves with broad, semiamplexicaul auricles; middle leaves 15 cm long, 7 cm wide, deeply pinnately incised into 2–3-parted, unevenly toothed, broadly lanceolate or deltoid-ovate, sub-acute segments with 4–5 mm long, thin spines on margin and hard spines to 12 mm long, terminal on teeth; apical leaves small, lanceolate, long-spinose-pinnately toothed. Capitula nodding, small, solitary, globose, 1.5–2.0 cm in dia by end of flowering, surrounded by up to 2 cm long, yellowish, remote spines; terminal capitula on

somewhat short branches, and axillary on long branches. Involucre with smooth, long, divergent spines, narrowed above, with recurve arachnoid-hairy bracts; involucre bracts lanceolate, more or less long densely-pectinately-spiny-ciliate on margin; outer and middle bract dark-purple, spinescent; inner bracts sublinear, spinescent with the recurved spine, arachnoid-hairy above. Corolla purple, 15–16 mm long limb almost 2 times as long as narrow tube. Pappus sordid-white, to 1 mm long, with slightly elongate, brownish, toothed tips of inner hairs achenes 2.5 cm long (immature). Flowering July to August.

Forest and subalpine zones, along forest edges and in trampled meadows.—*Caucasus*: Western Transcaucasia (Svanetia, Megrelia Adzharia, Abkhazia). Endemic. Described from Upper Svanetia (Mestia). Type in Florence.

Note. A rare species described from Upper Svanetia. A topotype of this species, collected by D.I. Sosnowsky, is preserved in Tbilisi. From seeds of these plants sent by Sosnowsky to Petrak, specimens were grown and subsequently reported on by Petrak in his work *Cirsiotheca Universa*. Among the species of the series *Fimbriata* this species is unique in the form of its small, globose, little-opened capitula, and the form of its involucre bracts.

Section 2. Epitrachys DC. in Duby. Bot. Gall. I (1828) 286 p. max p.; Koch Syn. (1837) 392; C. Koch in Linnaea, XXIV, 396 p. p., pro gen.; Boiss. Fl. or. III, 523, emend. p. max p.—*Eriolepis* Cass. in Dict. Sc. nat. XXXV (1825) 172, pro gen.; DC. Prodr. VI, 635 p. p., prosect.—*Lophiolepis* Cass. in Dict. Sc. nat. XLI (1826) 313, pro gen.; DC. Prodr. VI, 634 p. p., pro sect.—Leaves more or less densely covered above with tiny spiny bristles. Capitula erect, on short, less often long peduncles, somewhat surpassing apical leaves, or sessile, subtended by apical leaves, more or less surpassing capitula. Involucre arachnoid-hairy, less often subglabrous; involucre bracts gradually elongated from outer to inner, smooth or spiny-ciliate on margin; outer bracts usually narrowed from middle attenuated into upward directed or decurved spines, less often spines shorter than bracts. Corolla limb irregularly 5-parted almost to middle, almost equal or half as long as narrow tube. Pappus shorter than florets. Achenes (4)5–7 mm long.

Type of section: *C. italicum* DC.

Note. Segregated and published by De Candolle for the first time in 1828 (DC. apud Duby, 1. c.), the section included several species growing in Southern Europe, particularly *C. italicum* DC., *C. lanceolatum* (L.) Scop., *C. eriophorum* Scop., and others.

90 Later, Boissier included in the section a number of Eurasian and Caucasian species. I am restricting the scope of this section some-

what by including species with nodding capitula in the separate section *Caucasigena* Charadze.

Species of the section *Epitrachys* DC. are distributed in arid and mountainous regions of the Mediterranean, West Asia, the Caucasus, and occasionally Soviet Central Asia. Detailed intrasectional division was proposed by Petrak (Petrak in *Bibl. Bot.* 78 [1912] 5), who erected a number of subsections. Petrak considers the mountains of Soviet Central Asia, with one species—*C. turkestanicum* (Rgl.) O. and B. Fedtsch., as the eastern boundary of the section *Epitrachys*. In 1938 he described (Petrak in *Fedde, Repert*, XLIII, 271) *C. interpositum* Petrak from Yunnan with characters intermediate between the sections *Onotrophe* (Cass.) DC. and *Epitrachys* DC. The most significant distinguishing character between the two sections is the presence of spiny bristles on the upper surface of the leaves in *Epitrachys* DC. and their absence in *Onotrophe* (Cass.) DC. The latter section, including the type of the genus, must be named *Cirsium*.

Subsection 1. Congesta Petrak in *Bibl. Bot.* 78 (1912) 5.—Cauline leaves sessile, coriaceous, stiff. Capitula ovate-oblong, clustered in capitate inflorescence. Involucre glabrous or with scattered arachnoid hairs; involucre bracts scabrous or smooth on margin, closely appressed, scarios, spinescent with hard, long, spreading or upward-directed spines. Achenes large, 6–7 mm long.

Type of subsection: *C. congestum* Fisch. and Mey. ex DC.

Note. Petrak considers four Western Asian species, two of which penetrate also into southern regions of Transcaucasia, to comprise this subsection. Petrak notes the unique position of the species of this subsection, which approach species of the subsection *Bracteosa* Petrak. As elements of the section *Epitrachys* DC., species of this subsection are distinguished by having the stiffest leaves and largest achenes.

18. **C. congestum** Fisch. and Mey. ex DC. *Prodr.* VI (1837) 641; *Boiss. Fl. or.* III, 525; Petrak in *Izv. Kavk. Muz.* VIII, 1–2, 37; in *Nabelek, It. turc.-pers.* II, 33; *Grossh. Fl. Kavk.* IV, 178; *Charadze in Fl. Turkm.* VII, 241; in *Fl. Azerb.* VIII, 405.—**Exs.:** *Sint. It. transcasp. pers.* No. 959.

Perennial. Rhizome thick, woody, with brown scaly remnants of old leaves at base of stem; stem hard, ascending, slightly angular, sulcate, usually glabrous or with scattered arachnoid hairs, simple or weakly branched in upper part, 50(60)–120(150) cm high. Leaves coriaceous, stiff, sparsely spinose above with very thin arachnoid pubescence, subglabrous beneath, with scattered, short, curly hairs and prominent veins, more or less deeply pinnately lobed, with thin, sparse

91 spines on margin and to 15–18 mm long, hard, yellowish spines terminal on deltoid, acuminate lobes; basal leaves oblong, 30–45 cm long, 10–12 cm wide, long-petiolate, pinnatifid into broadly deltoid, 3–5-parted, acuminate, spinescent lobes; cauline leaves to 25 cm long, 7–8 cm wide, 10–15 cm long toward stem apex, somewhat distant, recurved, ovate or broadly-lanceolate, at base broader, semi-amplexicaul, at apex tapered to lanceolate segment, leaf sinuately-pinnatifid in 2–3-parted short-deltoid lobes with long, stiff spines. Capitula oblong, 2.5–3.5 cm long, 1.5–2.5 cm in dia, conically narrowed at base, subsessile, in axils of lanceolate, pinnatifid, long-spiny leaves, usually slightly surpassing capitula; capitula numerous, clustered at stem tip, less often axillary, in capitate inflorescence. Involucre glabrous, with upward directed, spreading, usually long spines; involucre bracts scabrous on margin, very thinly spiny-ciliate or toothed, at base of capitula usually short-subulate; outer involucre bracts subulately narrowed from ovate-lanceolate base into yellowish, more or less thin, hard, upward directed or slightly recurved spines, 2–3 times as long; inner bracts linearly lanceolate, scarious, narrowed into somewhat short spines. Florets pale-pink, 22–24 mm long; corolla limb irregularly incised almost to middle, somewhat shorter than tube. Pappus yellowish from basally almost scaly, lustrous, sparsely plumose hairs and apically somewhat cusp-like enlarged inner hairs; achenes to 7 mm long. Flowering August to September.

Clayey-rubbly slopes, in mountain steppe and semi-steppe zone, from 700–1200 m.—*Caucasus*: Southern Transcaucasia (Daralagez, Nakhichevan ASSR, Megri); *Soviet Central Asia*: mountainous Turkmenia (Karakala District). *General distribution*: Armenia and Kurdistan, Iran. Described from Kurdistan from Sovich's specimens. Type in Leningrad.

Note. De Candolle considered *C. consanguineum* DC., described from the collection of Belanger from Iran (DC. Prodr. VI, 641), as a separate species. Later, Boissier (Fl. or. III, 526) cites it as *C. congestum* β . *consanguineum* (DC.) Boiss, distinguishing it from the typical form by its longer capitula.

19. ***C. sorocephalum*** Fisch. and Mey. Ind. Sem. Hort. Petrop. 2 (1835) 33; in Hohen. Enum. pl. Talysch. 281; DC. Prodr. VI, 636 p. excl. pl. Meyeriana: Somm. and Lev. in Nuov. Giorn. Bot. Ital. N. S. II, 1 (1895) 9; Boiss. Fl. or. III, 526; Ldb. Fl. Ross. II, 727; Petrak in Izv. Kavk. Muz. VIII, 1–2, 37, descr. emend.; Grossh. Fl. Kavk. IV, 178; Charadze in Fl. Azerb. VIII, 405.

Perennial. Stem strong, ascending, (40)50–75 cm high, sulcate, 92 glabrous or more or less scatteredly arachnoid-hairy, simple, less often

in upper part with few axillary branches. Leaves stiff, more or less coriaceous, usually glabrous, with scattered small, erect spines above, glabrous beneath or at places thinly arachnoid-hairy, with very prominent veins; lower leaves oblong or oblong-lanceolate, to 30 cm long and 10 cm wide, narrowed to winged petiole, sparsely spiny-toothed, short-acuminate, deeply sinuately pinnately lobed with broadly ovate, 2–5-parted, deltoid lobes; teeth tapered into hard, yellowish, to 20 mm long, spines; upper cauline leaves gradually reduced, middle to 10 cm long, 5 cm wide, ovate-oblong, sessile, auriculate, semiamplexicaul, remotely sinuately pinnatifid to 1/3, with deeply 2–3-parted lobes, lobes lanceolate-deltoid spinescent; apical leaves narrowly lanceolate, deeply sinuate pinnatipartite, with short triangular lobes spinescent, with long stiff spines, 2–3 times as long as capitula. Capitula ovate-oblong, 20–30 mm long, 14–20 mm in dia, narrowed toward base, in clusters of 4–6(10), terminal on stem and short proximate branches, in umbellate-capitate inflorescence, apical leaves projecting above capitula. Involucre glabrous; lower and middle bracts imbricate, middle bracts coriaceous, slightly carinate; bracts gradually becoming longer from outer ovate to inner linear-lanceolate, scabrous on margin, very thinly spiny-ciliate, gradually tapered into prickly short spine, sometimes with brown spot in upper half. Florets pale-pink, 21 mm long; corolla tube scarcely longer than limb. Pappus sordid-white, at base yellowish, consisting of thin scaly hairs, inner hairs with long toothed tips; achenes brownish, with dark striations, 6.5 mm long. Flowering July to August.

Dry stony slopes, from mid-montane to subalpine zone.—*Caucasus*: Talysh (Lenkoran). *General distribution*: Afghanistan. Described from Talysh. Type in Leningrad; isotype in Tbilisi.

Note. The range of this species is still unclear. So far it is known from Talysh and is reported for Afghanistan (Petrak in Kojé and Rechinger, *Symp. Afgh.* II [1955] 180; Kitamura, *Fl. Afgh.* [1960] 408). We do not rule out the possibility of its occurrence also on the Iranian upland. De Candolle (DC. *Prodr.* VI, 636) cited the specimen of *C. aduncum* Fisch. and Mey. ex DC. (= *C. fallax* Fisch. and Mey.) from Meyer's herbarium under this name.

Subsection 2. Bracteosa Petrak emend. Charadze.—Subsect. *Bracteosa* Petrak 2. *Rigida* Petrak in *Bibl. Bot.* 78 (1912) 6, excl. 1. *Phyllocephala* Petrak.—Subsect. *Microcephala* Petrak, *ibid.* 6.—Leaves sessile or scarcely decurrent on stem, more or less coriaceous, stiff, 93 glabrous or thinly arachnoid-hairy. Capitula usually medium-sized or small, globose-ovate or ovate. Involucre glabrous or weakly arachnoid-hairy; involucre bracts usually entire, abruptly attenuated into

straight or more or less spreading spines, almost as long as involucre bracts, less often shorter or slightly longer.

Type of subsection : *C. bracteosum* DC.

Note. Petrak includes two series in the subsection *Bracteosa* Petrak:

1) *Phyllocephala* Petrak and 2) *Rigida* Petrak.

From the first group, *C. bornmülleri* Sint. ex Bornm. grows on the territory of the USSR; it so markedly differs in the structure of the involucre bracts and, in part, the pappus and achenes that it can be treated as a separate subsection. It seems more natural to include *C. aduncum* Fisch. and Mey. ex DC. in the subsection *Bracteosa*, which is considered by Petrak as the separate subsection *Microcephala* Petrak. The subsection *Bracteosa* Petrak includes the group of Caucasian-Western Asian species.

20. *C. bracteosum* DC. Prodr. VI (1837) 641; Boiss. Fl. or. III, 532 p. p. excl. var. β .; Somm. and Lev. in Nuov Giorn. Bot. Ital. N. S. II, 1, 12; Petrak in Nabelek. It. taurc.-pers. II, 33; Charadze in Fl. Azerb. VI, 404.—*C. strigosum* Fisch. and Mey, ex DC. Prodr. VI (1837) 640 p. p. quoad pl. ex Armenia et Persia; Petrak in Izv. Kavk. Muz. VIII, 1–2, 56, non MB.—*C. strigosum* var. *gymnocalycina* Trautv. in Tr. Peterb. Bot. Sada, II, 2 (1873) 555.

Perennial. Stems slightly angular, sulcate, usually glabrous or with scattered crisped hairs, simple, branched above with long, upward spreading axillary branches. Cauline leaves numerous, to 80 mm long, 15 mm wide (excluding spines), divergent, slightly rugose above, covered with numerous tiny, more or less appressed spines, midrib very prominent beneath, convolute, lanceolate, distantly pinnately lobed, sessile, slightly decurrent with auricles, with long, acute, more or less narrowly lanceolate terminal segment, spinescent with 5–6 mm long stiff spine; leaf lobes 2-parted, with small deltoid lobes, proximal lobules almost reduced, strongly attenuated into long, hard, more or less thin, sharp, straw-yellow spines 10–12(15) mm long, ciliate, with thin, hard, 2–4 mm-long spines on margin; upper cauline leaves to 4 cm long, broadly lanceolate; apical leaves subtending capitula, 3–5, narrow-lanceolate, more or less pinnately dentate, usually 2–3 times as long or almost equal to capitulum. Capitula terminal and axillary, solitary, more or less numerous; terminal capitula sessile, to 25 mm long, 20 mm in dia, less often larger; axillary capitula 8–12 mm long, on elongated lateral branches and with terminal capitula form short
94 racemes in corymbose-paniculate common inflorescence. Involucre glabrous or with occasional arachnoid-hairs; involucre bracts oblong-lanceolate; lower bracts almost ovate-oblong, glabrous, carinate, along margin scabrous, usually tapered from middle in thin, carinate, more

or less falcately recurved tip, strongly extended into thin, spines 2–4 mm long; inner bracts scarious, spinescent, with more or less recurved scaly tip. Florets purple, 15–18 mm long; corolla tube somewhat longer than limb. Pappus sordid-yellowish-white, of few hairs, inner hairs plumose in lower part and clavate-toothed above; achene brown, to 5 mm long. Flowering July to August.

Among phrygana vegetation in mid-montane zone.—*Caucasus*: Southern Transcaucasia (Nakhichevan ASSR). *General distribution*: Armenia and Kurdistan, Iran. Described from Iran from Belanger's specimens without precise indication of locality. Type in Geneva.

Note. In Leningrad (Herbarium of the Botanical Institute of the Academy of Sciences of the USSR), the Sovich specimen from Kurdistan (Pere) is preserved, which is cited by De Candolle as *C. strigosum* Fisch. and Mey. ex DC.; it also is cited by Boissier under the name *C. bracteosum* DC. Plants of Southern Transcaucasia are similar to this specimen. I also examined the Aucher-Eloy specimen (Elbourz, No. 4813) cited by Boissier and identical to Transcaucasian specimens. However, the Kotschy specimen from Kuh-Däena is considerably different from the above-mentioned specimens.

The specimen from Kazikibaran from Radde's collections (upper reaches of the Araks) was described by Petrak (op. cit.) as *C. strigosum* (MB.) MB. and is cited by Trautvetter as *C. strigosum* var. *gymnocalycina* Trautv. According to the diagnosis, the Transcaucasian specimens differ by the more or less fine arachnoid pubescence and the dimensions and structure of the capitula. This species occupies an intermediate position between *C. strigosum* (MB.) MB. and *C. aduncum* Fisch. and Mey. ex DC. It is distinguished from the first species by ovoid- or globose-oblong capitula and long-acuminate, erect, but not falcately recurved, involuclral bracts, and from the second species by oblong capitula and attenuated, thin, spinescent involuclral bracts.

The variability of *C. bracteosum* has not yet been adequately studied. I did not have the opportunity to examine its type; hence it is not possible to discuss the specific identity of close forms growing on the territory of Transcaucasia and Western Asia.

21. ***C. strigosum*** (MB.) MB. Fl. taur.-cauc. III (1819) 558 p. p.; in Fisch. cat. Hort. Gorenk. 35; Link, Enum. pl. II, 300; C.A.M. Verzeichn. 69; DC. Prodr. VI, 640 p. p.; Boiss. Fl. or. III, 536 p. p. excl. β . *chorassanicum* Boiss; Ldb. Fl. Ross. II, 728; Somm. and Lev. in Nuov. Giorn. Bot. Ital. N. S. II, 1, 14; Grossh. Fl. Kavk. IV, 181; 95 Opred. Rast. Kavk. 483; Charadze in Fl. Azerb. VIII, 403.—*C. rigidum* Petrak in Vestn. Tifl. Bot. Sada, Vyp. 24 (1912) 5 p. p. quoad pl. ex Ata-Czai, non DC.—*Carduus strigosus* MB. Beschreib. Land. Casp.

Meer. (1800) 194, diagn.—*Cnicus strigosus* MB. Fl. taur.-cauc. II (1808) 277.

Perennial. Stem erect, strong, up to 50 cm high, branched above, slightly angular, glaucous, glabrous or with scattered arachnoid hairs, to tip densely leafy. Leaves glaucous, stiff, upper surface not densely covered with more or less erect, tiny spines, glabrous or with scattered arachnoid hairs, glabrous beneath or finely arachnoid-hairy on veins, with very prominent network of veins, and short, upward directed spines on margin, ovate-oblong or broadly-lanceolate; basal and lower cauline leaves pinnately incised into remote 2-parted segments, with oblong lobes strongly narrowed into hard spines 2–5(7) mm long, narrowed toward base into spiny petiole; other cauline leaves sessile, auriculate, amplexicaul, long-acuminate, lobes terminating in hard spines, upto 12 cm long, 5 cm wide, sinuately-pinnately shallow cut in 2-parted, ovate or ovate-deltoid lobes, upper lobes reduced, lower oblong-ovate, strongly spinescent; leaves of lateral branches somewhat reduced, surpassing axillary capitula on very short peduncles; apical leaves linearly-lanceolate, adpressed to capitula and usually surpassing them. Capitula numerous, terminal and axillary, in corymbose-paniculate common inflorescence, globose-ovate, narrowed toward base, short-pedunculate, 1.5–2.5 cm in dia; axillary capitula often reduced; usually undeveloped. Involucre glabrous, less often sparsely arachnoid-hairy; involucre bracts appressed, imbricate, gradually becoming longer from outer to middle, oblong or ovate-elliptical, lustrous, straw-yellow, with dark-green stripe, carinate, tapered above middle to carinate, dark-colored, more or less falcately recurved tip strongly spinescent with thin, up to 4 mm long spines; inner bracts linearly lanceolate, scarious, tapered to recurved sharp points. Florets pale-pink; corolla tube narrow, almost 2 times as long as limb. Pappus sordid-white, at base yellowish, with toothed, somewhat clavate tips of elongate inner hairs; achenes to 5 mm long. Flowering July to August.

Found up to mid-montane zone, on dry rubbly slopes and in river ravines.—*Caucasus*: Eastern Transcaucasia (Kuba District). Endemic. Described from Eastern Transcaucasia (Shemakha). Type in Leningrad.

Note. This species is usually confused with *C. rigidum* DC., from which it is easily distinguished by its numerous capitula, usually not rising above the subtending leaves, and much more highly branched, densely leafy stem. Boissier refers Bunge's specimen from Iran (Khorasan) to this species under the name β . *khorrassanicum*, which is distinguished by its larger capitula, and, apparently, is a separate species. Under the name *C. strigosum* Fisch. and Mey. ex DC., De Candolle mentions the specimen from Kurdistan (Pere), cited by Boissier as *C. bracteosum* DC. The entire group of species of the affinity *C. bracteosum* DC. undoubtedly needs a critical review.

22. *C. rigidum* DC. Prodr. VI (1837) 640; C. Koch in Linnaea, XVII, 41; Ldb. Fl. Ross. II, 728; Petrak in Vestn. Tifl. Bot. Sada, Vyp. 24, 5 p.p. quoad pl. ex Ardanucz; Grossh. and Schischk. Sched. ad Pl. or. exs. 14; Grossh. Fl. Kavk. IV, 183; Opred. Rast. Kavk. 484; Charadze in Fl. Gruzii, VIII, 514, descr. georg.—*C. strigosum* MB. Fl. taur.-cauc. III (1819) 558 p. p.—*C. arachnoideum* Boiss. Fl. or. III (1975) 536 p. p. quoad. pl. Stevenianas, non MB.—*C. aspinellum* Soják in Nov. bot. Hort. bot. Univ. Carol. Prag. (1961) 36.—*Cnicum strigosus* Stev. in Mém. Soc. Nat. Mosc. IV (1812–1813, reimpr. 1830) 102, non MB.—*Epitrachys rigida* C. Koch in Linnaea, XXIV (1851) 400.—**Exs.:** Pl. or. exs. No. 48.

Perennial. Stem at base woody, usually solitary, ascending, slightly sulcate, sparsely arachnoid-hairy, in lower part white-arachnoid-floccose, branched almost from middle, 20–60 cm high. Leaves more or less stiff, usually subglabrous, above, with scattered, appressed, tiny spines, glaucous beneath, usually with prominent thin veins, more or less occasionally arachnoid-hairy on midrib, margin ciliate from tiny, thin, upward directed spines; basal and lower cauline leaves oblong, almost to base pinnately parted into distant, deeply 2-parted, oblong-elliptical segments, narrowed in narrow-winged, long, floccose-white-hairy petiole, acuminate, with petiole 23 cm long, 8–10 cm wide; leaf segments almost to base 2-parted, with oblong, short-acuminate, elongate lobes, upper of them usually reduced, with hard spines; middle cauline leaves sessile, broadly amplexicaul, toothed with more or less reduced, almost ovate-oblong segments; leaves in upper part of stem and on elongate branches more or less remote, usually stiff, almost ovate, broadly amplexicaul, sessile, strongly spinescent with more or less thickened spines 7–8 mm long, shallow sinuately pinnately divided into broadly ovate lobes; their secondary lobes deltoid-ovate, strongly spinescent. Capitula terminal on stem and branches, solitary, erect ovate or globose-ovate, 35–40 mm long, 25–35 mm in dia, usually rising above apical leaves, sometimes with 1–2 linear-lanceolate leaves, distant from capitula, ciliate, small, spinescent. Involucre glabrous, with occasional, scattered, arachnoid hairs and imbricate bracts; outer bracts ovate, middle linearly lanceolate, coriaceous, glabrous, straw-yellow, lustrous, gradually tapered into sharp, dark-green, carinate, somewhat recurved tip, strongly spinescent with spines 2–4 mm long; inner bracts scarious, linearly lanceolate, acuminate, falcately recurved, scaly tip. Florets pink, 28 mm long, with corolla tube up to 15 mm long. Pappus at base yellowish, sordid-white above, inner hairs apically scabrous, slightly enlarged, clavate; achenes light brown, 5.5 mm long, 3.3 mm wide. Flowering July to August.

Dry slopes, in mid-montane zone.—*Caucasus:* Western Transcaucasia (vicinity of Tbilisi, Gori), Southern Transcaucasia

(Meskhetia). *General distribution*: Armenia and Kurdistan (Ardanuch). Described from Aragvi River ravine. Type in Geneva; isotype in Leningrad.

Note. *C. rigidum* DC. has been confused with *C. strigosum* (MB.) MB. and *C. arachnoideum* (MB.) MB. From the former it is clearly distinguished by the shape of the capitula and short-acuminate involucre bracts; from *C. arachnoideum* (MB.) MB. it differs significantly and can be compared only in the form of the lower cauline leaves. Steven's specimen, from which De Candolle described *C. rigidum* DC., was included by Marschall-Bieberstein in *C. strigosum* (MB.) MB., the plant characteristic for the eastern Caucasus. Later, Petrak (op. cit.) described *C. strigosum* (MB.) MB. in detail from two specimens, one of which is *C. rigidum* DC. from the former Artvin District (Ardanuch) and the other is *C. strigosum* (MB.) MB. from the Kuba District. *C. rigidum* DC. is distributed in Central Transcaucasia, penetrating to Lazistan.

In 1961, J. Soják described this same species as *C. aspinellum* Soják (1. c.), comparing it with *C. strigosum* (MB.) MB., from a specimen collected by Grossheim and Kolakovsky from the vicinity of Tbilisi (Olginskoe).

23. ***C. aduncum*** Fisch. and Mey. ex DC. Prodr. VI (1837) 636; Ldb. Fl. Ross. II, 728; Petrak in Tr. Tifl. Bot. Sada, XII, 1, 20; Grossh. and Schischk. Sched. ad Fl. or. exs. 25; Grossh. Fl. Kavk. IV, 183; Oprod. Rast. Kavk. 484; Charadze in Fl. Azerb. VIII, 403.—*C. fallax* Fisch. and Mey. in Hohen. Enum. pl. Talysch. (1838) 280; Boiss. Fl. or. III, 535; Ldb. Fl. Ross. II, 728; Somm. and Lev. in Nuouv. Giron. Bot. Ital. N. S. II, 1, 13.—*C. sorocephalum* DC. Prodr. VI (1837) 636 p. p. non Fisch. and Mey.—*C. calvescens* Soják in Nov. bot. Hort. bot. Univ. Carol. Prag. (1961) 35.—**Exs.:** Pl. or. exs. No. 96.

Perennial. Root ligneous. Stem strong, ascending, sulcate, more or less scatterdly crisped-hairy, at base with dark-brown remnants of basal leaves to 60 cm high, densely leafy, strongly branched above, with somewhat flexuous branches bearing numerous small capitula in dense corymbose paniculate common inflorescence. Leaves very sparsely arachnoid-hairy above, with somewhat dense, appressed, tiny spiny bristles, glabrous beneath, with prominently raised midrib and usually long arachnoid-hairs on veins, deeply sinuately pinnately divided into linearly lanceolate segments, spiny-ciliate on margin, with long acute terminal segment, lateral segments 2-parted, proximal lobes short, strongly spinescent, with up to 12 mm long spines; basal leaves usually with more or less elongate, winged petiole; cauline leaves oblong, 9–18 mm long, 4–9 mm wide, sessile, semiamplexicaul, almost to base

sinuately-pinnately parted, with oblong-lanceolate 2-parted segments, 2–5 cm long, with strongly reduced deltoid-lanceolate proximal lobe with spinescent lobules; apical leaves narrowly lanceolate, pinnately lobed, long-spiny, closer to capitula, usually not surpassing capitula. Capitula terminal, in clusters of 2–3 on very short peduncles, less often solitary, ovate, 15–20 mm in dia. Involucre sparsely arachnoid-hairy; outer involucral bracts ovate, inner oblong-lanceolate, straw-yellow, slightly carinate, glabrous, weakly arachnoid-hairy on margin in upper part, abruptly narrowed to erect or recurved spine; inner bracts linearly lanceolate, acuminate, with recurved scaly apex. Florets red, 17–19 mm long; corolla tube narrow, to 12 mm long, limb 7–8 mm long, 2/3 parted, usually recurved in ray florets. Pappus yellowish, at tip sordid-white, with few plumose hairs of almost same length; inner hairs scabrous at tip, somewhat clavate; achenes to 5 mm long, dark brown. Flowering July to August. (Plate V, Fig. 1.)

Rubby habitats and among scrubs, from mid-montane to subalpine zone.—*Caucasus*: Southern Transcaucasia (Novo Bayazet, Agmagan, Karabakh, Nakhichevan ASSR), Talysh (Zuvant). *General distribution*: Armenia and Kurdistan. Described from Karabakh. Type in Leningrad.

Note. The status of *C. aduncum* Fisch. and Mey. ex DC. is still not entirely clear. Boissier, the first to unite this species with *C. fallax* Fisch. and Mey., described from Hohenacker's specimens from Zuvant (Lenkoran), preferred the latter name over the prior name, *C. aduncum* Fisch. and Mey. ex DC. The specimen of *C. fallax* Fisch. and Mey. from Lenkoran was wrongly cited by De. Candolle under the name *C. sorocephalum* Fisch. and Mey. The question of separate status for *C. fallax* still needs to be re-examined on the basis of new material. Petrak (op. cit.) showed the separateness of these two species, allying *C. fallax* with the Western Asian species *C. bracteosum* DC. and *C. fraternum* DC. The presence of transitional forms between the type specimens of *C. aduncum* and *C. fallax* does not allow one to delimit these species. The length of the spines on the involucral bracts, pubescence, size of the capitula, and other characters vary, but the structure of florets deserves special attention. As a characteristic feature, Petrak mentions *C. fallax* as having florets with an abrupt transition from the narrow corolla tube to the limb, whereas in *C. aduncum* the corolla tube is gradually expanded.

There is a basis to presume that the phenomena of sexual dimorphism are observed in this particular case.

Subsection 3. Phyllocephala (Petrak) Charadze comb. nova.—Subsect. *Bracteosa* Petrak 1. *Phyllocephala* Petrak in Bibl. Bot. 78 (1912) 6.—Capitula ovate, narrowed above, subsessile, surrounded by bracteal leaves surpassing them. Leaves coriaceous; cauline leaves

sessile, with large amplexicaul auricles, somewhat decurrent. Involucral bracts numerous, membranous, appressed, spine scent; inner hairs of pappus long-plumose only in lower part, scabrous above.

Note. It differs from the subsection *Bracteosa* Petrak by having the involucral bracts completely closed up to the end of flowering and tiny, thin, apical spines at the tips of the bracts.

Type of subsection: *C. phyllocephalum* Boiss.

24. *C. bornmülleri* Sint. ex Bornm. in Fedde, Repert. VIII (1910) 260; O. and B. Fedtsch. Perech. Rast. Turk. IV, 282; Charadze in Fl., Turk. VII, 241.—**lc.**: Charadze in Fl. Turk. VII, Plate XXVIII.—**Exs.**: Sint. It. transcasp.-pers. No. 690.

Perennial. Root thick, producing solitary, less often many stems. Stem ascending, to 60 cm high, glabrous or rarely arachnoid-hairy, sulcate, divergently branched above, basally with blackish-brown fibrous remnants of old leaves. Leaves coriaceous, with divergent spiny bristles above, glabrous or with fine, thin, arachnoid-pubescence beneath, glaucous with prominent whitish veins, deeply pinnately divided into 2–3-parted, linear-lanceolate segments, strongly spinescent, spines up to 7 mm long; basal leaves to 18 cm long, long-petiolate, petiole spiny-toothed; cauline leaves to 9 cm long, narrowed into linear-lanceolate tip, basally broadened, auriculate, semiamplexicaul, obliquely decurrent; apical leaves almost up to base incised into narrowly lanceolate, long-spiny segments, subtending capitula, and slightly surpassing or almost 2 times as long. Capitula solitary or in clusters of 2–4, terminal on stems and branches, less often axillary, ovate, cuneate, 2.5 cm long and 1.5–2.0 cm in dia, short-pedunculate, borne in elongate paniculate common inflorescence. Involucral bracts numerous, appressed, imbricate, glabrous at apex, roundish in upper portion, floccose-arachnoid-hairy on margin, with short, filiform purple spine at apex. Corolla purple, 25–27 mm long; limb to 15 mm long. Pappus sordid-white, to 18–20 mm long; inner hairs clavate, toothed, long-plumose only in lower part, short-plumose to setose above. Achenes reddish-brown-brown, somewhat cuneately narrowed toward base, to 6 mm long. Flowering July to October.

Zone of mixed herb-grass steppe, among cushion-plant formations and in old fields from 1,200 to 2,000 m.—*Soviet Central Asia*: mountainous Turkmenia. *General distribution*: northern Iran. Described from Kopetdag (Sulyukli). Type in Brno.

Note. It is somewhat separate from all other species of the section by having ovate capitula, imbricate, tight involucral bracts with filiform, small spines, inner hairs of pappus long-plumose only in the lower part, and achenes narrowed toward the base and cuneately trun-

cate. It was described from Bornmüller's specimens collected on the border with Iran and published by Sientenius. Bornmüller notes that his species may be compared with species of the genus *Notobasis*, but morphologically it is close to the Lebanese species *C. phyllocephalum* Boiss. *C. bornmülleri* also differs somewhat from species of the section *Epitrachys* DC. by the structure of the pollen grains, which, according to I.S. Shtepa, have a thinner exine.

Subsection 4. Armata Charadze in Addenda XXVII, 603.—Subsect. *Eriophora* Petrak in Bibl. Bot. 78 (1912) 6 p. p. (3. *Horrida* Petrak, 5. *Lappacea* Petrak) excl. 1. *Erioccephala* Petrak, 2. *Ferocia* Petrak, 4. *Caucasica* Petrak.—Subsect. *Ciliata* Petrak. 1. *Serrulata* Petrak, ibid. 5 p. p.—Stem densely leafy. Leaves deeply pinnately incised, more or less coriaceous, with strongly spinescent lobes. Capitula usually large, less often medium-sized, erect, surrounded by somewhat long apical leaves, solitary, in clusters of 2–3, or in paniculate inflorescence. Involucre usually densely arachnoid-hairy or with thin arachnoid-pubescence; involucre bracts entire, smooth or scabrous, less often with occasional spines on margin, usually narrowed from middle to erect or divergent long spines.

Type of subsection: *C. lappaceum* (MB.) MB.

Note. The species of this subsection are widely distributed in Asia Minor, Iran, Afghanistan, southern Transcaucasia, Dagestan, and occasionally in the mountains of Soviet Central Asia. Petrak includes in the subsection *Eriophora* Petrak mainly the eastern European and Mediterranean species of the affinity of *C. eriophorum* (L.) Scop. with the Caucasian-Western Asian series of species. However, it seems more natural to consider *Eriophora* Petrak to have two vicariant subsections, i.e., subsect. *Eriophora* Petrak in the narrow sense and subsect. *Armata* Charadze. The members of both of these subsections are well differentiated by the structure of their capitula and involucre bracts.

Series 1. Lappacea (Petrak) Charadze comb. nova.—Subsect. *Eriophora* Petrak 5. *Lappacea* Petrak in Bibl. Bot. 78 (1912) 6 p. max. p.—Capitula medium-sized, in more or less lax racemose or racemose-paniculate inflorescence, less often clustered at tips of stems in racemose-capitate inflorescence. A row of narrowly-lanceolate, small, greenish bracteal leaves, to half as long as involucre usually developing at base of involucre. Florets red or pink.

- 101 25. ***C. lappaceum*** (MB.) MB. Fl. taur-cauc. III (1819) 558 p. p.; DC. Prodr. VI, 637 p. p.; Ldb. Fl. Ross. II, 729 p. p.; Boiss. Fl. or. II, 531, p. p. excl. syn.; Somm. and Lev. in Nuov. Giorn. Bot. Ital. N. S. II, 1, 12; Charadze in Fl. Gruzii, VIII, 500; in Fl. Azerb. VIII,

399.—*C. lappaceum* ssp. *eulappeceum* Petrak var. *bibersteinii* Petrak in Tr. Tifl. bot. sada, XII, 1 (1912) 10.—*C. lappaceum* var. *biebersteinii* Grossh. Fl. Kavk. VI (1934) 183.—*C. penicillatum* C. Koch in Linnaea, XVII (1843) 41.—*Carduus lappaceus* MB. Beschreib. Länd. Casp. Meer. (1800) 193.—*Cnicus lappaceus* MB. Fl. taur.-cauc. II (1808) 277, excl. syn. *Carduus horridus* Adams.—*Epitrachys penicillata* C. Koch in Linnaea, XXIV (1851) 399.

Perennial. Stem 30–40 cm high, sulcate, finely whitish arachnoid-tomentose, ascending, simple or with few axillary branches above. Leaves densely spinose above, white-tomentose beneath on veins, more or less deeply pinnately incised; basal leaves oblong-elliptical, to 20 cm long, 7–8 cm wide, with short, toothed-winged, spiny petiole, almost to base sinuately pinnately lobed into oblong-lanceolate segments; segments unequally 2-parted, slightly recurved, rarely spiny-ciliate, lobes apically strongly narrowed into spines 12–15 mm long; terminal segments elongated ternate with short lateral lobes; lower cauline leaves like basal, narrowed toward base, sessile, upper ones smaller, 7–13 cm long, ovate-lanceolate, sessile, semiamplexicaul, divergent from stem, with broad, yellowish, thick vein above, sinuately-pinnately parted into unequal 2-parted ovate-deltoid, long-spiny lobes, proximal lobules more or less completely reduced, spinescent. Capitula solitary, terminal on stem and usually on elongated axillary branches, 15–25 mm in dia, globose-ovate, surrounded by narrowly-lanceolate apical leaves, slightly or almost 2 times surpassing capitula, in racemose or corymbose-paniculate common inflorescence. Involucre subglabrous or sparsely floccose-arachnoid-hairy; involucre bracts at base of capitula leafy, greenish, linear-lanceolate, spinescent, half as long as capitula; outer bracts ovate-lanceolate, narrowed from middle into recurved tip, thinly spinescent; inner bracts linear-lanceolate, spinescent with recurved tip. Corolla red, 22 mm long; limb 5-parted almost to middle, somewhat shorter than narrow tube. Pappus sordid-white, with thin fragile bristles, inner bristles with longer filiform tips, scabrous above; achenes 5.5 mm long, grayish-brown or almost reddish-brown. Flowering August to September. (Plate V, Fig. 2.)

102 Mid-montane to subalpine zone, on herb slopes and among shrubs.—*Caucasus*: Eastern and Southern Transcaucasia. Endemic. Described from Iberia and Shirvan Mountains. Type in Leningrad.

Note. The species is usually interpreted broadly by authors of the Western Asian flora. However, the forms similar to the type have a limited range, and apparently are not found beyond the Caucasus. The majority of the varieties of this species are distinct species close to *C. lappaceum*: also, the specimens from Turkey and Iran identified as *C. lappaceum* (MB.) MB. apparently do not belong to this species.

26. *C. anatolicum* (Petрак) Grossh. Fl. Kavk. IV (1934) 182 p. max. p. excl. var. *ferox* (Boiss.) Grossh.; Charadze in Fl. Gruzii, VIII, 501; in Fl. Azerb. VIII, 400.—*C. anatolicum* var. *microcephalum* Grossh. and var. *ramosum* Grossh. Fl. Kavk. IV (1934) 182.—*C. lappaceum* E. *microcephalum* Boiss. Fl. or. III (1875) 532 p. p.—*C. lappaceum* var. *lineariloba* Trautv. in Tr. Peterb. bot. sada, IV, 1 (1876) 158.—*C. lappaceum* ssp. *anatolicum* Petрак in Tr. Tifl. Bot. Sada, XII, 1 (1912) 12 p. p.; in Nabelek, It. turc.-pers. II, 33, diagn. brev.—*C. lappaceum* ssp. *anatolicum* var. *microcephalum* Petрак in Tr. Tifl. bot. sada, XII, 1 (1912) 14 p. p.; in Izv. Kavk. Muz. VIII, 1–2, 56.—*C. lappaceum* ssp. *anatolicum* var. *ramosum* Petрак in Tr. Tifl. bot. sada, XII, 1 (1912) 14; in Izv. Kavk. Muz. VIII, 1–2, 56. *C. lanciflorum* γ. *subnudum* DC. Prodr. VI (1837) 638.

Perennial. Stem 20–50 (80) cm high, ascending, weakly branched above, more or less sulcate, densely arachnoid-hairy, sparsely leafy. Leaves divergent from stem, usually very densely setose above with appressed, spiny bristles, midrib and lateral veins yellowish, distinct against background of pale green lamina, whitish-tomentose beneath, usually with raised subglabrous, thick midrib; all leaves pinnately incised almost to base into narrowly lanceolate or linearly-lanceolate acuminate segments, strongly spinescent with hard, yellow, spines 3–9(12) mm long; segments 2-parted to base, apical lobe reduced, spinescent, recurved; terminal segments usually short-spinescent; basal and lower cauline leaves narrow, oblong, with winged petiole, usually 20 cm long, 5–6 cm wide, upper cauline leaves shorter, sessile, at base usually not broadened, deeply pinnately divided into more or less deltoid-lanceolate or ovate-lanceolate lobes; apical leaves 3–4, at base of capitula, linear-lanceolate, almost 2 times as long as capitula. Capitula globose-ovoid, 15–35 mm in dia, terminal or axillary, subsessile, short-pedunculate or on long lateral branches, few, in racemose-paniculate common inflorescence. Involucre at base usually glabrous, sparsely arachnoid-hairy above, less often more densely; outermost involucral bracts narrowly lanceolate, transitional to small apical leaves; outer bracts ovate-lanceolate, glabrous, straw-yellow, weakly carinate, narrowed from middle in more or less falcately recurved, arachnoid hairy, spinescent tip; inner bracts linear-lanceolate, narrowed to fine recurved, spiny corolla. Corolla pink 16 mm long, limb scarcely longer than narrow tube, deeply 5-parted. Pappus yellowish, with fragile bristles, inner bristles narrowed to scabrous, filiform tips; achenes reddish-brown, 5–6 mm long. Flowering August to September. (Plate V, Fig. 3.)



Dry mountain meadows, usually from mid-montane to subalpine zone.—*Caucasus*: Southern Transcaucasia *General distribution*: Asia Minor, Armenia and Kurdistan, Iran. Described from Turkish Armenia. Type in Vienna.

Note. It differs from the other species of the series *Lappacea* by having the leaves deeply incised into very narrow segments and small solitary capitula on more or less elongate branches. Assessment of the taxonomic importance of the varieties of *C. anatolicum* (Petrak) Grossh. needs special study.

27. *C. megricum* Charadze in Addenda XXVII, 603; in Fl. Azerb. VIII (1961) 402, descr. ross.—*C. lappaceum* var. *tomentosum* auct. fl. cauc. p. p. non Boiss.

Perennial. Stem 30–100 cm high, simple ascending, tomentose, densely leafy to tip. Leaves elongate-oblong, more or less densely spinose above, or spines very short and leaf surface scabrous and thinly arachnoid pubescent, white-tomentose beneath; lower cauline leaves pinnately incised into linearly lanceolate, acuminate segments, basally narrowed into more or less long toothed-winged petiole; leaf segments unequally 2-parted, lobes and teeth strongly spinescent with 10–15 mm-long, hard spines; upper cauline leaves sessile, semi-amplexicaul, deeply pinnately parted. Capitula surrounded by narrowly linear, greenish apical leaves, slightly surpassing them, terminal on stem and in axil of apical leaves, subsessile or on thick, densely whitish-arachnoid-hairy, short peduncles. Involucre ovate, subglabrous or arachnoid hairy, 1.2–2.0 cm in dia; lower involucral bracts at base of capitula greenish; others scarious, ovate to lanceolate, abruptly narrowed into acute, somewhat falcately recurved tip, spinescent, glabrous below, arachnoid-hairy above, weakly scabrous on margin. 105 Florets pinkish; pappus yellowish-whitish; achenes dark colored. Flowering August to September.

Meadows in subalpine zone.—*Caucasus*: Southern Transcaucasia (Zangelan, Megri). Described from vicinity of Megri. *General distribution*: Possibly grows in Iran. Type in Azerbaidzhan.

Note. The species is close to *C. anatolicum* (Petrak) Grossh. in its pubescence and small capitula, but the latter are in terminal clusters on the stem as in *C. schelkownikowii* Petrak. It is well distinguished from the latter species by having not grayish but dense white-tomentose pubescence on the leaves and by narrow, petiolate lower cauline leaves. Specimens of this species have been identified as *C. lappaceum* var. *tomentosum* (Boiss.) Petrak.

28. *C. schelkownikowii* Petrak in Izv. Kavk. Muz. VIII, 1–2 (1914) 44; Grossh. Fl. Kavk. IV, 182; Oprod. Rast. Kavk. 483; Charadze in Fl. Azerb. VIII, 401; Papava in Vestn. Gos. Muz. Gruzii, XV A, diagn. repet.—*C. laniflorum* β . *szowitsianum* DC. Prodr. VI (1837) 638—*C. lappaceum* β . *subracemosum* Ldb. Fl. Ross. II (1845) 729.—*C. lappaceum* γ . *tomentosum* Boiss. Fl. or. III (1875) 531 p. p. *C. lappaceum* var. *tomentosum* Petrak in Tr. Tifl. Bot. Sada, XII, 1 (1912) 10 p. p.; Grossh. Fl. Kavk. IV, 183 p. p.—**Ic.**: Petrak in Izv. Kavk. Muz. VIII, 1–2, Plate 2.

Perennial. Stem thick, hard, simple, ascending, sulcate, more or less densely grayish-arachnoid-hairy, densely leafy, with terminal capitula. Leaves usually recurved, more or less densely setose above with thin, spine-like bristles, with prominent veins broadened at base; cauline leaves broadened at base, auriculate, ovate-oblong, deeply-sinuate-pinnately parted with long spiny teeth, semiamplexicaul; leaf segments 2–3-parted with short upper teeth recurved; lower lobes large, lanceolate- or ovate-deltoid, obtuse or short-acuminate, on margin spiny-ciliate; all lobes strongly spinescent with thick, yellowish stiff spine 8–15 mm long, upper cauline leaves like lower, but somewhat shorter. Capitula terminal, in clusters of 3–9, in racemose inflorescence, sessile, ovate-globose, upper solitary capitulum 3.5 cm in dia and 3.6–4.0 cm long, apical leaves almost 2 times surpassing capitula. Capitula in axils of long upper leaves 2–5, smaller usually 2.5 cm in dia, 3 cm long, sessile or on short peduncles. Lowermost involucre bracts many, linear-lanceolate, undivided, spiny-ciliate on margin, somewhat shorter or almost as long as involucre; outer involucre bracts glabrous below, densely grayish-arachnoid-lanate above, ovate at base, from middle abruptly narrowed into linearly lanceolate, carinate apex, tapered into
106 more or less erect spine; inner bracts linear-lanceolate, long-attenuate into yellowish spine 2–4 mm long, horizontal or somewhat falcately recurved. Corolla purple; limb 5-parted to middle, almost equaling narrow tube or somewhat shorter. Filaments denticulate-hairy. Pappus sordid white with unequal bristles, inner bristles almost 2 times as long as outer, lanate over 2/3, filiform at tip, toothed; achenes immature. Flowering July to September.

Subalpine and alpine zones.—*Caucasus*: Southern Transcaucasia (Karabakh, Nakhichevan ASSR), Talysh. *General distribution*: Iran and Afghanistan. Described from vicinity of nomadic settlement of Ala-Khanchala in Karabakh. Type in Tbilisi; isotype in Leningrad.

Note. It is distinguished from *C. lappaceum* (MB.) MB. by clustered, subsessile, grayish-lanate capitula. The specimen of Sovich from Karabakh cited by De Candolle as *C. laniflorum* β . *szowitsianum* DC. and later included by Boissier under *C. lappaceum* γ . *tomentosum*

Boiss. belongs to this species. The specimens of Sovich from Karabakh are cited by Ledebour under the name *C. lappaceum* β . *subracemosum* DC. They are distinguished from the type by somewhat smaller capitula and acuminate leaf lobes. The Lenkoran specimens are distinguished also by a more xerophilous habit. This species is distinguished from *C. macrobotrys* (C. Koch) Boiss. by relatively small capitula and pubescence. *C. schelkownikowii* Petrak is reported from Afghanistan (Petrak in Køje and Rechinger, *Symb. Afgh.* II [1955] 178; Kitamura, *Fl. Afgh.* II [1960] 408). The range of this species is not yet sufficiently clear. Possibly the Afghan specimens are closer to *C. pseudolappaceum* Charadze, which was described from Kopetdag.

29. *C. macrobotrys* (C. Koch) Boiss. *Fl. or.* III (1875) 532; Petrak in *Tr. Tifl. bot. sada*, XII, 1, 19; in *Izv. Kavk. Muz.* VIII, 1–2, 54; in Nabelek, *It. Turc.-pers.* II, 33; *Grossh. Fl. Kavk.* IV, 182; *Opred. rast. Kavk.* 483 (sub. *C. macroptero* Sphalm. [sic.]); Charadze in *Fl. Azerb.* VIII, 401.—*C. macrobotrys* var. *longilobum* Bordz. in *schedia*, quoad. pl. e. Sarykamysch.—*C. lappaceum* γ . *macrocephalum* Ldb. *Fl. Ross.* II (1846) 729.—*Epitrachys macrobotrys* C. Koch in *Linnaea*, XXIV (1851) 399.

Perennial. Stem 40–150 cm high, robust, ascending, more or less densely, grayish-arachnoid-hairy, sulcate, simple, with large solitary, terminal and axillary capitula in short racemose common inflorescence. Leaves green above with midrib straw-yellow, broadened at base, and prominent lateral veins, setose with appressed or slightly divergent, spiny bristles and with occasional flexuous hairs; sparsely grayish-tomentose beneath; cauline leaves oblong, middle ones 10–15 cm long, sessile, auriculate, weakly decurrent, remotely pinnately parted into deltoid-ovate or deltoid-lanceolate, unequally two-parted lobes, with short upper recurved lobe; terminal segment linearly lanceolate; all lobes and teeth more or less strongly spinescent, with 6–12 mm long, hard spines; apical leaves in inflorescence almost linearly lanceolate, with strongly reduced segments and short spines, surpassing capitula. Capitula (2.5)3.0–3.5(5.5) cm in dia, subsessile, in axils of apical leaves, less often lateral, on short peduncles. Involucre weakly floccose-lanate or subglabrous below, densely arachnoid-hairy above; lower involucral bracts many, narrowly linear, greenish-brown, spinescent, usually more than 1/2 as long as involucre, rarely floccose below, long arachnoid hairy above; outer bracts glabrous, carinate; oblong-ovate, scabrous above on margin, abruptly narrowed from middle into falcately recurved, narrowly linear spiny apex with long floccose hairs; inner bracts glabrous, linearly lanceolate, falcately recurved. Corolla pink, 23 mm long; corolla tube narrow, gradually transitional to broad limb;

limb lobed up to 1/3. Pappus yellowish, to 20 mm long, inner hairs with somewhat elongate, scabrous tips; achenes 6 mm long, 3 mm wide, brownish. Flowering August to September.

Subalpine zone, in meadows.—*Caucasus*: Eastern Transcaucasia (between Shakhdag and Khinalug peaks), Dagestan (Kurush), Talysh. *General distribution*: Asia Minor (Geksu, Khinish and Abusardag), Armenia and Kurdistan (Kars, Sarykamys, Verakdar near Van, between Bashkale and Kochan). Described from Asia Minor. Type in Berlin.

Note. It is distinguished from *C. schelkownikowii* Petrak by the considerably larger capitula, form of the leaves, and nature of the pubescence. The range of this species is not entirely clear and it all needs refining.

Series 2. Cosmeliana Charadze.—Subsect. *Eriophora* Petrak 5. *Lappacea* Petrak in Bibl. Bot. 78 (1912) 6 p. min. p.—Florets yellow. Capitula medium-sized, densely arachnoid-hairy, solitary, terminal on stem and branches, sessile; apical leaves considerably surpassing capitula. Leaves pinnate, with approximate, linear, deeply two-parted segments.

30. *C. cosmellii* (Adams) Fisch. ex Hohen. in Bull. Soc. Nat. Mosc. VI (1833) 251; Petrak in Tr. Tifl. bot. sada, XII, 1, 6; Ldb. Fl. Ross. II, 730; Trautv. in Tr. Peterb. bot. sada, IV, 1, 158; Grossh. Fl. Kavk. IV, 182; Opred. Rast. Kavk. 483; Charadze in Fl. Gruzii, VIII, 502; in Fl. Azerb. VIII, 400.—*C. lappaceum* MB. Fl. taur.-cauc. III (1819) 558 p. p.; Boiss. Fl. or. III, 531 p. p.—*C. lokense* Conr. and Fr. in Bull. Herb. Boiss. III (1895) 468.—*Carduus cosmellii* Adams in Web. and Mohr. Beitr. Naturk. I (1805) 66.—**Exs.**: Pl. or. exs. No. 97; Herb. fl. cauc. No. 197; Petrak, Cirsioth. Univ. No. 95.

Perennial. Stem strong, ascending, (15)40–60 cm high, somewhat flexuous, spreadingly branched from middle, indistinctly angular, sulcate, purple, arachnoid-hairy, to tip densely leafy. Leaves setose above with spiny bristles, grayish-tomentose beneath with prominent, weakly arachnoid, whitish midrib, linear or lanceolate-elliptical, sinuately-pinnately incised almost to base, with approximate, elongated segments; segments 2–5-parted, with 2 linearly-lanceolate, almost equal lobes; anterior lobe usually recurved with deltoid-lanceolate teeth, strongly spinescent with yellowish spines 5–7 mm long, on margin spiny-ciliate and somewhat recurved; all cauline leaves narrowed toward base to winged-toothed, long-spiny petiole; petioles long in lower and short in upper leaves; terminal segments linearly-lanceolate, strongly spinescent; cauline leaves somewhat shorter above, on the average 15–20 cm long,

4–5 cm wide; apical leaves many, linear or linearly lanceolate, somewhat exceeding capitula, narrowed toward base, acute, with short lateral lobes, spinescent. Capitula globose-ovate, solitary, terminal, less often 2 on stem and long axillary branches, in paniculate common inflorescence. Involucre 1.5–3.5 cm in dia, thinly arachnoid-pubescent; outer involucral bracts ovate-lanceolate, inner linearly lanceolate abruptly narrowed, spinescent with slightly recurved, long spine; lower most bracts few, narrowly linear-lanceolate, arachnoid-hairy almost from base, outer and inner ones glabrous, lustrous, scarious, arachnoid-hairy at base of spines. Florets yellow, 25 mm long, with narrow, tube to 15 mm long; limbs 5-parted. Pappus yellowish-white, to 20 mm long, inner hairs with long scabrous tips; achenes 6.5 mm long, up to 3 mm wide, light reddish-brown with dark brown striations. Flowering July to September.

Mid-montane to subalpine zone. Along roads in forest zone and in mountain meadows. Common weed of mountain pastures, particularly in Southern Transcaucasia.—*Caucasus*: Eastern, Southern and Western Transcaucasia (reported from Adzharia). *General distribution*: Asia Minor. Described from region between Tbilisi and Dusheti. Type in Leningrad.

Note. Hybrids are known.

1. *C. × trifurcum* (*C. cosmellii* × *C. caucasicum*) Petrak in *Izv. Kavk. Muz.* VIII, 1–2 (1914) 59.—**Exs.**: Petrak, *Cirsioth*, *Univ.* No. 140.

Described from Bakuriani, where it was collected among related forms.

Petrak (1. c.) reports that this hybrid is of special interest because hybrids are very rare among species of the section *Epitrachys* DC. in contrast to the members of the section *Onotrophe* (= *Cirsium*). The pollen studies conducted by I.S. Shtepa showed that almost 70% of the pollen is not fully viable. *C. cosmellii* is widespread in Southern Transcaucasia, whereas the southern boundary of *C. caucasicum* runs through the Trialeti Range, where hybrids are observed.

109 2. *C. cosmellii* × *C. ciliatum* (= *C. ciliatiforme* Petrak): Grossh. *Fl. Kavk.* IV (1934) 189.

Caucasus: Reported from Southern Transcaucasia (former Akhalkalak District).

In the structure of the capitula, particularly the involucral bracts, it is more similar to *C. szowitsii* (C. Koch) Boiss. than to *C. ciliatum* (Murr.) Moench; it approaches *C. cosmellii* in its leaves with the proximate segments cut almost to the base into slightly unequal, narrow, oblong lobes.

3. *C. × succinctum* Ldb. Fl. Ross. II (1846) 732.

Stem ascending, sparsely pilose with crispate hairs, with dark purple spots, sulcate, branched above. Lower cauline leaves oblong, to 25 cm long, sparsely spiny-setose above, grayish-tomentose beneath, on midrib subglabrous, narrowed into petiole, deeply pinnately incised into oblong segments; lateral segments unevenly 2–3-parted, with anterior short ovate-deltoid lobes; all lobes strongly spinescent with up to 7 mm-long, hard spines; other leaves gradually reduced upward, sessile, semiamplexicaul; apical leaves divergent, surpassing capitula. Capitula 3–4 cm in dia, solitary, terminal on stem and axillary branches, in corymbose-paniculate common inflorescence. Involucre covered with thin arachnoid pubescence; involucre bracts straw-yellow, sometimes dark-colored, carinate, outer and middle ovate to oblong-ovate, narrowed above middle into long, herbaceous, recurved tip, spinescent; inner bracts linearly lanceolate, with thin, recurved spiny tip. Florets red.

Caucasus: Eastern Transcaucasia (Sarial). Described from Sarial Mountains in Azerbaidzhan from Hohenacker's specimens. Noted on the labels of *C. succinctum* is: "... together with *C. tricholoma* Fisch. and Mey." In the form of the leaves it is almost indistinguishable from *C. tricholoma*. Authors of the Caucasian flora have considered it a synonym of *C. lappaceum* (MB.) MB., which it approaches in its erect capitula and form of the involucre bracts, while differing by having large capitula and an arachnoid-hairy involucre. In having apical leaves that surpass the capitula, it is similar to *C. cosmellii*. Possibly, it is a hybrid between *C. cosmellii* and *C. tricholoma*.

Series 3. Arachnoidea Charadze.—Subsect. *Ciliata* Petrak 1. *Serrulata* Petrak in Bibl. Bot. 78 (1912) 5 p. min. p.—Capitula basally slightly cuneate, solitary or 2–3 on short peduncles. Involucre bracts usually scabrous on margin, smooth, less often with occasional spiny setae. Basal and lower cauline leaves pinnately incised, upper pinnately parted or pinnately lobed.

The species of this series are distributed in the Caucasus and Crimea. They differ from species of the series *Lappacea* by the shape of the capitulum that is usually projected above the apical leaves.

- 110 31. *C. arachnoideum* (MB.) MB. Fl. taur.-cauc. III (1819) 657; DC. Prodr. VI, 639; Ldb. Fl. Ross. II, 732; Boiss. Fl. or. III, 536 p. excl. syn.; Lipsky, Fl. Kavk. 358, excl. var. β .; Grossh. Fl. Kavk. IV, 183, excl. var.; Oprod. Rast. Kavk. 484.—*Cnicus arachnoideus* MB. Fl. taur.-cauc. II (1808) 277.— *Ic.*: Rchb. Pl. crit. IV, tab. 359.

Perennial. Rhizome thick, woody, producing 1–3 erect stems; plant 70–80 cm high. Stem yellowish or reddish, weakly angular, sparsely crisped hairy, simple or weakly branched above, leafy to tip. Leaves densely spinulose above, with appressed spinules, subglabrous beneath, along veins weakly arachnoid hairy, less often thinly arachnoid. Basal and lower cauline leaves with long petioles, semiamplexicaul; lower leaves including petioles 21–25(37) cm long, 9–10(18) cm wide, elliptical-elongate, pinnately divided almost to base, basal segments broad, with elongated broadly lanceolate terminal lobe and deltoid-ovate lateral lobes; middle and upper cauline leaves auriculately broadened, semiamplexicaul, middle ones to 12 cm long and 5.5 cm wide, narrowed at apex, lanceolate-elliptical to ovate, usually deeply sinuate-pinnately divided into 2-parted elongated, lanceolate or deltoid-ovate lobes, spinescent, on margin finely spiny-ciliate; apical leaves small, approximate to capitulum, usually deflexed. Capitulum ovate, terminal, somewhat projected above leaves, solitary, at apices of stem and branches, on short peduncles, sub-sessile, aggregated in compact, corymbose paniculate inflorescence. Involucre 15–20(25) mm in dia, 18–20 mm long, basally cuneate at beginning of flowering, subapically attenuate, often purple, thinly arachnoid-hairy; outer bracts narrow, lanceolate, carinate, gradually narrowed, spinescent with thin purple spines, sometimes with occasional spines on margin; outer bracts usually 3–4 mm long, gradually longer inward; inner ones membranous, linearly lanceolate, with incurved fine tip. Florets purple, to 26 mm, in broader part to 14 mm long, limb cut up to middle. Pappus basally brownish, sordid-white above, inner hairs with scabrous tips; achenes to 5.5 mm long, silver-gray, with dark streaks. Flowering July to August.

Commonly in limestone regions. Mid-montane to subalpine zone, in meadows, along forest edges, in crops; widely distributed as component of weedy tall-herb vegetation.—*Caucasus*: Ciscaucasia (Central and Eastern parts), Dagestan. Described from Beshtau. Endemic. Type in Leningrad.

Note. It is distinguished from the other species of the series by having very small outer involucral bracts and weakly pubescent leaves.

32. **C. euxinum** Charadze in Zam. po Sist. i Geogr. Rast. Tbil. 23 (1963) 108.—*C. laniflorum* Grossh. Opređ. Rast. Kavk. (1949) 482, non MB.—*C. arachnoideum* var. *incanum* Lipsky in Schmalh. Fl. II (1897) 102; Lipsky, Fl. Kavk. 358; Grossh. Fl. Kavk. IV, 183; Kolak. Fl. Abkhazii, IV, 271; Charadze in Fl. Gruzii, VIII, 508.

Perennial. Stem to 70 cm high, weakly angular, ribbed, floccose-crisped-hairy or almost white-tomentose-hairy, erect, more or less

branched above. Leaves thinly spinose above, more or less densely white-tomentose beneath, with prominent midrib; basal leaves oblong-ovate, up to 25 cm long, 16 cm wide, deeply sinuate-pinnately divided into broad approximate segments, in turn apically bifid into deltoid lobes, ciliolate, spinose on margin with obtuse teeth and segments spinescent bearing spines to 3 mm long, narrowly decurrent on petiole as wing, petiole almost as long as lamina; cauline leaves oblong, narrowed at both ends, sessile, semiamplexicaul, sinuate-pinnately parted to middle or deeper into elongate, unequally bifid, ovate-oblong segments, apically toothed, teeth spinescent; middle cauline leaves to 20 cm long, to 11 cm wide, upper ones 6 cm long and to 4 cm wide. Capitula numerous, terminal and axillary, ovate-globose, basally weakly cuneate, 1.5–2.0(2.5) cm in dia, with arachnoid-hairy involucre. Involucral bracts imbricate, outer ones smaller, lanceolate, narrowed into thin, deflexed purple spine, glabrous, scabrous on margin, weakly arachnoid-hairy above, inner ones linearly lanceolate, tapered into fine cusp. Florets red, to 27 mm long, in expanded part to 13 mm. Pappus sordid-white, basally yellow, with inner hairs apically narrowed into slightly clavate, scabrous tip; achenes 5 mm long, 2.5 mm wide, brown with short dark streaks. Flowering July to August.

Limestone cliffs.—*Caucasus*: Western Transcaucasia (Anapa, vicinity of Novorossiisk, Gelendzhik, Gagra). Endemic. Described from vicinity of Novorossiisk. Type in Leningrad.

Note. This species is usually treated as a variety of *C. arachnoideum* (MB.) MB. with which, however, it has very little in common. It is closer to the Crimean forms of *C. laniflorum* (MB.) MB., from which it is distinguished by globose capitula and smaller involucral bracts. In the east, the range of *C. euxinum* extends to the Gagra District. This species is one of the indicators of the Crimean-Western Caucasian floristic links.

33. *C. laniflorum* (MB.) MB. Fl. taur.-cauc. III (1819) 557; DC. Prodr. VI, 638, excl. var.; Ldb. Fl. Ross. II, 731 p. p.; Charadze in Zam. po Sist. i Geogr. Rast. Tbil. 23, 106.—*Cnicus laniflorus* MB. Fl. taur.-cauc. II (1808) 276.

112 Perennial. Stem ascending, usually to 50 cm high, weakly angular, sulcate, pale purple, more or less thinly arachnoid-hairy, below inflorescence almost white-tomentose, with deflexed leaves, weakly branched above. Leaves deeply sinuate-pinnately parted, densely spinose with slightly appressed spines, sometimes very finely arachnoid-hairy, white-tomentose beneath, with ligneous midrib; lower cauline leaves with long spinose petiole; middle cauline leaves narrowed into more or less short, toothed and long spinose along margin, amplexicaul petiole,

elongated-elliptical, 25 cm long, 13 cm wide, incised almost up to base into linearly lanceolate unequally 2-parted segments, with 1–2 lateral deltoid-ovate teeth, leaf lobes narrowed into spines 2–4 mm long; upper cauline leaves sessile, semiamplexicaul, to 12 cm long, pinnately parted into ovate or ovate-oblong segments, tapered into spines usually upto 8 mm long. Capitula terminal, usually solitary, on short peduncles, subsessile, slightly elongate, with florets 2.5–3.5 cm long, 2.0–2.5 cm in dia, wide open at end of flowering, to 3 cm in dia, clustered in 2–3 or solitary, on short, axillary and terminal peduncles, forming elongated racemose-corymbose inflorescence. Involucre floccose-arachnoid-hairy; involucre bracts narrowly lanceolate, spinose along margin, almost abruptly tapered into long, thin, hard, more or less squarrose spine. Corolla pink, 23–24 mm long, broader part more or less longer than narrow tube, cut upto 1/3, geniculately bent in outer florets. Pappus sordid-white, basally yellowish, to 22 mm long, more or less dense; inner pappus hairs slightly longer than outer, apically slightly thickened, scabrous; achenes to 5 mm long, 2.5 mm wide, yellowish, with blackish-purple streaks. Flowering August to September.

Herb slopes, along roads in pine and juniper forests, occasionally in Yaila [mountain pastures].—*European Part*: Crimea. Endemic. Described from Crimea. Type in Leningrad.

Note. It differs from the species of the series *Arachnoidea* and *Lappacea* by the long squarrose spines of involucre bracts and is sharply differentiated by the degree of incision of the lower and upper cauline leaves.

34. **C. sublaniflorum** Soják in Nov. bot. Hort. bot. Univ. Carol. Prag. (1961) 36.—*C. fimbriatum* ssp. *bornmülleri* Petrak in Öest. bot. Zeitschr. X (1910) 395.—*C. serrulato-lanceolatum* Boiss. Fl. or. III (1875) 553 p. p.; Zelenetzky in Zap. Novoross. Univ. 102, 351 p. p.

Perennial. Stem ascending, up to 80 cm high, sulcate, more or less purple, arachnoid-hairy, branched from middle, densely leafy below, sparsely above. Leaves with appressed spines above, more or less loosely white-tomentose-beneath; lower cauline leaves oblong-elliptical, more or less deeply sinuate-pinnately divided into ovate-oblong or oblong lobed, basally lobes with coarse deltoid-lanceolate teeth, spinose-ciliate along margin strongly tapered to yellow; 2–6 mm-long, hard spines; upper leaves gradually reduced toward apex, oblong or lanceolate-oblong, shallowly pinnately parted, sessile basally auriculately expanded, semiamplexicaul; apical leaves 1–2 at base of capitula, small lanceolate, usually progeosthetic, pinnately-toothed, with long-spinescent teeth. Capitula solitary, terminal and axillary, ovate or

globose-ovate, 2–3.5(5) cm in dia. Involucre densely floccose-arachnoid from slightly yellowish hairs; outer involucre bracts glabrous, tapered to greenish tip, more or less recurved, tapered into spine 3–5 mm long. Corolla 26–28 mm long, in broader part incised to middle, usually 13 mm long. Pappus sordid white, inner hairs with longer scabrous tip; achenes 5 mm long, brownish. Flowering July to August.

Among pear forests, in glades, in pine forests, on northern slopes of Yaila.—*European Part*: Crimea (Karadag, Crimean State Reserve, Massandra, Lesser and Greater Chuchel, Mangup-Kale, Salamlar, Simferopol and others). Endemic. Described from Crimea (Karadag). Type in Leningrad.

Note. Petrak, who described this plant as *C. fimbriatum* ssp. *bornmülleri* Petrak, compared it with *C. fimbriatum* ssp. *tricholoma* (Fisch. and Mey.) Petrak. The latter is a separate species and belongs to the series of closely related species grouped around *C. osseticum* (Adams) Petrak, for which nodding capitula are characteristic. *C. sublaniflorum* Soják with its erect capitula and structure of the leaves is closer to the Crimean species *C. laniflorum*, differing from it by having a broad, less incised lamina, a densely arachnoid-hairy involucre and larger capitula; it also differs by having involucre bracts that terminate in an herbaceous, deflexed tip, with a more or less short small spine. Possibly, specimens of this species were the ones cited by Boissier as hybrid forms between *C. serrulatum* and *C. lanceolatum*, under the name *C. serrulato-lanceolatum*. Zelenetzky supported this view. The ecological conditions and the distribution of this species still need to be investigated.

Soják segregated the specimen cited by Petrak as *C. fimbriatum* ssp. *bornmülleri* Petrak from Karadag as *C. sublaniflorum* Soják. Soják considers closely related forms that differ from this specimen by having attenuated spinescent involucre bracts with occasional spines on the margin to be *C. laniflorum* (MB.) MB. Specimens with entire involucre bracts were described by him under the name *C. tauricum* Soják. I attach a broader meaning to *C. sublaniflorum* Soják, by including under it all specimens with involucre bracts having an attenuated herbaceous tip with a more or less short spine. Moreover, the spininess of the margin of the lower involucre bracts varies and sometimes is almost unexpressed. The typical form of *C. sublaniflorum* (MB.) MB. should be considered the widespread one in southern
114 Crimea; its characteristic features are the form of the involucre bracts, with strongly elongate, yellowish, squarrose tips, a narrower, slightly elongate capitulum, and deeply pinnatifid leaves. Identical specimens are pre-served in the Marschall-Bieberstein herbarium in Leningrad among Steven's collections.

35. *C. tauricum* Soják in Nov. bot. Hort. bot. Univ. Carol. Prag. (1961) 35.

Perennial. Stem erect, 60–80 cm high, sulcate, arachnoid-hairy, more or less snow-white, weakly branched above. Cauline leaves coriaceous, oblong-elliptical, sessile, semiamplexicaul, not decurrent, distant and sinuately pinnately incised; leaf lobes oblong, unequally 2-parted, short-tapered to spines 3–4 mm long; lamina thinly spinose-ciliate, finely setose above, more or less densely snow-white arachnoid-hairy beneath; leaves gradually reduced above, sinuate-toothed. Capitula 4, without or with 1 bracteal leaf somewhat distant from capitulum, broad, spinose along margin, reduced; capitulum ovate-globose, erect, 2.5–3.0 cm in dia. Involucre densely grayish-arachnoid-hairy; outer and middle involucre bracts lanceolate, entire, with small papillae (under a hand lens), more or less abruptly narrowed from middle, narrow part 5–7 mm long, with short yellow stramineous spine, more or less erect or somewhat deflexed, never arcuate; spines of inner involucre bracts longer and deflexed. Corolla purple, to 30 mm long, about 12.5 mm long in broader part. Pappus to 18 mm long, sordid-white; mature achenes unknown. Flowering August.

Montane herb slopes.—*European Part*: Crimea (Yaila, Ai-Petri). Described from Crimea. Type in Prague.

Note. It is a small montane race of the *C. laniflorum* (MB.) MB. alliance. With its numerous involucre bracts with thin spines it approaches the Caucasian species *C. euxinum* Charadze.

Series 5. Pugnacia Charadze.—Subsect. *Eriophora* Petrak 3. *Horrida* Petrak in Bibl. Bot. 78 (1912) 6 p. p.—Involucre bracts almost subulately narrowed into long, erect spines; capitula more or less large, surrounded by apical leaves. Leaves deeply pinnately incised into ovate or oblong segments, on both sides or only beneath whitish-arachnoid-hairy or white-tomentose, less often subglabrous.

It includes mainly Caucasian species found in the Greater Caucasus region. One species.—*C. cephalotes* Boiss.—is of the Caucasus and Asia Minor.

115 36. *C. cephalotes* Boiss. Diagn. pl. or. ser. I, 6 (1845) 102; Fl. or. III, 533; Somm. and Lev. in Nuov. Giorn. Bot. Ital. N.S. II, 1, 12; Charadze in Fl. Gruzii, VIII, 499; in Zam. po Sist. i Geogr. Rast. Tbil. 20, 46.—*C. Horridum* DC. Prodr. VI (1837) 638, quoad pl. ex Erzerum, non MB. (sec. Boissier).—*C. horridum* var. *tomentosum* auct. non Boiss.: Petrak in Tr. Tifl. Bot. Sada, XII, 1 (1912) 33; in Vestn. Tifl. Bot. Sada, XII, 1(1912) 33; in Vestn. Tifl. Bot. Sada, Vyp. 24, 3.—*C. horridum* ssp. *tomentosum* Petrak Izv. Kavk. Muz. VIII, 1–2 (1914)

48 p. p. quoad pl. ex Adsharia.—*C. tomentosum* Grossh. Fl. Kavk. IV (1934) 181 p. p.; Oprod. Rast. Kavk. 483 p. p. non C.A.M.—*C. munitum* Somm. and Lev. in Nuov. Giorn. Bot. Ital. N.S. II, 1 (1895) 12 p. p.; in Tr. Petersb. Bot. Sada, XVI (1900) 255 p. p.; non MB.—*C. munitum* var. *stenophyllum* Somm. and Lev. op. cit. (1895) 12; op. cit. (1900) 256.

Perennial. Stem basally surrounded by dark brown petioles of old leaves, thick, ascending, sulcate, more or less grayish-arachnoid-hairy, simple or with 1–2 axillary branches above, to tip leafy, (15)20–60 cm high. Leaves grayish above from more or less sparse arachnoid pubescence and sparse, short, spiny bristles, grayish-arachnoid-hairy to white-tomentose beneath, deeply pinnately divided into broad, ovate or roundish-ovate, less often oblong, 2-parted almost to middle, lobes with 3–5 teeth, tapered to hard spines 4–5 mm long, with sparse squarrose spines along margin; basal leaves to 25(30) cm long, 8(12) cm wide, elongate-elliptical, narrowed into elongate spinose-toothed petiole, deeply pinnately divided, with approximate segments; cauline leaves sessile, semiamplexicaul, linear-oblong or linear-lanceolate, pinnately cut into roundish-ovate segments with obovate sinuses between them; apical leaves at base of capitula numerous, broad, oblong, more or less pinnately parted, as long as or longer than capitula. Capitula solitary, terminal on stem and branches, subsessile in axils of apical, reduced leaves, 3.5–5.5 cm long, 3–5 cm in dia. Involucre densely floccose, grayish-arachnoid-hairy; involucre bracts elongate, outer ovate-lanceolate, inner lanceolate-linear, gradually narrowed into elongate, erect spines, glabrous beneath, carinate, blackish-brown above, almost to tip grayish-arachnoid-hairy. Florets purple, 30–35 mm long; corolla with long, narrow tube, abruptly broadening to limb 11–13 mm long. Pappus brownish-yellowish with longer, almost filiform, apically scabrous inner hairs; achenes brown, 5 mm long. Flowering July to September.

Rubby and stony places, in subalpine and lower alpine zones.—*Caucasus*: Western Transcaucasia (mostly mountains of Adzharia and Guria, occasionally in Upper Svanetia). *General distribution*: Asia Minor, Armenia and Kurdistan. Described from Erzerum. Type in Geneva.

Note. The species is variable in the form of the leaves and the pubescence and spininess of the upper side of the lamina. Possibly it forms hybrids with forms of *C. pugnax* Somm. and Lev., which it adjoins along the northern boundary of its range in the Greater Caucasus region. Authors of the Caucasian flora usually refer specimens of *C. cephalotes* Boiss. to *C. tomentosum* C.A.M., from which they are well distinguished by their large, usually solitary capitula and the form of the leaves. Probably, Sommier and Levier referred this same species to

C. munitum (MB.) MB., describing it as *C. munitum* var. *stenophyllum* Somm. and Lev.

37. *C. pugnax* Somm. and Lev. in Nuov. Giorn. Bot. Ital. N.S. II, 1 (1895) 12; in Tr. Peterb. Bot. Sada, XVI (1900) 256.—*C. pugnax* var. *araneosum* Somm. and Lev. l. c. (1900) 257.—*C. horridum* (Adams) Petrak in Tr. Tifl. Bot. Sada, XII, 1 (1912) 19, non MB. (1819).—*C. horridum* auct. non MB.: Charadze in Fl. Gruzii, VIII (1952) 497, descr. georg.; in Zam. po Sist. i Geogr. Rast. Tbil. 20, 47; in Fl. Azerb. VIII, 397.—*C. horridum* ssp. *macrocephalum* Petrak in Izv. Kavk. Muz. VIII, 1–2 (1914) 46 p. p. non *Cirsium macrocephalum* C.A.M.—*C. macrocephalum* Grossh. Fl. Kavk. IV (1934) 181 p. p.; Oprod. Rast. Kavk. 483 p. p. non C.A.M.—*C. munitum* MB. Fl. taur.-cauc. III (1819) 559; DC. Prodr. VI, 639; Ldb. Fl. Ross. II, 731; Boiss. Fl. or. III, 533, excl. var. β . and γ .—*C. munitum* var. *hypopolia* Trautv. in Tr. Peterb. Bot. Sada, V, 2 (1878) 448.—*Carduus horridus* Adams in Web. and Mohr, Beitr. Naturk. I (1805) 66.—*Cnicus munitus* MB. Fl. taur.-cauc. II (1808) 279.

Perennial. Plant with somewhat ascending, thick stems, 25–50 cm high. Stem sulcate, more or less sparsely arachnoid-hairy, weakly branched above, leafy to tip. Leaves stiff, oblong-broadly lanceolate, upper ones oblong, more or less densely setose above with short spiny bristles and glabrous or sparsely arachnoid-hairy, glabrous beneath, on main veins arachnoid-hairy or entirely, more or less densely, grayish-arachnoid-hairy, usually deeply pinnately divided or in lower leaves shallowly parted into unequal 2–3-parted or 2–3-toothed broadly ovate segments, with lobes apically deltoid, pointed, tapered to hard, more or less thick, yellowish spines, 6–10 mm long, sparsely short spiny along margin; basal and lower cauline leaves basally narrowed into long spiny toothed petiole, acute; middle and upper leaves basally weakly narrowed, semiamplexicaul, middle leaves to 15 cm long, 5 cm wide. Capitula usually 3–6 cm in dia, sessile, terminal on stem and branches, usually 1–4, surrounded by apical leaves, more or less projected above them. Involucre densely whitish-arachnoid-hairy; outer involucre bracts ovate-oblong, glabrous below, lustrous, arachnoid-hairy above, weakly carinate, tapered to long, straight or slightly bent spines; outermost bracts abruptly narrowed from broad base to long arachnoid-hairy spines, inner ones linearly lanceolate, gradually narrowed into thin, curved, elongate spine. Florets purple-red, 25–35 mm long; corolla with long narrow tube, abruptly transitional to broad, 13 mm long, to 1/3 cut up limb. Pappus brownish, with scarcely thickened, elongate tips of inner hairs; achenes 5.5 mm long, dark-brownish-reddish-brown. Flowering July to September.

Mid-montane to alpine zone, in meadows and pastures, as weed, and along roads.—*Caucasus*: Ciscaucasia, Dagestan, Eastern Transcaucasia, Western Transcaucasia (northern part). Described from Dout Pass. Endemic. Type in Florence.

Note. The species is highly polymorphic. The size of the capitulum is variable, as is the pubescence of the leaves (from more or less glabrous to grayish-arachnoid-hairy), etc. It is possible that *C. pugnax* forms hybrids at the boundary of its range with *C. tomentosum* C.A.M. in the Eastern Caucasus and with *C. cephalotes* Boiss. in the Western Caucasus. This species has been described under different names, first by Adams as *Carduus horridus* Adams, then by Bieberstein as *Cnicus munitus* MB. In all probability Sommier and Levier redescribed this same species as *C. pugnax* Somm. and Lev. At the same time, they cited specimens of *C. cephalotes* Boiss. from Western Transcaucasia under the name *C. munitum* (MB.) MB.

The first combination, *C. horridum* (MB.) MB. (basionym *Cnicus horridus* MB.), was used by Bieberstein for *C. caucasicum* (Adams) Petrak and is an earlier homonym of *C. horridum* (Adams) Petrak. For this reason the latter name, based on the basionym *Carduus horridus* Adams, must be rejected. The next name, in chronological order, of this species—*Cirsium munitum* (MB.) MB. (basionym *Cnicus munitus* MB.)—must also be rejected, as having been given to the same specimen from the Kazbek District. This leaves *C. pugnax* Somm. and Lev. as the valid name. This species was described from several specimens from the basin of the Teberda River and from the Kazbek District.

Sommier and Levier consider the form with glabrous leaves from the Dout Pass as the type of this species. Among the pubescent forms (var. *araneosum*) Sommier and Levier cite a specimen from Daryal, from where *Carduus horridus* Adams and *Cnicus munitus* MB. also were described.

38. **C. balkharicum** Charadze in Zam. po Sist. i Geogr. Rast. Tbil. 22 (1961) 69.

Perennial. Whole plant white-arachnoid-hairy, producing several stems. Stems strong, erect, usually to 75 cm high sulcate, branched above, purple, weakly white-arachnoid-hairy, leafy to tip. Leaves large, deflected from stem, greenish above, scabrous from tiny, almost inconspicuous, appressed spines, arachnoid-hairy, white tomentose beneath, only along midrib thinly arachnoid-hairy, oblong-ovate or elliptical, broad, shallow or deeply sinuate-pinnately parted into unequal 2–3-parted, ovate segments, lobes broadly deltoid tapered to hard, 5–10 mm long, yellowish spines; basal and lower caulines leaves to 25 cm long, 11 cm wide, narrowed at both ends, other cauline leaves

sessile, semiamplexicaul, middle ones 15–20 cm long, 5–8 cm wide; apical leaves at base of capitula strongly reduced, shorter than or very slightly surpassing capitula. Capitula roundish-ovoid, (4)5–6(7) cm in dia, solitary, terminal on stems and some axillary branches. Involucre densely whitish-arachnoid-hairy; lower involucral bracts small, abruptly narrowed into long arachnoid-hairy spines, outer ones ovate-lanceolate, scarious, greenish-yellowish, weakly carinate, glabrous, along margin floccose-hairy, abruptly narrowed into long, thin, basally slightly curved, arachnoid-hairy spines; inner bracts linearly lanceolate, glabrous, narrowed into strongly curved, thin tip, along margin floccose- and arachnoid-hairy above. Florets pinkish-lilac, large; corolla 40 mm long, in broader part 17–18 mm long, cut up to 1/3. Pappus yellowish-whitish, with soft hairs, inner hairs apically narrowed and toothed, with slightly clavate tips; achenes marbled, greenish, with blackish-brown stripes, to 6 cm long. Flowering August to September.

Rubble slopes and meadows, subalpine to alpine zone, as weed.—*Caucasus*: Central Caucasus (in upper reaches of Uruk, Balkar Cherek and Bezingi Cherek, and Chegem rivers). Endemic. Described from basin of Bezingi Glacier. Type in Tbilisi.

Note. It differs from the polymorphic *C. pugnax* Somm. and Lev. by the white-tomentose pubescence of the entire plant, wider, shallowly pinnatifid leaves, and the usually larger capitula, which projected above the cauline leaves.

Series 6. Tomentosa Charadze.—Subsect. *Eriophora* Petrak 3. *Horrida* Petrak in Bibl. Bot. 78 (1912) 6 p. p.—Capitula medium-sized, subsessile, terminal on stem and branches, usually clustered in 2–3 or solitary, surrounded by more or less longer apical leaves. Leaves narrow, oblong or linear-oblong, pinnately divided, with more or less deltoid-ovate lobes, white-tomentose, occasionally more or less glabrous.

39. *C. tomentosum* C.A.M. Verzeichn. (1831) 69; DC. Prodr. VI, 637; Ldb. Fl. Ross. II, 730; Grossh. Fl. Kavk. IV, 181 p. p.; Oped. Rast. Kavk. 483 p. p.; Charadze in Zam. po Sist. i Geogr. Rast. Tbil. 20, 45; in Fl. Azerb. VIII, 396.—*C. munitum* γ . *tomentosum* Boiss. Fl. or. III (1875) 533.—*C. horridum* var. *tomentosum* Petrak in Tr. Tifl. Bot. Sada, XII, 1 (1912) 20.—*C. horridum* ssp. *tomentosum* Petrak in Izv. Kavk. Muz. VIII, 1–2 (1914) 48 p. p.—*C. horridum* ssp. *isophyllum* Petrak, op. cit. (1914) 49.—*C. isophyllum* Grossh. Fl. Kavk. IV (1934) 181; Oped. Rast. Kavk. 483.—**lc.** Petrak, op. cit. (1914) 1–2, plate III.—**Exs.:** Herb. Fl. cauc. No. 199.

- 119 Perennial. Rhizome thick, ligneous, producing 1–5 aerial shoots. Stem branched from base, ligneous, covered with brown-reddish-brown remnants of petioles of old leaves, ascending, weakly sulcate, white-tomentose, (20) 40–60 cm high, simple or branched above. Leaves white-tomentose beneath, scabrous above from small, scattered spiny bristles, grayish- or whitish-arachnoid-hairy to white-tomentose; lower cauline leaves 20–26 cm long, 3–5 cm wide, basally narrowed into short petiole, acuminate, linearly oblong or linearly lanceolate, pinnately parted; leaf segments unequally 2–3 parted into ovate-deltoid or lanceolate-deltoid lobes, narrowed into long, yellowish, hard spines 5–8 mm long, occasionally spines to 12 mm long, sparsely spiny-ciliate along margin; middle and upper cauline reduced toward stem top, linearly lanceolate to oblong-lanceolate, shallowly pinnately parted, sessile, basally slightly broadened, semiamplexicaul, with weakly decurrent auricles; apical leaves at base of capitula, narrow, pinnately parted, with distant lobes, slightly or almost 2 times surpassing capitulum. Capitula globose-ovate, 2.5 cm in dia, subsessile, usually solitary or in 2–3, terminal, on stem and branches. Involucre more or less floccose-arachnoid-hairy; involucre bracts greenish-yellow, glabrous, lustrous, weakly carinate above, outer ones ovate or oblong-ovate, tapered to more or less bent or almost straight, basally arachnoid-hairy, hard, yellowish spines; inner bracts oblong-lanceolate, narrowed into subulately acute tip. Florets red or pink, usually 17 mm long; limb 5-parted to middle, almost 1/2 as long as corolla tube. Pappus brownish-white, with soft hairs, inner hairs narrowed into scabrous tip; mature achenes not known. Flowering August to September. (Plate IV, Fig. 2.)

Alpine zone in rubbly places, along glacial cirques, to 3,200 m.—*Caucasus*: Central Caucasus (Terek River gorge), Eastern Transcaucasia (Tfandag, Shakhdag), Dagestan (sources of Avar Kois and Samur rivers), Southern Transcaucasia (Murovdag, Sevan and Zangezour ranges). *General distribution*: Armenia and Kurdistan. Described from Eastern Caucasus. Type in Leningrad.

Note. It differs from all the species of the series *Tomentosa* by having white-tomentose pubescence over the entire plant; the specimen from the Megrin District, which requires further investigation, especially stands out by its dense snow-white hairs.

40. **C. daghestanicum** Charadze in Zam. po Sist. i Geogr. Rast. Tbil. 22 (1961) 68; in Fl. Azerb. VIII, 398.

- 120 Perennial. Stem hard, ascending, to 100 cm high, branched above with divergent branches, more or less densely arachnoid-hairy, leafy to tip. Leaves divergent, oblong, more or less broadly elliptical, pinnati-

fid-sinuate, with 2–3-parted broadly ovate, approximate lobes, tapered to hard, yellowish spines, up to 12 mm long, loosely grayish tomentose beneath, tuberculate above, sparsely spinose, sometimes arachnoid-hairy; lower cauline leaves narrowed toward base, usually to 25 cm long, 8 cm wide, acuminate; middle and upper cauline leaves auriculate, semiamplexicaul, middle ones to 17 cm long; apical leaves at base of capitula, strongly reduced. Capitula on short peduncles, solitary, terminal, on stem and branches, forming lax corymbose-paniculate inflorescence, 3–4 cm in dia, basally with 2–3 linear-lanceolate, plumosely spiny-toothed apical leaves, somewhat surpassing capitula. Involucre white-arachnoid-hairy; involucre bracts from outer oblong-lanceolate to inner linear-lanceolate, tapered to erect or, in inner bracts, curved long spines, glabrous below, smooth above, weakly arachnoid-hairy, with dark spots, along margin scabrous. Corolla pinkish, 23 (24) mm long, limb 8–9 mm long. Pappus yellowish-white, with long, apically serrate and clavately thickened inner hairs; achenes to 4 mm long, dark reddish-brown. Flowering August to September.

Rubby talus, in subalpine zone.—*Caucasus*: Dagestan (basin of Samur River). Endemic. Described from Gashelk Range. Type in Tbilisi.

Note. In its broad leaves and solitary capitula, it is closer to the series *Pugnacia* Charadze but differs by having narrower outer involucre bracts, which allies it with the series *Lappacea* Petrak.

41. *C. ketzkhoveli* Charadze in Zam. po Sist. i Geogr. Rast. Tbil. 22 (1961) 64.

Perennial. Stem ascending, 30–40 cm high, thinly grayish tomentose, simple or weakly branched above, densely leafy to tip. Leaves oblong or linear-oblong, divergent, green above, more or less densely spiny-setose, with thin appressed bristles, sometimes thinly arachnoid-hairy, whitish beneath, finely tomentose, pinnatifid into 2–3-parted, ovate lobes with 8–10 mm long teeth at apex. Cauline leaves oblong, apically narrowed, semiamplexicaul, 15–23 cm long, 3.5–5.0 cm wide; nearer stem tip somewhat reduced, lower leaves basally narrowed; apical leaves at base of heads linear or lanceolate, pinnatifid, long spiny, somewhat surpassing capitula. Capitulum on short peduncles, solitary or 2–3, terminal or axillary, in corymbose paniculate inflorescence. Involucre 2.5–3.0 cm in dia, thinly arachnoid-hairy, with erect or slightly deflexed, long yellowish spines; involucre bracts from outer ovate to inner linear-lanceolate, glabrous, lustrous, tapered: to thin, slightly curved, long spine, greenish-yellowish, dark brownish-green above, along margin scabrous, at base of spine long-arachnoid-hairy. Florets purple-lilac; corolla to 21 mm long, limb 10 mm. Pappus brownish-white, its outer hairs plumose up to tip, inner hairs long, serrate and

clavately thickened at apex; achenes brownish-reddish-brown, 4.5 mm long. Flowering August to September.

Alpine zone, on rubbly talus.—*Caucasus*: Dagestan (sources of Avar Kois), Eastern Transcaucasia (Kakhetia, upper reaches of Argun River). Endemic. Described from upper reaches of Tetr Durudzh in Kakhetia. Type in Tbilisi.

Note. It differs from *C. tomentosum* C.A.M. by the leaves that are white-tomentose only beneath and green and densely spiny-setose above and by the apical leaves slightly surpassing the capitula. From *C. daghestanicum* Charadze it differs by having narrower leaves that are densely white-tomentose beneath and a compact general inflorescence.

42. *C. tindaicum* Charadze in Zam. po Sist. i Geogr. Rast. Tbil. 22 (1961) 66.

Perennial. Stem hard, ascending, usually simple, 40–50 cm high, dark purple, subglabrous, with scattered, crisped, articulate hairs, leafy to tip. Leaves divergent, linearly lanceolate, semiamplexicaul, thin-acuminate, middle cauline leaves to 18 cm long, 4–6 cm wide, sinuately pinnatifid into 2–3-parted lobes, lanceolate, segments narrowed into hard spines as long as or scarcely surpassing them, green on both sides, very thinly appressed-spiny above, with prominent, stramineous, basally broadened midrib and lateral veins, more or less glabrous beneath, sparsely arachnoid-hairy, more distinctly on midrib, lateral veins very prominent, whitish, thick, continuing in stiff, thick, to 12 mm long spines; apical leaves, slightly surpassing capitula, narrowly lanceolate, pinnately parted. Capitula 13–18 mm in dia, terminal, 5–8, clustered on short peduncles, axillary capitula reduced, solitary on peduncles somewhat longer than capitula, in racemose-corymbose inflorescence. Involucral bracts lanceolate, imbricate, glabrous, along margin scabrous, greenish-yellow, scarious, above blackish-purple, tapered to thin, yellowish, somewhat divergent spine, somewhat surpassing involucral bracts. Florets pale-pink, to 20 mm long, limb about 9 mm. Pappus sordid-white, basally yellowish, with strongly elongated, scabrous tips of inner pappus hairs; achenes to 5 mm long, dark brown. Flowering July to September.

122 Rubbly talus, in alpine zone.—*Caucasus*: Dagestan (upper reaches of Andii Kois, in Avar Kois Gorge), Eastern Transcaucasia (mountainous Tushetia). Endemic. Described from Dagestan (Gaer-meer Mountain near the village of Tindi). Type in Tbilisi.

Note. This species is readily distinguished from other species of the series *Tomentosa* Charadze by the narrow leaves that are green on both sides, almost concolorous, glabrous or thinly arachnoid-hairy with hard spines, and also by the pale pink color of the florets. With its

clustered small capitula it approaches *C. tomentosum* C.A.M., differing from it by the absence of white-tomentose pubescence and by having a compact racemose inflorescence with more numerous capitula.

Series 7. Macrocephala Charadze.—Capitula large, solitary; involucre bracts tapered to straight, thick spines; pubescence of multicellular slightly scaly, crisped hairs; leaves subglabrous or grayish-arachnoid-hairy, with sparse spiny bristles above.

43. *C. macrocephalum* C.A.M. Verzeichn. (1831) 70; DC. Prodr. VI, 640; Ldb. Fl. Ross. II, 730; Charadze in Zam. po Sist. i Geogr. Rast. Tbil. 20, 44; in Fl. Azerb. VIII, 395.—*C. horridum* ssp. *prasinolepis* Petrak in Izv. Kavk. Muz. VIII, 1–2 (1914) 47.—*C. prasinolepis* Grossh. Fl. Kavk. IV (1934) 181; Oprod. Rast. Kavk. 483.—*C. horridum* β. *eriocephalum* Boiss. Fl. or. III (1875) 533.—*C. tomentosum* Trautv. in Tr. Peterb. Bot. Sada, X, 1 (1887) 118, non C.A.M.

Perennial. Stem up to 40 cm high, ascending, yellowish, thick, covered with long, intertwined arachnoid hairs, leafy to tip, simple or weakly branched at apex, with large, solitary capitula. Cauline leaves sessile, basally rounded, auriculate, semiamplexicaul, narrowed toward apex, ovate or oblong-ovate, 12–15 cm long, 6–7 cm wide; basal leaves oblong-lanceolate, abruptly narrowed into more or less elongated petiole, 25 cm long, 9–10 cm wide; all leaves shallowly sinuately pinnately divided in 2–3-parted, ovate or deltoid-ovate segments, lobes acuminate, with yellowish, ligenous lateral veins, prominent on both sides and narrowed into here, thick spines to 10 mm long, more or less arachnoid-hairy above or glabrous, usually with scattered spinose bristles less often lacking bristles, more or less grayish-arachnoid-hairy beneath to almost white-tomentose, occasionally arachnoid-hairy only along veins; apical leaves reduced, crowded at base of capitula, broadly lanceolate, remotely pinnately toothed with long spines. Capitula 5–6 cm in dia, globose, solitary, terminal on stem and slender branches, subsessile, surrounded by apical leaves scarcely surpassing them. Involucre unevenly grayish-hairy; involucre bracts glabrous below, lustrous, yellowish-green, outer ones ovate, inner linearly lanceolate, weakly carinate, narrowed from middle into long greenish tip, tapered to erect, yellowish, thick spine, densely pubescent above, along margin, with long crisped hairs, at base with scaly hairs; outermost bracts oblong-lanceolate and pilose almost from base. Florets reddish, 33–36 mm long; limb 15 mm long, 5-parted to middle. Pappus 26–28 mm long, sordid-white, inner pappus hairs apically scabrous, weakly clavate, long; achenes dark brown, to 7 mm long. Flowering August to September.

Rubby talus and stony slopes in alpine and subalpine zones.—*Caucasus*: Eastern Transcaucasia (Kuba District), Dagestan. Endemic. Described from Eastern Caucasus (Tfandag). Type in Leningrad.

Note. The name *C. macrocephalum* C.A.M. has been broadened by authors of the Caucasian flora to include *C. pugnax* Somm. and Lev. (= *C. horridum* (Adams) Petrak). The type of *C. macrocephalum*, from Tfandag Peak, differs sharply from *C. pugnax* in several characters, mainly in the nature of the pubescence of the involucre bracts, and in having broad leaves. The distribution of *C. macrocephalum* in Dagestan and the Eastern Caucasus is highly restricted. Despite this, the species varies greatly in leaf pubescence. Petrak described the pubescent form as ssp. *prasinolepis* Petrak, which was later elevated by Grossheim to the rank of species as *C. prasinolepis* (Petrak) Grossh. A densely arachnoid-hairy specimen of this species was cited by Trautvetter as *C. tomentosum* C.A.M.

Series 8. Argillosa Charadze.—Capitula solitary, surrounded by apical leaves surpassing them. Leaves coriaceous, stiff, green above, snow-white beneath, shallowly sinuately-pinnately lobed.

44. *C. agrillosum* V. Petr. ex Charadze in Zam. po Sist. i Geogr. Rast. Tbil. 20(1958) 50; Grossh. Opređ. Rast. Kavk. 458; Charadze in Fl. Azerb. VIII, 395.—*Cnicus trautvetteri* Winkl. in Schedis. quoad pl. e loc. Chuznach.

Perennial. Stems robust, erect, branched above, 60–100 cm high, more or less densely arachnoid-hairy, almost snow-white, solitary or 2–5. Leaves stiff, coriaceous, elongate-elliptical or ovate-oblong, snow-white-tomentose beneath, sparsely spinose-setose above, narrowed above into hard spines to 10 mm long, semiamplexicaul, shallowly and remotely sinuately pinnately lobed, with 2-parted ovate-deltoid lobes, tapered to hard spines, 8–10 mm long, and sparsely spinose along margin; lower cauline leaves 15–25 cm long, 4–8 cm wide, others gradually reduced toward stem tip. Capitula terminal, solitary or in 2–3, surrounded by apical leaves surpassing them, basally broadened, 2.5 cm in dia, with florets about 4 cm long. Involucre scatteredly floccose-arachnoid-hairy; involucre bracts scarious, outer ones oblong-elliptical or ovate, yellowish, abruptly narrowed into elongate, yellowish spine, almost as long as bract; inner bracts linearly lanceolate, narrowed into cusp. Corolla pinkish-violet, to 30 mm long; limb 12.5 mm long. Pappus sordid-white, to 22 mm long, inner pappus hairs apically serrate, scarcely thickened at tip; achenes light brown, to 5.5 mm long. Flowering August to September. (Plate VI, Fig. 1.)

Mid-montane to subalpine zone, in rubbly places, among phryganoid vegetation, mainly in limestone areas.—*Caucasus*: Eastern Transcaucasia (Kuba District), Dagestan. Endemic. Described from Alta-Agach in Eastern Caucasus. Type in Baku.

Note. A characteristic species of the central limestone region of Dagestan, somewhat isolated from the Caucasian-Western Asian species of the series *Tomentosa* Charadze, it is one of the xerophytes of Dagestan. Because of its snow-white pubescence on the stems and leaves, it sometimes has been confused by Caucasus authors with *C. tomentosum* C.A.M. or with *C. sinuatum* (Trautv.) Boiss., although the latter species is sharply distinguished by the structure of its involucre bracts.

Series 9. Turkestanica Charadze.—Subsect. *Eriophora* Petrak 3. *Horrida* Petrak in *Bibl. Bot.* 78 (1912) 6 p. p.—Outer involucre bracts with erect, hard spines. Capitula large, arachnoid-hairy, surrounded by long-spinose apical leaves. Leaves with long thick spines.

The series includes two species found in the mountains of Soviet Central Asia. The presence of narrow, long-pointed straight spines on the lower involucre bracts shows its closeness to the species of the series *Lappacea*, differing by having larger, densely arachnoid-hairy capitula and deltoid leaf segments bearing strongly thickened hard spines. The latter characters give a reason to ally this series with the series *Pugnacia*, with which Petrak compared *C. turkestanicum* (Rgl.) Petrak. He split this species from *C. eriophorum* s. l., which differs considerably in the structure of the involucre bracts.

45. *C. turkestanicum* (Rgl.) Petrak in *Oest. Bot. Zeitschr.* LX, 9 (1910) 351.—*C. eriophorum* γ . *turkestanicum* Rgl. in *Tr. Peterb. Bot. Sada*, VI, 2 (1880) 319.—*C. eriophorum* var. *turkestanicum* O. and B. Fedtsch. *Perech. Rast. Turk.* IV (1911) 283.

Perennial. Stem 40–80 cm high, thick, simple, more or less densely white tomentose, densely leafy. Leaves with numerous appressed spine-like bristles above, more or less thinly arachnoid-hairy, with yellowish prominent veins and midrib broadened at base, densely grayish-tomentose beneath, with very prominent thick and ligneous midrib and lateral veins extending to apices of lobes as hard, stramineous spines, oblong or ovate-oblong, deeply sinuately pinnately divided into broadly deltoid-lanceolate or deltoid-ovate segments, spiny-ciliate on margin, to 15–17 cm long; apical segments oblong, lanceolately tapered into hard spines up to 10 mm long, lateral segments usually nonuniformly 2-parted, with more or less reduced anterior lobe; all lobes and teeth tapered to thick, hard spines 10–12 mm long; basal and lower cauline

leaves more deeply pinnately incised, to 25 cm long, narrowed in more or less short, narrow-winged spinulose petiole, middle and upper leaves sessile, with long semiamplexicaul auricles, 2-parted into deltoid lobes, tapered to long, hard spines; rosette of small leaves often in axils of upper leaves surrounding undeveloped axillary capitula; apical leaves at base of capitula, morphologically similar to remaining leaves, almost as long as or surpassing capitula. Capitula 3–4, globose-ovate, 5–6 cm in dia, subsessile, clustered at stem apices in shortly racemose inflorescence, surrounded by deeply pinnately divided apical leaves surpassing them. Involucre densely grayish arachnoid-hairy; outermost involucre bracts scabrous above, gradually narrowed from broad base into long straight spines, densely arachnoid-hairy, other bracts from outer ovate-oblong to inner oblong-broadly lanceolate, glabrous, scarious, carinate, gradually narrowed above middle into linearly lanceolate, slightly curved tip, weakly arachnoid-hairy above. Florets pink, 30–32 mm long; limb as long as narrow corolla tube or somewhat longer, to middle 5-parted. Pappus golden, sordid-white above, with scarcely long, scabrous tips of inner pappus hairs; achenes brown, to 6 cm long. Flowering August to September.

Stony slopes, from 2,200 to 3,500 m.—*Soviet Central Asia*: Tien Shan, Pamiro-Alai. Endemic. Described from Darvaz. Type in Geneva; paratype in Vienna; isotype in Leningrad.

46. ***C. pseudolappaceum*** Charadze in Zam. po Sist. i geogr. Rast. Tbil. 23 (1963) 115; in Fl. Turkm. VII, 240, descr. ross.—*C. lappaceum* var. *ferox* auct. fl. As. Med. non Boiss.—*C. lappaceum* auct. non MB.: O. and B. Fedtsch. Perech. Rast. Turk. IV (1911) 283.—*C. lappaceum* γ . *monocephalum* Bge. Beitr. Kenntnis Russl. Stepp. Centr.-As. (1851) 190.—*Exs.*: Sint. It. transcasp.-pers. No. 1097.

Perennial. Stem basally with brown fibrous remnants of old leaves, ascending, ligneous, 40–70 cm high, densely arachnoid-hairy or almost tomentose, sulcate, simple or with short axillary shoots above, 126 leafy up to apex. Cauline leaves oblong, more or less divergent, sinuately pinnately parted into broadly deltoid-lanceolate, remote segments, densely spiny-setose above with thin, more or less appressed or erect bristles, densely white-tomentose beneath, with thick midrib and lateral veins, tapered to long, hard spines; basal and lower cauline leaves narrowed to more or less long petiole; all leaves lanceolate, cauline leaves sessile, auriculate, semiamplexicaul, spinose-ciliate on margin, with slightly revolute margin; apical leaves pinnately divided into narrow lobes, slightly narrowed, tapered into long, hard spine, surrounding capitula, almost 1.5 times as long. Capitula terminal or axillary, subsessile, solitary, in short racemose inflorescence. Involu-

cre' covered with weakly floccose, white-arachnoid hairs, terminal capitula 2.5–3.5 cm in dia, axillary sometimes 1.5 cm in dia with florets 4 cm long; outer involucre bracts broad at base, subulate, with straight spine, 1/2 as long as involucre, more or less arachnoid-hairy, from outer oblong-ovate to inner linearly lanceolate, glabrous, greenish-yellow, weakly carinate, narrowed from middle into thin, arachnoid-hairy spines. Florets pink, to 30 (32) mm long; corolla tube to 16 mm long. Pappus basally golden-yellow, sordid white above, to 23 mm long, with elongate scabrous tips of inner hairs; achenes 5 mm long, brown. Flowering July to September.

Juniper zone, on gypsiferous hills and dry mountain slopes to 2,800 m.—*Soviet Central Asia*: mountainous Turkmenia, Pamiro-Alai Region (Guzar, Baisun). *General distribution*: Iran-Afghanistan. Described from Arvaz in Kopetdag. Type in Alma-Ata.

Note. It differs from *C. turkestanicum* (Rgl.) Petrak by having oblong, smaller capitula, floccose pubescence on the involucre, and leaf segments long-attenuated into hard spines.

From the series *Lappacea*, with which this species usually has been allied, it differs by having broader lower involucre bracts, a different leaf form with distant segments, and other characters that give this plant a unique appearance.

Subsection 5. Eriophora Petrak in *Bibl. Bot.* 78 (1912) 5 p. p.—**Subsect. Eriophora 1. Erioccephala** Petrak, l. c.—Leaves grayish arachnoid-hairy beneath; cauline leaves sessile, not decurrent. Capitula usually large, occasionally, medium-sized. Involucre bracts apically scarious, colored, more or less broadened, fimbriate along margin, tapered to thin, more or less short, spines, scabrous on margin or with occasional spinous cilia.

The subsection includes species distributed in the Mediterranean region and replaces the subsection *Armata* Charadze.

- 127 47. **C. polonicum** (Petrak) Iljin in *Izv. Glavn. Bot. Sada Akad. Nauk SSSR*, XXX, 3–4 (1932) 350; Majevskaa, *Fl. ed.* 8, 603; Klok. in *Vizn. Rosl. URSR*, 568; Geideman, *Opred. Rast. Mold. SSR*, 289.—*C. eriophorum* ssp. *decussatum* Petrak var. *polonicum* Petrak in *Bibl. Bot.* 78 (1912) 35.—*C. eriophorum* var. *spathulatum* auct. non Naeg. and Löhrl.: Malz. in *Sitzb. Naturf. Ges. Uni. Jurj.* XVI, 2 (1907) 129; Schmalh. *Fl. Yugo-Zap. Ross.* 317; *Fl.* II, 101.—*C. eriophorum* var. *platyonichium* auct. non Wallr.: Fedtsch. and Fler. *Fl. Evrop. Ross.* (1910) 1009.—*C. eriophorum* auct. fl. ross. non Scop.: Bess. *Enum. pl. Vohlyn.* (1822) 32; Ldb. *Fl. Ross.* II, 731 p. p.—**lc.**: Petrak in *Bibl. Bot.* 78, fig. 10.—**Exs.**: *Fl. polon. exs.* No. 957 (sub *C. decussato* Janka); GRF No. 115.

Biennial. Stems robust, crisped-hairy, weakly flexuous, thick, sulcate, more or less densely lanate, 60–150 cm high, branched above, leafy to top. Leaves almost to base pinnately incised into divergent, linearly lanceolate, unequally 2-parted segments, with shorter apical lobe, narrowed into hard spine, finely and unequally spiny-ciliate along margin, with long, thin, spinous bristles above, grayish-tomentose beneath, with arachnoid-hairy, prominent veins. Lower leaves up to 37 cm long, elliptical, with narrow segments, tapered to long, hard spine, basally narrowed to spinose-lobate, auriculate petiole, semiamplexicaul; middle cauline leaves sessile, semiamplexicaul, narrowed at apex, gradually reduced upward; apical leaves as long as capitula or 2–3 times surpassing them. Capitula solitary, terminal on stem and few long shoots, 6–8 cm in dia, in corymbose paniculate inflorescence. Involucre more or less densely lanate; involucre bracts linearly lanceolate, with thin and occasional spiny cilia along margin, abruptly broadened above, scarious, fimbriate along margin, obtuse, with thin yellowish spine, somewhat recurved, purple; inner bracts linearly lanceolate, gradually narrowed into long, arachnoid-hairy tip. Corolla red, 34 mm long, tube narrow, to 22 mm long; limb incised to middle. Pappus sordid-white, to 25 mm long, with elongate, toothed tips of inner hairs; achenes to 6 mm long, 2.3 mm wide, light reddish-brown, with black stripes. Flowering July to September.

Roadsides, scrubs, fields, mountain slopes.—*European Part*: Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga, Lower Volga. *General distribution*: Central Europe. Described from vicinity of Tula. Type in Leningrad.

Note. It differs from *C. decussatum* Janka by having slightly obtuse, oblong-ovate and oblong-lanceolate appendages of the involucre bracts, which abruptly end in a short spine; in *C. decussatum* Janka, 128 the involucre bracts are gradually narrowed and attenuated into a spine at the apex. *C. polonicum* (Petrak) Iljin is distributed in the eastern part of the range of the subsection *Eriophora* Petrak and replaces *C. decussatum* Janka, distributed in the Ciscarpathian part of Eastern Europe.

Subsection 6. Ciliata Petrak in *Bibl. Bot.* 78 (1912) 5 p. p.—*Lophiolepis* Cass. in *Dict. Sc. nat.* XLI (1826) 313, pro sect.; DC. *Prodr.* VI, 634 p. max. p.—Subsect. *Ciliata* 1. *Serrulata* Petrak op. cit. 5 p. min. p., 2. *Ciliata* Petrak, op. cit. 5, 3. *Fimbriata* Petrak, op. cit. 5 p. min. p.—Capitula large, globose. Involucre ovate-roundish, glabrous or weakly hairy; apical leaves completely or partly surrounding capitulum. Involucre bracts imbricate, appressed, linearly lanceolate, spinescent, more or less incised, spiny-ciliate or entire; outer bracts upward-spreading, outer deflexed.

Type of subsection: *C. ciliatum* (Murr.) Moench.

I have excluded Caucasian species with nodding capitula from this subsection, which I place in the separate section *Caucasigena* Charadze. Some species of [Series] 1. *Serrulata* Petrak have been included in the subsection *Armata* Charadze.

48. *C. serrulatum* (MB.) MB. Fl. taur.-cauc. III (1819) 557 p. p. excl. var.; DC. Prodr. VI, 638; Ldb. Fl. Ross. II, 725; Schmalh. Fl. II, 101; Fedtsch. and Fler. Fl. Evrop. Ross. 1010, excl. syn.; Nevski in Sorn. Rast. SSSR, 4, 289; Pavlov, Fl. Tsentr. Kazakhst. III, 311; Klok. in Vozn. Rosl. URSR, 568 p. p.—*Cnicus serrulatus* MB. Fl. taur.-cauc. II (1808) 275.

Biennial. Stem 100–150 cm high, hard, ascending, corymbosely branched above, leafy to top, sulcate, sparsely crisped-hairy. Leaves green above, more or less densely covered with fine spiny bristles, grayish-tomentose beneath, finely spiny-ciliate along margin; lower leaves oblong-elliptical, 18–25(30) cm long, narrowed into petiole, pinnately incised almost to base into deltoid-lanceolate, 2-parted segments, with long, broadly or narrowly lanceolate, acuminate, at apex somewhat subobtuse lobes; lobes and teeth long tapered to hard spines 4–6 mm long; middle and upper cauline leaves semiamplexicaul, auriculate, ovate or ovate-lanceolate, deeply two-parted into unequal, lanceolate or linearly lanceolate lobes, long tapered to thin spines 7–9 mm long; apical leaves to 1.5–2 cm long, occasionally smaller, ovate, shallowly-pinnately lobed, usually reaching base of capitula. Capitula on short, thick peduncles, erect, solitary, terminal on stem and branches, often 5–6 clustered in corymbose inflorescence. Involucre weakly cuneate at base, 2.5–3.5 cm in dia, more or less oblong, 3–4 cm long, somewhat expanded at end of flowering; outer involucre bracts strongly reduced, more or less deflexed, lanceolate, long-tapered to erect, hard, short spine, with fine, upward spreading spiny cilia along margin above; middle and inner involucre bracts elongate, lanceolate to linearly lanceolate, outer ones gradually narrowed into erect, stiff spines, inner ones into scarious tip, thinly spiny-ciliate along margin with upward-spreading and appressed cilia, stramineous, carinate above, densely thin appressed-hairy along margin. Florets red, 27–30 mm long; corolla tube 14–16 mm long; limb cut up to 1/3. Pappus to 19 mm long, sordid-white, yellowish below, with dark, elongate and toothed tips of inner hairs; achenes 4 mm long. Flowering July to September.

On solonchetses in forest-steppe zone; meadows, roadsides, irrigation channels.—*European Part*: Volga-Don, Trans-Volga, Bessarabia, Black Sea Region, Crimea, Lower Don, Lower Volga; *Western Siberia*: Upper Tobol (cited for the former Aktyuba and Irgiz districts). Endemic. Described from Crimea. Type in Leningrad.

Note. The species varies in the degree of incision of the leaves, width of their segments, and to some extent, size of the capitula. The most typical forms from Crimea are distinguished by very small, narrow lower involucral bracts. In Ukraine, forms with somewhat larger capitula are found, which are transitional to *C. ciliatum* (Murr.) Moench, whose northern limit of distribution overlaps the range of *C. serrulatum*. An especially large number of intermediate forms is observed at the eastern limit of distribution of the species in the Lower Volga and Trans-Volga regions. Authentic specimens of *C. ciliatum* are known from these same places. *C. ukranicum* Bess., which has been cited as a synonym of *C. ciliatum*, differs by having long, deflexed lower involucral bracts similar to those of *C. ciliatum*. Possibly *C. ukranicum* Bess. is one of the intermediate forms, and whether it is a good species can be resolved finally only by careful study in nature. I am refraining from including it as synonym of *C. serrulatum*.

49. *C. ukranicum* Bess. in DC. Prodr. VI (1837) 635.—*C. ciliatum hybridum* Fisch. Cat. Hort. Gorenk. (1812) 35, nomen.—*C. ciliato-affine* Bess. Enum. pl. Volhyn. (1822) 75, nomen.—*C. serrulatum* MB. Fl. taur.-cauc. III (1819) 557 p. p.; Klok. in Vozn. Rosl. URSR, 568 p. min. p.

Biennial. Stem ascending, 40–60 cm high, weakly flexuous and branched above, more or less densely crisped-hairy, slightly ribbed, brownish, densely leafy to tip. Leaves divergent, oblong-lanceolate; middle cauline leaves 9–11 cm long, up to 3 cm wide, sinuately pinnately parted into unequally 2-parted, remote, lateral segments, lobes of segments lanceolate, subacute, strongly spinescent; lower leaves narrowed into short petioles, others basally auriculate, semiamplexicaul, acuminate; apical leaves reduced, lanceolate, upward spreading, often
130 reaching upper margin of involucre; all leaves green above, with small, appressed, spinose bristles, densely grayish-tomentose beneath, with prominent midrib and lateral veins, usually stiff and strongly tapered to spines 4–8 mm long. Capitula solitary, globose-ovate, terminal on stem and branches, usually short-pedunculate, 3–4 clustered in corymbose inflorescence. Involucre glabrous, 2.5–3.5 cm in dia; involucral bracts from outer narrowly lanceolate to inner linearly-lanceolate, elongate, gradually narrowed into thin, long spines, finely setose-ciliate along margin; outer and middle bracts carinate, with longer cilia, outer ones usually recurved, dorsally along margin thinly appressed-hairy, scabrous; inner bracts dark violet above, narrowly linearly lanceolate, narrowed into thin, long, weakly bent cusp. Florets purple, to 27 mm long; corolla tube narrow, to 16 mm long; limb unequally 5-parted to deeper than middle. Pappus sordid-white, with scabrous, elongated

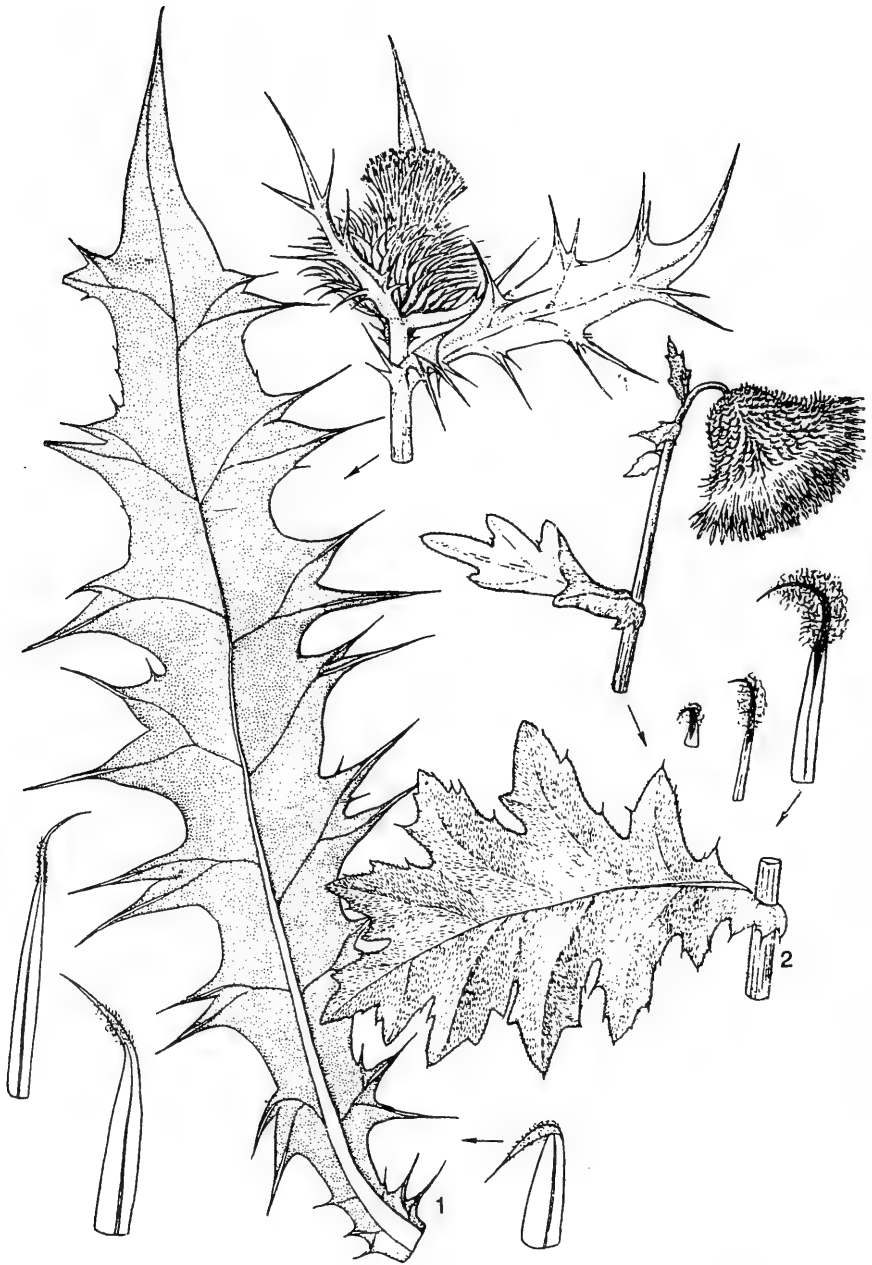
tips of inner hairs; mature achenes unknown. Flowering July to September.

Steppe slopes and pastures.—*European Part*: Bessarabia, Upper Dniester. *General distribution*: Central Europe (Transylvania). Described from Podolia. Type in Kiev (?).

Note. In the pubescence of the floral bracts, it is closer to *C. serrulatum* (MB.) MB., differing from it by having larger capitula and longer lower involucre bracts, which are ciliate along margin, recurved, and gradually narrowed to spines. From *C. ciliatum* (Murr.) Moench it is well differentiated by the form of the narrower involucre bracts. Apparently this species is cited by T. Geidemann (*Opred. Rast. Mold.* [1954], p. 289) for the flora of Moldavia under the name *C. ciliatum* (Murr.) Moench.

50. *C. ciliatum* (Murr.) Moench, Meth. Suppl. (1802) 227; MB. Fl. taur.-cauc. III, 556; Spreng. Syst. veg. 3, 372; DC. Prodr. VI, 635; Ldb. Fl. Ross. II, 725; Boiss. Fl. or. III, 527; Schmalh. Fl. II, 102; Grossh. Fl. Kavk. IV, 179; Charadze in Fl. Gruzii, VIII, 509; in Fl. Azerb. VIII, 394.—*C. ciliatum* β . *microcephalum* Ldb. Fl. Ross. II (1846) 735.—*Carduus ciliatus* Murr. Comm. Gött. (1784) 35.—*Cnicus ciliatus* Willd. Sp. pl. III, 3 (1803) 1667; MB. Fl. taur.-cauc. II, 275.—*Lophiolepis calocephala* Cass. in Dict. Sc. nat. XXVII (1823) 181.—**lc.**: Murr. Comm. Gött. tab. 5.

132 Biennial. Stem erect, (50)100–150 cm high, thickened, branched above, slightly ribbed and sulcate, with scattered, crisped, and finely arachnoid hairs. Leaves green and finely appressed-spiny-setose above, grayish and appressed arachnoid-hairy beneath, with prominent thin venation, oblong-elliptical, more or less deeply sinuately pinnately incised into oblong-broadly lanceolate, 2–3-parted segments; their lobes tapered to thin, hard spines 3–7 mm long, thinly spiny-ciliate along margin; lower cauline leaves petiolate, elongated, lobed, semi-amplexicaul, with long apical segment incised almost to base into deeply 2–3-parted, oblong lobes, to 35–40 cm long, 18 cm wide, segments usually with 2 almost equal lobes and 1 strongly reduced, ovate lobe, strongly spinescent; other cauline leaves sessile, auriculate, more or less semiamplexicaul; middle leaves 25 cm long, 6–7 cm wide, sinuately pinnately parted into unequal 2-parted segments, with lanceolate, strongly spinescent lobes; upper leaves gradually reduced; apical leaves usually 1–2, linearly lanceolate, more or less recurved, usually as long as capitula. Capitula solitary, terminal, subsessile, globose-ovate, (2)3–4 cm in dia. Involucre subglabrous, weakly arachnoid-hairy; outer involucre bracts oblong-lanceolate, greenish, usually recurved, ciliate above, cilia long, thin, with yellowish spines to 7 mm long; middle



involucral bracts divergent, linearly lanceolate, stramineous, weakly carinate, with purple spot above, and finely ciliate; inner bracts scarious, stramineous, spinescent, along margin smooth. Florets violet-red; corolla 25–26 mm long, limb 11–13 mm long, 5-parted. Pappus sorbid-white, of numerous soft hairs, middle hairs with long filiform tips; achenes 5.5 mm long, yellowish-brown. Flowering August to September.

Roadsides, logged forests, forest meadows, limestone slopes.—*European Part*: Volga-Don, Black Sea Region, Lower Don, Lower Volga, Trans-Volga; *Western Siberia*: Upper Tobol (watersheds of Greater and Lesser Uzen); *Caucasus*: Ciscaucasia, Dagestan, Eastern and Western Transcaucasia. Endemic. Described from specimens grown in Göttingen Botanical Garden from seeds of an unknown collector.

Note. Apparently, we must consider the Volga Region as the locus classicus of this species, which was attributed by 18th-century western authors to Siberia. In Trans-Volga this species is found frequently; farther west, it is reported sporadically and to the west (Hungary) it probably is replaced by *C. furiens* Griseb. and Schrenk. It is widespread throughout the Caucasus, growing as weed along roads. Among the South European forms a transition to *C. serrulatum* (MB.) MB. is observed, and in Southern Transcaucasia, to *C. szowitsii* (C. Koch) Boiss.

51. *C. szowitsii* (C. Koch) Boiss. Fl. or. III (1875) 527; Grossh. 133 Fl. Kavk. IV, 179; Charadze in Fl. Gruzii, VIII, 510; in Fl. Azerb. VIII, 395.—*C. ciliatum* Szowits in schedis, non Moench.—*C. ciliatum* ssp. *szowitsii* Petrak in Izv. Kavk. Muz. VIII, 1–2 (1914) 40.—*C. ciliatum* var. *xantholepis* Petrak in Tr. Tifl. Bot. Sada, XII, 1 (1912) 2.—*Epitrachys szowitsii* C. Koch in Linnaea, XXIV (1851) 397.—**Exs.**: Petrak, Cirsioth. Univ. Nos. 85, 86, 139.

Biennial. Stem up to 100 cm high, geniculately ascending, branched above, weakly ribbed, sulcate, subglabrous, with scattered arachnoid hairs, or more or less arachnoid-hairy, densely leafy. Leaves stiff, coriaceous, yellowish-green and more or less densely appressed-spiny-setose above, involute, spiny-ciliate, whitish-arachnoid-hairy beneath or subglabrous and only along veins arachnoid-hairy; veins yellowish-white, prominent, thick, cauline leaves oblong or ovate-lanceolate, middle ones to 15–20 cm long, sinuately pinnately parted into unequally 2-parted segments; lower cauline leaves longer, with oblong-lanceolate lobes, terminal lobes of segments strongly reduced, deltoid-ovate, tapered to often 3-toothed spines sometimes longer than them; upper leaves reduced, shallowly pinnate into deltoid-lanceolate or deltoid-ovate lobes; all cauline leaves sessile, with toothed, semi-

amplexicaul auricles, apically with long narrow segment. Capitulum globose-ovate, (2.5) 4–5 cm in dia, solitary, terminal on stem and leafy branches, subsessile, with short, thick peduncles, in more or less lax corymbose-paniculate common inflorescence. Involucral bracts coriaceous, glabrous, ovate below, stramineous, narrow above, more or less long, broadly lanceolate; outer and middle bracts purple above, stramineous along margin, with incised spiny-ciliate margin, long-tapered into erect, long, hard spines; usually outer and some middle bracts recurved; inner bracts carinate, narrowly linearly lanceolate, purple above, along margin sparsely spiny-ciliate, strongly tapered to slightly curved, hard spine. Florets purple; corolla to 32–35 mm long; corolla tube narrow, 20–22 mm long, limb unevenly incised to middle. Pappus with numerous yellowish-white hairs, inner hairs filiform with scabrous tips; achenes 5 mm long, grayish-brown with black stripes. Flowering July to September.

Mid-montane zone; dry grassy slopes, forest edges, old fields, stony talus, river, gravels.—*Caucasus*: Dagestan, Southern Transcaucasia. *General distribution*: Armenia and Kurdistan, Iran. Described from Karabakh. Type in Berlin; isotype in Leningrad.

Note. It differs from *C. ciliatum* (Murr.) Moench by having broader involucral bracts and very hard spines. Parsa (*Fl. Iran*, III [1943] 563) reports it for Iran both as *C. ciliatum* and *C. szowitsii*; the occurrence of the former in Iran seems doubtful to us.

Hybrid forms have been observed in the Caucasus.

1. *C. ciliatum* (Murr.) Moench \times *C. caucasicum* (Adams) Petrak (*C. \times Petrakii* Kozl. and Woron. in schedis): Grossh. Fl. Kavk. IV (1934) 189; Charadze in Fl. Gruzii, VIII, 494.

Caucasus: Southern Transcaucasia (Borzhomei, Bakuriani).

It grows among the parental forms. A series of transitions to *C. ciliatum* s. l. and *C. caucasicum* is observed. Apparently, *C. szowitsii*, as a species close to *C. ciliatum*, should be recognized as one of the parental species, which the broad purple involucral bracts of the hybrid would indicate. From *C. caucasicum* the hybrid forms inherit long, often thin spines and weak but arachnoid-floccose pubescence of the involucre, nodding capitula, and dense white tomentum on the lower surface of the leaves. These forms are related to *C. szowitsii* (*C. Koch*) Boiss. by leaf form, broadly lanceolate, more or less spiny-ciliate, attenuate-spinescent involucral bracts, and almost straight, upward-directed capitula. In habit, there are some forms closer to *C. szowitsii* (*C. Koch*) Boiss. and others closer to *C. caucasicum* (Adams) Petrak.

2. **C. aduncum** Fisch. and Mey. ex DC. \times *C. ciliatum* (Murr.) Moench.—*C. \times xenogenum* Petrak in Fedde, Repert. XLIII (1938) 299. *Caucasus*: Southern Transcaucasia (Novo-Bayazet).

This hybrid was grown by Petrak in Moravia from seeds collected in Novo-Bayazet by Grossheim and Edelmeyer. Some plants differed from *C. aduncum* by having leaves slightly narrowed at the base into petioles, with loosely grayish-arachnoid-tomentose pubescence on both sides, especially marked larger globose-ovate capitula that are not tapered to the base; and broader involucre bracts tapered to carinate, hard spines and with a very finely ciliate-spiny margin at the base. Petrak presumes that plants of *C. ciliatum* would have had to grow near *C. aduncum*. Apparently, in this case these could be plants of *C. szowitsii*, which are more widespread in southern Transcaucasia.

Subsection 7. Lanceolata Petrak in Bibl. Bot. 78 (1912).—Leaves short- or long-decurrent. Capitula medium- or large-sized, globose-ovate or ovate. Involucre scatteredly arachnoid-hairy or subglabrous; involucre bracts oblong-lanceolate, gradually attenuated into thin spines, usually upward directed or outer bracts falcately decurved.

Based on the form of the involucre bracts, the species of this subsection stand the closest of all to the subsection *Ciliata*, understood by us in a more restricted sense than by Petrak.

135 Series *Alata* (Petrak) Charadze comb. nova.—Subsect. *Lanceolata* Petrak 2. *Alata* Petrak in Bibl. Bot. 78 (1912) 7.—Stem winged. Leaves long-decurrent. Capitula somewhat projected above apical leaves.

52. **C. vulgare** (Savi) Ten. Fl. Nap. V (1835–1836) 209; Arénes in Bull. Jard. Bruxelles, XXIV, 4, 255; Charadze in Fl. Azerb. VIII, 394.—*C. vulgare* (Savi) Airy-Shaw in Fedde, Repert, XLIII (1938) 304; Grossh. Opred. Rast. Kavk. 481; Kirpichn. in Majevski, Fl. Ed. 8, 603.—*C. vulgare* (Savi) Petrak, Cirsioth. Univ. IV (1912) 33, nom. provis. in adnot.—*C. vulgare* ssp. *vulgare* Arénes op. cit. 257.—*C. vulgare* ssp. *silvaticum* (Tausch) Arénes, op. cit. 259.—*C. lanceolatum* (L.) Scop. Fl. Carn. ed. 2, II (1772) 130, non Hill (1769).—*C. lanceolatum* auct. non Hill: DC. Prodr. VI (1837) 636; Ldb. Fl. alt. IV, 4; Fl. Ross. II, 726; Schmalh. Fl. II, 102; O. and B. Fedtsch. Perech. Rast. Turk. IV, 283; Grossh. Fl. Kavk. IV, 178; Kryl. Fl. Zap. Sib. XI, 2886; Klok. in Vizn. Rosl. URSR, 569.—*C. lanceolatum* β . *hypoleucum* DC. Prodr. (1837) 636; Grossh. Fl. Kavk. IV, 178.—*C. lanceolatum* var. *vulgare* Naegeli ex Koch, Syn. ed. 2 (1843–1845) 990.—*C. lanceolatum* var. *nemorale* Naegeli ex Koch. ibid.—*C. lanceolatum* ssp. *eulanceolatum* Beger apud Hegi, Ill. Fl. VI, 2 (1929)

874.—*C. lanceolatum* ssp. *hypoleucum* (DC.) Beger apud Hegi, *ibid.*
 875.—*C. lanceolatum* ssp. *savianum* Arènes in *Not. syst. Mus. Hist. Nat. Paris*, XIII, 1–2 (1947) 60.—*C. lanceolatum* ssp. *silvaticum* Arènes, *ibid.*—*C. silvaticum* Tausch in *Flora XII*, 1 (1829) 38.—*C. nemorale* Rchb. *Fl. Germ. excurs.* (1830) 286.—*Carduus lanceolatum* L. *Sp. pl.* (1753) 821.—*Carduus vulgaris* Savi, *Fl. Pis.* II (1798) 241.—*Ascalea lanceolata* (L.) Hill, *Herb. Brit.* I (1769) 72, tab. 51, fig. 2.—*Lophiolepis dubia* Cass. in *Dict. Sc. nat.* XXVII (1823) 183.—*Eriolepis lanceolata* (L.) Cass. in *Dict. Sc. nat.* XLI (1826) 331.—**Ic.:** Hill, *Herb. Brit.* I, tab. 51, fig. 2; Rchb. *Ic. Fl. Germ.* tab. 826, fig. 1, 2; Fedtsch. and Fler. *Fl. Evrop. Ross.* 1012; Dostál, *Kvêt. CSR*, No. 547, 1; Hei, *Ill. Fl.* VI, 2, fig. 564, 565, 573.—**Exs.:** *Fl. exs. austro-hung.* No. 3769 (sub *C. silvatico* Tausch); GRF No. 2027.

Biennial. Rhizome fusiform; stem (5)50–150 cm high, ascending, branched, sulcate, more or less crisped-hairy, with long and thinly arachnoid hairs, toothed- or spiny-winged. Leaves lanceolate, elongate to linearly lanceolate, densely spiny-setose above, arachnoid-hairy to white-tomentose beneath (var. *hypoleucum*), sinuately pinnately parted; middle cauline leaves 7–10 cm long, 3–4 cm wide, with long-decurrent, toothed wings, their teeth strongly spinescent, spinulose on margin; segments of leaves remote, usually deeply 2-parted into ovate-deltoid or lanceolate-deltoid lobes, long-tapered to thin, yellowish spines, 5–10 mm long, occasionally anterior lobe almost reduced; basal
 136 leaves with broadly ovate lobes, usually withering early; upper cauline leaves gradually narrowed; apical leaves reaching base of capitula. Capitula solitary on reduced peduncles, ovate, (2.5)3–4(5) cm in dia. Involucre roundish-ovate, with or without small bracts at base; involucre bracts lanceolately subulate, usually yellowish-green, blackish-brown above, weakly carinate, tapered to thin, yellowish spine, usually shorter than bracts; outer bracts falcately recurved from middle, floccose, subglabrous, inner ones linearly lanceolate, tapered to slightly bent spines. Florets red, (25)30–35 mm long, with very narrow and long corolla tube, 2 times as long as limb; latter lobed almost to middle. Pappus sordid-white, with thin lustrous hairs, long-plumose almost to tip; achenes 3.5–4 mm long, grayish. Flowering July to September.

Lowlands to mid-montane zone; roadsides, abandoned fields, wastelands, and stony places.—*European Part:* All regions; *Caucasus:* All regions; *Western Siberia:* Ob Region, Upper Tobol Region, Irtysh; *Soviet Central Asia:* Aralo-Caspian Region, Lake Balkhash Region, mountainous Turkmenia, Pamiro-Alai Region, Tien Shan. *General distribution:* Europe (except Arctic), Mediterranean Region, Balkans-Asia Minor, Armenia and Kurdistan, Iran and Afghanistan, Dzhungaria-Kashgaria, North America (introduced). Described from Italy. Type in Italy.

Section 3. *Lamyropsis* Charadze in Addenda XXVII, 603.—Capitula on short peduncles, projected above leaves. Outer involucrel bracts narrowed to deltoid-lanceolate scarious-tip, spinescent, usually spines 2–3 times surpassing lower broader part of bracts; inner bracts shorter or almost as long as outer. Achenes compressed, with oblong tubercle at apex. Pappus of thin fragile hairs, inner hairs plumose almost up to apex, with filiform tips. Perennial plants with more or less coriaceous leaves or glabrous, or subglabrous above, white-tomentose beneath; lateral segments of leaves reduced and strongly tapered to hard spines.

Type of section: *C. sinuatum* (Trautv.) Boiss.

Note. This section is represented by three species, which replace each other in parts of the southern Balkans, the Caucasus, and Soviet Central Asia. In their habit, species of the section *Lamyropsis* approach members of the genus *Lamyra* Cass. but differ from them by the structure of achenes and pappus. They show some similarity to species of the section *Echenais*, differing from them in the glabrous peduncles, capitula lacking apical leaves, form of the involucrel bracts, and also coriaceous leaves that are snow-white beneath.

The southern Balkan species *C. cynaroides* (Lam.) Spreng. was referred by de Candolle to the section *Platyraphium* of the genus *Chamaepeuce*; and recently it has been included by Tamamschian in the genus *Lamyra* Cass. as *L. cynaroides* (Lam.) Tamamsch. (in *Zam. po Sist. i Geogr. Rast. Tbil.*, No. 22, p. 81). However, even Boissier noted that this species is closer to *Cirsium* in the structure of achenes.
137 I consider it best to assign this species to section *Lamyropsis* of the genus *Cirsium*.

53. ***C. sinuatum*** (Trautv.) Boiss. Fl. or. III (1875) 546; Grossh. Fl. Kavk. IV, 187; Opred. Rast. Kavk. 485; Charadze in Fl. Gruzii, VIII, 514; in Fl. Azerb. VIII, 402; Papava in Vestn. Gos. Muz. Gruzii, XVA, 32.—*C. cynaroides* MB. Fl. taur.-cauc. III (1819) 559, non Spreng.—*Cnicus cynaroides* MB. Fl. taur.-cauc. II (1808) 280, non Willd.—*Chamaepeuce sinuata* Trautv. in Tr. Peterb. Bot. Sada, II (1873) 477.—*C. cynaroides* DC. Prodr. VI (1837) 659 p. p.; Ldb. Fl. Ross. II, 745 p. p.—**Exs.**: Herb. Fl. cauc. No. 394.

Perennial. Stems basally woody, ascending, more or less divaricately branched, densely leafy up to apex, 30–40 cm high, appressed-white-tomentose. Leaves coriaceous, lower ones oblong-elliptical, usually 8–12 cm long, 3.5 cm wide upper ovate-lanceolate, gradually reduced, all sessile, basally narrowed, acute, lustrous and green above, with prominent, whitish lateral veins, glabrous or along veins weakly arachnoid-hairy, snow-white or densely appressed-tomentose

beneath, on margin broadly sinuately pinnately lobed; lobes usually 2-parted, acuminate, with thick veins, strongly tapered to hard, yellowish spines 4–5 mm long. Capitula solitary, terminal on slightly curved stems and long axillary branches on short peduncles, somewhat projected above small apical leaves. Involucre ovate, 3–4 cm long, 2–3 cm in dia, weakly arachnoid-hairy with scattered hairs; outer involucre bracts ovate, narrowed from middle to subulate, spiny, falcately recurved tip; middle bracts oblong-ovate, glabrous, carinate, scarious, stramineous, with tuberculate purple spots, along margin floccose white-arachnoid, narrowed to lanceolate subulate, strongly spinescent tips longer than them, with divergent or upward spreading spines; inner bracts broad, linearly lanceolate, scarious, with narrow, scaly, more or less short point, usually shorter than outer bracts. Corolla dark-pink, to 22 mm long; limb unequally 5-partite almost to middle; anthers 10 mm long, with short filaments, covered with fine papillate hairs. Achenes dark brown, to 5.5 mm long; pappus of thin, fragile, sordid-white or yellowish hairs; inner pappus hairs somewhat longer than outer, plumose almost up to tip, with filiform tips. Flowering July to September. (Plate VII, Fig. 1.)

Rubbly slopes of ravines, from mid-montane to subalpine zone, mostly in clay shales.—*Caucasus*: Main Range (near Shtulu Pass, ravine of Arm-Khi River; near Shatil, Kuba District), Dagestan, Eastern Transcaucasia (former Nukhin District), Southern Transcaucasia (Tedzam ravine). Endemic. Described from Bekker's specimens from Dagestan (between Kurakh and Kro). Type in Leningrad; isotype in Tbilisi.

Note. This species differs from the southern Balkan species *C. cynaroides* (Lam.) Spreng. by the weakly incised leaves with bifid lobes and the shorter cusps of the outer involucre bracts.

54. *C. lamyroides* Tamamsch. in Zam. po Sist. i Geogr. Rast. Tbil. 22 (1961) 81.—*Chamaepeuce macrantha* Schrenk in Bull. Acad. Sc. Pétersb. X (1842) 354; Fisch. and Mey. Enum. pl. nov. II, 38; Ldb. Fl. Ross. II, 745.

Perennial. Stem ascending, large, up to 40 cm high, branched above, with solitary capitula at apices of stem and long axillary branches, leafy, sulcate, more or less thinly grayish-tomentose. Cauline leaves linear-lanceolate, sessile, semiamplexicaul, with long auricles, acuminate, glabrous above, green, with yellowish-white venation, weakly arachnoid-hairy along veins, grayish-tomentose beneath; middle cauline leaves to 20 cm long, 2.5 cm wide, sinuately pinnately parted into deltoid-lanceolate, 2–3-parted segments, their lobes strongly tapered to stiff, yellowish spine 7 mm long, sparsely spiny-ciliate; lower cauline

leaves broadly lanceolately-elliptical, narrowed into short petiole, subacute, 28 cm long, to 7 cm wide, pinnately parted into approximate, roundish-oval, sharp-toothed usually indistinctly 5-parted lobes, with hard, short spines at tips of teeth; lamina lustrous with veins ligneous, thickened at leaf margin above, occasionally sparsely floccose, beneath densely white-tomentose; apical leaves strongly reduced, narrowly linearly lanceolate, coarsely pinnately toothed with long spines, usually 1–2, uppermost leaves surrounding base of capitula, not surpassing capitula, recurved. Capitula solitary, in corymbose panicles, globose-ovate, with few divaricate, long, yellow cusps⁺, of which lower usually deflexed downward. Involucre 2.5–3 cm in dia, 3–3.5 cm long, scatteredly floccose, grayish-arachnoid-hairy above; involucre bracts from outer broadly ovate to middle oblong-ovate, 5–10 mm long, abruptly narrowed into linearly deltoid-lanceolate tip, dorsally carinate, incurved spinescent cusp usually longer than broader part of bracts, in middle bracts almost 2 times as long, membranous below, yellowish, glabrous, with dark-brown spot above, carinate, long, floccose-arachnoid-hairy below cusp; inner bracts linearly lanceolate, to 2
 139 cm long, narrowed to short cups. Corolla pink, to 22 mm long; limb scarcely shorter than narrow corolla tube, unequally 5-parted almost to middle. Achenes 5 mm long, stramineous, with long obtuse tubercle; pappus with few, thin, fragile hairs, sordid-white, inner hairs long, with denticulate tips. Flowering July to August.

Rubbly slopes and river valleys.—*Soviet Central Asia*: Dzhungaria-Tarbagatai. *General distribution*: May be found in Dzhungaria-Kashgaria. Described from Dzhungarian Alatau. Type in Leningrad.

Note. By many authors this species is described as a member of the genus *Chamaepeuce* allied with the southern Balkan species *Chamaepeuce cynaroides* (Lam.) Spreng., from which, however, it is well distinguished by the form of leaves.

Section 4. Echenais (Cass.) Petrak in Beih. Bot. Centralbl. XXXV, II, 2–3 (1917) 252.—*Echenais* Cass. in Bull. Soc. Philom Paris (1818) 33; id. op. cit. (1820) 4; id. in Dict. Sc. nat. XIV (1819) 170, XXV (1822) 226; DC. Prodr. VI, 660.—Leaves narrow, oblong-lanceolate, weakly crisped-arachnoid-hairy, or densely so beneath. Capitula ovate or globose-ovate, medium-sized, basally with tuft of undeveloped long-spinose bracts. Involucre bracts glabrous, or scarious to tip, more or less fimbriate-ciliate along margin or outer ones leafy, greenish, along margin scaly, or more or less cristate-spiny-ciliate, somewhat longer than inner, apically with long, scarious, erose-toothed or fimbriate, appendage, or narrowed into long membranous point, often considerably longer than florets. Corolla tube shorter or almost as long as limb. Achenes compressed, narrow, not longer than 4.5 mm.

Type of section: *C. echinus* (MB.) Hand.-Mazz.

Note. The genus *Echenais* Cass. was erected from the Caucasian species originally described as *Carlina echinus* MB. Cassini, after describing the genus *Echenais*, gives this species a new name, *E. carlinoides* Cass. Petrak broadened the circumscription of *Echenais* and treated it as a section, of the genus *Cirsium*, adding to it, besides the Asiatic ones, the North American species with scarious involucre bract, appendages. Leaving *Echenais* as an element of *Cirsium*, I consider it possible to refer to this section the group of Soviet Central Asian species of the *C. semenovii* Rgl. and Schm. alliance. Unlike typical *Echenais*, these species are distinguished by having the outer involucre bracts narrowed to long cusps. Besides the ones in Soviet Central Asia, species of this alliance with several characters transitional to typical *Echenais* are distributed in Afghanistan and the western Himalayas. Thus, Soviet Central Asia with adjoining parts of Western Asia may be considered one of the centers of origin of the section. In the western part of Western Asia, Asia Minor, and the Caucasus, only one member of the section—*C. echinus* (MB.) Hand.-Mazz.—is found.

55. *C. semenovii* Rgl. and Schm. in Bull. Soc. Nat. Mosc. XL, 3 (1867) 161; O. and B. Fedtsch. Perech. Rast. Turk., IV, 285; Petrak in Oest. Bot. Zeitschr. LXI, 322 p. p.—*Cnicus semenowii* Winkl. in Tr. Peterb. Bot. Sada, IX, 2 (1886) 523.—*Chamaepeuce macrantha* β. *bracteata* Rupr. in Mém. Acad. Sc. Pétersb. XIV, 4 (1869) 56.—Ic.: Petrak, op. cit. 322, Abb. 2.

Perennial. Rhizome thick, vertical, with numerous dark brown fibrous roots; stems to 55–60 cm high, ribbed weakly sulcate, purple-dark brown below, yellowish above, weakly branched, leafy to tip, with apically clustered, more or less numerous, capitula. Leaves green above, more or less glabrous or with scattered, crisped, arachnoid hairs, glaucescent beneath, along midrib more densely crisped hairy, with scattered hairs along veins, oblong-linearly lanceolate, sinuately pinnately parted into deltoid oval, inequidantate lobes, with apical teeth strongly spinescent, bearing yellowish spines 3–6 mm long; basal and lower cauline leaves 15–17 cm long, 2–3.5 cm wide, narrowed into toothed and finely spinose petiole up to 8 mm long; other cauline leaves oblong, divergent, narrowed at base, sessile, with weakly decurrent, narrow, semiamplexicaul auricles with spines 12 mm long; apical leaves reduced, not surpassing capitula; apical leaves at base of capitula sometimes with reduced lamina, long-spinescent, shorter than involucre. Capitula numerous, on short peduncles, subsessile, in lax, short racemes, almost capitate inflorescence at stem tip, solitary at

apices of axillary branches, not surpassing leaves. Involucre ovate-roundish, at beginning of flowering 2–2.5 cm in dia, dark brown, including spines somewhat surpassing florets, 3.5 cm long, with recurved cusps at end of flowering, occasionally grayish-arachnoid-hairy; outer involucre bracts ovate, to 5 mm long, yellowish below, glabrous, brown, carinate, linearly lanceolate above with long, pointed yellowish spine, almost 2 times as long as broader part in outer bracts, inner ones gradually reduced, innermost broadly lanceolate, narrowed into short point. Florets pale pink, to 21 mm long; corolla tube narrow, up to 9 mm long. Achenes dark brown, 5 mm long; pappus up to 18 mm long, sordid-white, with thin hairs; inner hairs apically scabrous. Flowering July to August.

Juniper to alpine zone, on river banks, screes and moraines.—*Soviet Central Asia*: Tien Shan. *General distribution*: Dzhungaria-Kashgaria. Described from Trans-Ili Alatau. Type in Leningrad.

56. *C. sairamense* (Winkl.) O. and B. Fedtsch. *Perech. Rast. Turk.* IV (1911) 286.—*C. semenovii* ssp. *sairamense* Petrak in *Öest. Bot. Zeitschr.* LXI (1911) 323.—*Cnicus sairamensis* Winkl. in *Tr. Peterb. Bot. Sada.* IX, 2 (1886) 522.—*Ic.*: Petrak, op. cit. 323, Abb. 3.

Perennial. Stem ascending, 40–60 cm high, somewhat ribbed and sulcate, finely white-arachnoid-hairy, branched almost from base or middle, with elongated axillary branches, densely leafy, with solitary large capitula at apices of stem and branches, occasionally clustered in 3s, of which lower considerably smaller than terminal. Leaves grayish-green above, sparsely crisped-hairy, thinly grayish-tomentose-arachnoid-hairy beneath, with somewhat prominent whitish veins, sinuately pinnately parted into deltoid-ovate, 3–5-toothed lobes, teeth tapered to long, thin, whitish spines, up to 10–12 mm long, irregularly ciliate-spinulose on margin; basal and lower cauline leaves long, oblong, almost reaching base of capitula or surpassing them; middle and upper cauline leaves linearly elliptical or linearly lanceolate, strongly reduced, lobate, leaves at base of capitula long-pinnate-spinose, usually not surpassing involucre. Capitula ovate-globose, terminal, 3.5–4 cm in dia, forming corymbose paniculate or narrowly racemose inflorescence. Involucre weakly arachnoid-hairy with long, upward directed, subulate spines, considerably surpassing florets; outer bracts broadly lanceolate, greenish-brown, glabrous below, sparsely arachnoid-hairy above, narrowed into long, membranous subulate point, below finely ciliate and with more or less elongated, occasional spines at base; middle bracts ovate or oblong-ovate, to 10 mm long, 3.5 mm wide, glabrous beneath, carinate, sparsely arachnoid-hairy above, abruptly narrowed into linear-subulate, more or less attenuate tip, long-tapered



into acute, yellowish spine, almost 3–5 times surpassing broader part of bracts; inner bracts linearly lanceolate, with very short, scaly, to 3 mm long point. Florets pale-pink, 22–23 mm long; corolla tube to 9 mm long; limb almost to middle unevenly 5-lobed. Achenes light brown, to 5 mm long, with long tubercle at apex; pappus sordid-white, 17–18 mm long, with inner hairs apically scabrous. Flowering July to August.

143 Mountain meadows.—*Soviet Central Asia*: Dzhungaria-Tarbagatai, Tien Shan. *General distribution*: Dzhungaria-Kashgaria. Described from Dzhungaria (southern shores of Lake Sairam). Type in Leningrad.

Note. It differs from *C. semenovii* Rgl. and Schm. by having the stem branched almost from the base, solitary capitula with the long-attenuated, erect cusps of the outer involucre bracts considerably surpassing the florets, and long cauline leaves that usually surpass the capitula. The type of the species is characterized by shortened, densely leafy stems that are branched almost from the base and bearing numerous solitary capitula. The plants from Tien Shan with tall stems branched from the middle also belong to this species.

57. *C. glabrifolium* (Winkl.) O. and B. Fedtsch. Perech. Rast. Turk. IV (1911) 286.—*C. glabrifolium* Petrak in Oest. Bot. Zeitschr. LXI (1911) 324.—*C. glabrifolium* var. *spinosissimum* O. and B. Fedtsch. op. cit. (1911) 286.—*Cnicus glabrifolius* Winkl. in Tr. Peterb. Bot. Sada, IX, 2 (1886) 523.—*Cnicus glabrifolius* var. *spinosissimus* Winkl. and var. *hirtus* Winkl. in schedis.—**lc.**: Petrak, l. c. Abb. 4.

Perennial. Rhizome with numerous fibrous roots; stem ribbed, sulcate, ascending, 55–70 cm high, at places purple, branched from middle, sparsely crisped-hairy. Leaves oblong-lanceolate; cauline leaves sessile, auriculate, apically narrowed, long-acuminate, usually glabrous above, sparsely crisped-hairy along veins beneath, with prominent midrib and lateral veins, sinuately pinnately-lobed almost to middle, with longer lower lobes; segments 2–3-parted into deltoid-ovate, crenate-toothed lobes, teeth strongly tapered to hard spines 5–12 mm long; middle cauline leaves 20 cm long, 8 cm wide, reduced upward. Capitula terminal on stem and axillary branches, subsessile, 2–6 clustered in corymbose-paniculate inflorescence, 1–2 cm in dia at beginning of flowering, enlarged at fruiting, 3.0–3.5 cm in dia, basally with rosette of short, spinescent, pinnately incised, linear-lanceolate leaves, with tips almost as long as involucre or somewhat longer. Involucre subglabrous or weakly arachnoid-hairy; outer involucre bracts dark brown, glabrous, broadly lanceolate, narrowed from middle to scarious, more or less spinescent tip, erect or upward spreading, almost as long as inner bracts, ciliolate; middle and inner bracts linearly lanceolate, apically narrowed to lanceolate, scarious, yellowish or purple,

fimbriate, acuminate, slightly bent appendage; in var. *spinosissimum* O. and B. Fedtsch., outer bracts abruptly narrowed to long cusp, with
 144 1–2 thin spines on each side at base. Florets purple, to 15 mm long. Corolla unevenly 5-parted almost to middle; limb longer than narrow tube, tube to 9 cm long. Achenes 4 mm long, brown with dark streaks, apically obliquely truncate, with long tubercle; pappus sordid-white, inner hairs with longer, scabrous tips. Flowering July to August. (Plate VIII, Figs. 1, 2).

Mountain gorges, on stony riverbanks, as roadside weed; mostly in mid-montane zone.—*Soviet Central Asia*: Dzhungaria-Tarbagatai, Tien Shan, Pamiro-Alai. *General distribution*: Dzhungaria-Kashgaria. Described from specimens from Dzhungaria and Zeravshan. Type in Leningrad.

Note. Winkler cited two specimens under the name *Cnicus glabrifolius* Winkl. One of them was collected from the Talka Gorge in the vicinity of Lake Sairam in Dzhungaria and the other from the Zeravshan Basin. The first can be considered the type of *C. glabrifolium* (Winkl.) O. and B. Fedtsch. It was later described in detail by Petrak, who considered it a hybrid of *C. semenovii* and *C. sieversii*. The Zeravshan specimen is closer to *C. sieversii* (Fisch. and Mey.) Petrak. According to Petrak, it should be referred to the latter, but it differs considerably from *C. sieversii* in the outer involucral bracts, which are attenuate-cusped and lack the membranous-fimbriate border characteristic of *C. sieversii*. I consider it possible to treat both specimens cited by Winkler as *C. glabrifolium* (Winkl.) O. and B. Fedtsch. The hybrid origin of the type of *C. glabrifolium* seems doubtful to me because similar specimens varying with respect to the fringe of the inner bracts are observed over a large area from Dzhungaria to the Zeravshan Range.

58. ***C. badakhschanicum*** Charadze in Addenda XXVII, 604.

Perennial. Stem to 1 m high, ascending, ribbed, scatteredly crisped-hairy below, densely lanate above with whitish, long-articulated, crisped hairs, branched above, with more or less elongated axillary branches. Cauline leaves glaucescent, scatteredly hairy above, more or less densely lanate beneath on midrib, middle ones to 10 cm long, lacking spines, to 3 cm wide, strongly reduced on floriferous branches, ovate-lanceolate or oblong-lanceolate; all leaves weakly, usually up to middle, sinuately pinnately lobed, with narrow sinuses, and broadly deltoid, 3–5-parted segments; cauline leaves sessile, long-acuminate, strongly spinescent, auriculate, semiamplexicaul, unevenly lobate-toothed, with numerous approximate, yellowish, hard unequal spines, lobes of segments tapered, to spines 12–13 mm long, sinuses with short, spines 2–3 mm long. Floriferous branches flexuous, with 2–5 clustered, subsessile

145 capitula at apices; bracteal leaves at base of capitula many, small, lanceolate, pinnately toothed, strongly tapered to hard yellowish spines 8–10 mm long, almost as long as Involucre or slightly longer. Involucre glabrous, roundish-ovate, 2–3.5 cm in dia, divergent at end of fruiting, with more or less horizontal bracts; outer bracts ovate-lanceolate, narrowed from middle to long, thin spines, somewhat shorter than inner, erect, sparsely arachnoid-hairy along margin, divergent, yellowish spines to 4 mm long; middle bracts lanceolate, glabrous, narrowed slightly above middle to thin, spinescent, slightly deflexed cusp, scarious at base along margin, with plumosely divergent thin spines; inner bracts linearly lanceolate, narrowed to slightly broader, scarious, undulate, slightly bent, acuminate tip. Florets pink, 17 mm long; corolla tube narrow, 7.5 mm long, limb lobed almost to middle. Achenes 4 mm long, grayish-white, with small dark streaks, compressed, slightly triquetrous, obliquely truncate apically, with tubercle; pappus yellowish-white, to 13 mm long, with very thin hairs, inner hairs scarious at tip. Flowering July to August.

Mountain river valleys, in grassy areas, in alpine zone.—*Soviet Central Asia*: Pamiro-Alai (Badakhshan). *General distribution*: Probably found in adjoining territory of Afghanistan. Described from Gunts River Valley from collections of O. and B. Fedtschenko. Type in Leningrad.

Note. It is distinguished from the Afghan species *C. argyracanthum* DC. by having the outer involucre bracts attenuated to thin, basally pinnate-aculeate spines and the inner bracts apically scarious. From *C. glabrifolium* (Winkl.) O. and B. Fedtsch. it differs by the outer bracts having long-pinnate-aculeate margins and the inner hairs having a narrow-membranous tip, as well as by the form of the leaves, which have long thin spines. Besides the collections of O. and B. Fedtschenko, in recent years, additional material of this species was made available by S. Ikonnikov.

59. *C. alberti* Rgl. and Schm. in Tr. Peterb. Bot. Sada, V, 2 (1880) 318; O. and B. Fedtsch. Perech. Rast. Turk. IV, 286; Petrak in Öest. Bot. Zeitschr. LXI, 321.—*C. semenovii* ssp. *alberti* Petrak in schedis.—*Cnicus alberti* Winkl. in schedis.—**lc.**: Petrak, op. cit. 322, Abb. 2.

Perennial. Stem ascending, 60–90 cm high, ribbed, branched from middle or almost from base, more or less densely covered with tiny crisped hairs, sparsely arachnoid-hairy, densely leafy. Leaves green above, with scattered crisped-arachnoid hairs, densely and grayish-arachnoid-hairy beneath; lower leaves oblong-lanceolate, narrowed toward base into winged, spinous-toothed petiole, apically attenuated,

- 146 22–27 cm long, 7 cm wide, sinuately-pinnately parted into broadly deltoid-ovate, 3–5-parted lobes, teeth on leaves strongly tapered to hard, thin spines 5–6 mm long, sinuses with distant spines 1–3 mm long; other leaves gradually reduced upward, lanceolate or narrowly lanceolate, sinuately pinnatifid with broadly ovate, sinuate-toothed lobes; middle leaves auriculate, and short-decurrent, winged, long-acuminate, pubescence like lower cauline leaves, with shorter spines at apices of teeth; apical leaves at base of capitula many, small, lanceolate, long-plumose, divergent, shorter than involucre. Capitula globose-ovate, 1.5–2.0 cm in dia, 3–5-clustered at tips of stem and long, somewhat flexuous, axillary branches, occasionally solitary, subsessile. Involucre finely arachnoid-hairy, with erect and slightly divergent cusps; outer bracts membranous, ovate-oblong, glabrous, arachnoid-hairy along margin, brown above, carinate, more or less gradually narrowed from middle, attenuate into yellowish, subulate, slightly elongate spine, almost as long as or shorter than inner bracts; inner bracts oblong-lanceolate to linearly lanceolate, membranous, with short cusp, at fruiting with falcately recurved apices. Florets 22 mm long; corolla tube narrow, 9 mm long; limb lobed to 1/3. Achenes 4 mm long, yellowish, with dark brown streaks; pappus sordid-white, with few hairs, inner hairs not plumose to tip. Flowering July to August.

Mid-montane to subalpine zone, in river valleys and along roads.—*Soviet Central Asia*: Tien Shan, Dzhungaria-Tarbagatai. *General distribution*: Dzhungaria-Kashgaria. Described from Musart River Valley. Type in Leningrad.

Note. In the work of Petrak (1911), the involucre bracts were not illustrated quite accurately. In the type of this species, the outer, especially the middle, bracts are attenuated to long spines, almost as long as the inner involucre bracts.

60. *C. sieversii* (Fisch. and Mey.) Petrak in Öest. Bot. Zeitschr. LXI (1911) 324.—*C. polyacanthum* Kar. and Kir. in Bull. Soc. Nat. Mosc. XIV (1841) No. 517.—*Echenais sieversii* Fisch. and Mey. Enum. pl. nov. I (1841) 44; Kar. and Kir. in Bull. Soc. Nat. Mosc. XV, No. 498; Ldb. Fl. Ross. II, 747; O. and B. Fedtsch. Perech. Rast. Turk. IV, 288.—*E. sieversii* var. β . Ldb. Fl. Ross. II (1846) 747.—*E. carlinoides* O. and B. Fedtsch. op. cit. (1911) 288 p. p. non Cass.—*Cnicus spinosissimum* Sievers in schedis.—**lc.**: Petrak op. cit. 325, Abb. 5.

- 147 Perennial. Rhizome vertical, with ligneous fibrous root. Stem ribbed, to 1 m high, ascending, at places purple, with scattered crisped hairs. Leaves oblong-ovate to oblong-lanceolate, glabrous above or more or less scatteredly crisped-hairy, densely crisped-hairy beneath on veins; lower cauline leaves 21 cm long, 7 cm wide, pinnately parted

in oblong or oblong-deltoid, unevenly 2–3-parted lobes, teeth strongly tapered to spines 8–12 mm long, sinuses with solitary spines 2–7 mm long, narrowly winged, weakly decurrent; basal leaves 35 cm long, 12 cm wide, narrowed into petiole, pinnately parted almost to base into oblong, unequally pinnately lobed segments; upper cauline leaves broadly lanceolate, to 7 cm long, 3 cm wide, auriculate, sessile, semiamplexicaul, unevenly pinnately toothed, ciliate-spinose from long and short, hard spines. Capitula globose-ovate, 2–2.5 cm in dia, 3–7 clustered at tips of stem and its branches, subsessile; bracteal leaves at base of capitula few, small, pinnately incised, long-spiny. Involucre glabrous; outer involucre bracts oblong-ovate, stramineous or brownish below, broadened above and membranous, whitish, fimbriate, spinescent; inner bracts linearly lanceolate, narrowed to membranous, slightly broadened tip, cuspidate. Florets pinkish-lilac; corolla 18.5 mm long, tube to 7 mm long, limb lobed to 1/3. Achenes whitish, to 4 mm long, with thin, longitudinal, dark streaks; pappus to 16 mm long, sordid-white, with few finely plumose hairs, inner hairs with long-scabrous tips. Flowering July to August. (Plate VIII, Fig. 3.)

Alpine zone, in rubbly places.—*Western Siberia*: Altai (Naryn Range, at sources of Tau-Tykol); *Soviet Central Asia*: Dzhungaria-Tarbagatai, Tien Shan. *General distribution*: Dzhungaria-Kashgaria. Described from Tarbagatai. Type in Leningrad.

Note. *C. sieversii* (Fisch. and Mey.) Petrak is allied with several species close to *C. semenovii* Rgl. and Schm. Among them, *C. glabrifolium* (Winkl.) O. and B. Fedtsch. stands out, with characters transitional to *C. sieversii* in the structure of involucre bracts. Petrak considers it possible to refer the specimen of the former species from Zeravshan to *C. sieversii*. However, the latter species is well distinguished from the Zeravshan specimen by the outer involucre bracts, which are broadened upward and fimbriate, and also by the form of the leaves.

The species *Echenais sieversii* Fisch. and Mey. and *Cirsium polyacanthum* Kar. and Kir. were published in 1841, but the *Enumeratio* of Fischer and Meyer came off the Press on June 15, 1841, whereas the first part of Karelin's and Kirilov's list appeared on July 2, and the second part in September (N.V. Pavlov—G.S. Karelin, 1948).

61. **C. echinus** (MB.) Hand.-Mazz. in Ann. Nat. Hofmus. Wien. XXIII (1909) 197; Petrak in Tr. Tifl. Bot. Sada, XII, 1, 25; in Vestn. 148 Tifl. Bot. Sada, 24, 14; in Izv. Kavk. Muz. VIII, 1–2, 75; Grossh. Fl. Kavk. IV, 186; Kolak. Fl. Abkhazii, IV, 274; Charadze in Fl. Gruzii, VIII, 510; in Fl. Azerb. VIII, 406.—*C. scleranthum* MB. taur.-cauc. III (1819) 559; C.A.M. Verzeichn. 69; Boiss. Fl. or. III, 540.—C.

scleranthon Spreng. Syst. veg. 3 (1826) 378.—*Carlina echinus* MB. Beschreib. Land. Casp. Meer. (1800) 199; Fl. taur.-cauc. II, 283.—*Echenais carlinoides* Cass. in Dict. Sc. nat. XIV (1819) 171; DC. Prodr. VI, 661; Ldb. Fl. Ross. II, 747.—*E. carlinoides* β . *nutans* DC. Prodr. VI (1837) 661.—*E. nutans* Cass. in Dict. Sc. nat. XXV (1822) 226.—**lc.**: Charadze in Fl. Azerb. VIII, Plate XL, 1.—**Exs.**: Petrak, Cirsioth. Univ. Nos. 93, 135, 136.

Biennial. Rhizome ligneous, nodulose; stem 45–60 cm high, ribbed ascending, more or less sparsely branched from middle, somewhat densely arachnoid-hairy, densely leafy to tip, with numerous capitula clustered in paniculate inflorescence. Leaves green above, with yellowish midrib, scatteredly whitish-arachnoid-tomentose beneath, deeply sinuately pinnately incised to almost entire, toothed, with yellowish spines 10 mm long; basal leaves up to 12 cm long, 3 cm wide, oblong-lanceolate, sinuately-pinnately incised almost to base into deltoid ovate, 2–3-parted, tooth, long-spinescent lobes and spinulose petiole; cauline leaves oblong-lanceolate, sinuately pinnatifid into deltoid ovate lobes, up to 9 cm long, 2 cm wide, with broad weakly decurrent auricles; lower cauline leaves narrowed toward base, semiamplexicaul, acuminate; apical leaves reduced, spinescent, surrounding base of capitula and almost as long as capitula. Capitula numerous, solitary or in 2s, terminal on axillary or lateral branches, in short racemose inflorescence, corymbose-paniculate at stem apices. Involucre roundish-ovate, 1–2 cm in dia, at base with few strongly reduced, long, plumosely-aculeate, bracteoles shorter than involucre, stramineous or whitish-yellow, glabrous, with numerous scales, attenuate into long, hard spines; outer bracts ovate to oblong-lanceolate, narrowed above, with green spot, transitional to broader, membranous ovate appendage, deeply fimbriate in outer and weakly fimbriate in middle bracts, tapered to long, yellowish, erect spine; inner bracts linearly lanceolate, broader, scarious, with toothed apex narrowed to point. Florets whitish or pale; corolla 19 mm long, tube narrow, to 9 mm long, limb lobed to deeper than middle. Achenes brownish-yellow, 4 mm long, with narrow border and raised apical tubercle; pappus sordid-yellowish-white, 17 mm long, inner hairs with toothed tips. Flowering August to September.

149 Mountain meadows and pastures, roadsides, sometimes as weed in crops and old fields, from foothills to subalpine zone.—*Caucasus*: throughout Caucasus. *General distribution*: Central Europe (Czechoslovakia, introduced), Asia Minor, Armenia and Kurdistan, Iran and Afghanistan. Described from Eastern Caucasus. Type in Leningrad.

Note. Only one member of the section *Echenais* is found in the Caucasus, Asia Minor and West Asia. This species is reported for Europe as an introduced plant. Evidently, it crosses with members of

the section *Cirsium*. The following are hybrids described from the Caucasus:

1. *C. obvallatum* (MB.) MB. × *C. echinus* (MB.) Hand.-Mazz.—× *C. lojkae* Somm. and Lev. in Nuov. Giorn. Bot. Ital. N. S. II, 1 (1895) 15; in Tr. Peterb. Bot. Sada, XVI (1900) 259; Petrak in Tr. Tifl. Bot. Sada, XII, 1 (1912) 25.—**lc.**: Somm. and Lev. l. c. (1900) tab. XXVI; in Dechy, Kaukasus, III (1907) tab. XXIV.—Outer involucre bracts apically not broadened, membranous, short-cristate-ciliate with short apical spine; inner bracts with scaly deltoid ovate, erose-toothed, cuspidate appendage. Capitula medium-sized surrounded by narrowly plumosely toothed and spinescent, slightly surpassing apical leaves; florets 17–18 mm long, yellowish. Leaves pale yellow, finely arachnoid-hairy beneath.

Subalpine zone.—*Caucasus*: Ciscaucasia (Ardon River Basin, Tsei Ravine), Eastern Transcaucasia (Gidauri and Georgian Military Road). Described from Central Caucasus from Lojka's collections (Tsei Ravine). Type in Florence.

2. *C. subinermis* C.A.M. × *C. echinus* (MB.) Hand.-Mazz.—*C. grossheimii* Petrak (*C. elodes* × *C. echinus*) in Vestn. Tifl. Bot. Sada, Nov. Ser., 2 (1926) 43.

In habit characters, especially the strongly branched stem, form of the leaves, and structure of the involucre bracts, this hybrid approaches *C. echinus*, from which, however, it differs by having broadly long-decurrent leaves and reddish florets, which resemble those of *C. subinermis*. In the shape of the outer involucre bracts, which are broadened above, this hybrid also differs somewhat from *C. echinus*.

Caucasus: Southern Transcaucasia. Described from Gyunei shore of Lake Sevan from Shakhdag Mountain.

Note. Petrak considers these plants as hybrids between *C. elodes* and *C. echinus*. Caucasus authors mistakenly referred *C. subinermis* Fisch. and Mey. to *C. elodes* MB.

Section 5. *Cirsium*.—Sect. *Onotrophe* (Cass.) DC. Prodr. VI (1837) 644; Nakai in Tokyo Bot. Mag. XXVI (1912) 357; Petrak in Beih. Bot. Centralbl. XXXV (1917) 254; Kitam. in Acta Phytot. et Geobot. III, 1 (1934) 2; Comp. Japon. I (1937) 40.—*Onotrophe* Cass. in Dict. Sc. nat. XXXVI (1825) 145.—*Onotrophe* sect. *Apalocentron* Cass. ibid. 146.—*Onotrophe* sect. *Microcentron* Cass. ibid.—Sect. *Chamaeleon* DC. in Duby, Bot. Gall. I (1828) 287; Koch. Syn. (1837) 393; Boiss. Fl. or. III, 524, 539; Nakai in Tokyo Bot. Mag. XXVI (1912) 357, pro subgen.—Sect. *Erysithales* DC. in Duby, l. c. 285.—

Sect. *Acarna* DC. in Duby, l. c. 286 p. p.—Sect. *Orthocentrum* DC. Prodr. VI (1837) 641.—*Orthocentron* Cass. in Dict. Sc. nat. XXXVI (1825) 480, pro gen.—Sect. *Apalocentron* (Cass.) Kitam. in Acta Phytot. et Geobot. XII, 2 (1943) 102.—Leaves glabrous above, thinly or densely arachnoid-hairy, occasionally scabrous from short hairs. Capitula medium- or small-sized or small, occasionally large, globose-ovate or globose. Involucre more or less imbricate, glabrous or arachnoid-hairy; involucre bracts foliaceous; occasionally coriaceous, undivided or spinose-ciliate, occasionally cristate-puberulent, short- or somewhat long-spinescent, sometimes apically broadened to more or less scarious, erose-toothed appendage. Florets red or yellowish, less often whitish; corolla tube narrow, almost as long as or shorter than ligule, latter unevenly 5-parted almost to middle; filaments pubescent or with occasional, short, sometimes papillate hairs. Achenes 3–5 mm long; pappus of few, fine plumose hairs, with scabrous or filiform tips.

The species of this section are widely distributed in Europe, Asia, and North America.

Type of section: type of genus.

Subsection 1. Montana Charadze in Addenda XXVII, 604.—Leaves broad, not decurrent, undivided or pinnately lobed; cauline leaves usually sessile, semiamplexicaul or narrowed into petiole, subglabrous, scatteredly hairy or grayish-tomentose beneath. Involucre bracts gradually longer from outer to inner, outer sometimes almost 1/2 as long as inner, occasionally somewhat broadened in upper part, scarious on margin. Capitula few, more or less clustered at apices of stems, occasionally solitary.

Perennial large herbs growing in the montane regions of Eastern Europe, Balkans, Caucasus, and Asia Minor.

Type of subsection: *C. pseudopersonata* Boiss. and Bal.

62. *C. kusnetzowianum* Somm. and Lev. in Tr. Peterb. Bot. Sada, XII, 1 (1892) 155; in Nuov. Giorn. Bot. Ital. N. S. II, 1 (1895) 12; in Tr. Peterb. Bot. Sada, XVI (1900) 261; Petrak in Tr. Tifl. Bot. Sada, XII, 1, 28; Grossh. Fl. Kavk. IV, 189; Kolak. Fl. Abkhazii, IV, 275.—Charadze in Fl. Gruzii, VIII, 481.—*C. kusnetzowianum* var. *polycephalum* Alb. Prodr. Fl. Colch. (1895) 144; Grossh. Fl. Kavk. IV, 189.—*C. kusnetzowianum* var. *oblongifolium* Alb. loc. cit. Somm. and Lev. op. cit. (1900) 262; Grossh. Fl. Kavk. IV, 189.—*C. pseudopersonata* ssp. *kusnetzowianum* (Somm. and Lev.) Petrak in Mitteil. Thüring. Bot. Gesellsch. II, 1 (1960) 33.—**lc.**: Somm. and Lev. in Tr. Peterb. Bot. Sada, XVI, Plate XXVII.—**Exs.**: Petrak, Cirsioth. Univ. No. 130.

Perennial. Stem up to 1.5 cm high, ascending, thinly arachnoid-hairy, sparsely crisped-hairy, sulcate-ribbed, leafy, with short branches above. Leaves broad, ovate-elliptical, with short-papillate hairs above, more or less pubescent on veins beneath with crisped arachnoid hairs, unevenly more or less coarsely toothed, teeth short-spinescent, sometimes leaves glabrous on both sides, coarsely toothed (var. *oblongifolium* Alb.), short-acuminate; lower cauline leaves abruptly narrowed in broadly winged, lobate petiole, to 6 cm long, including petiole 30 cm long, 13 cm wide; middle and upper cauline leaves subcordate, sessile, semiamplexicaul, reduced toward stem apes, 7–23 cm long, 4–9 cm wide; apical leaves 2–3, broadly or linearly lanceolate, surpassing capitula. Capitula globose-ovate, to 2 cm in dia, solitary, terminal on stem and short branches, or 3–6 in corymbose inflorescence, occasionally capitula numerous (var. *polycephalum* Alb.). Involucre glabrous or scatteredly arachnoid-hairy; inner involucre bracts elongated-lanceolate, tapered to thin, yellowish spine, brownish-green below, dark reddish-brown above, weakly carinate, ciliolate; inner bracts linearly lanceolate, with scarious tip. Florets purple-red; corolla 17–19 mm long with narrow tube to 5–7 mm long, limb parted to middle. Achenes 4 mm long, 1.5 mm wide, yellowish with dark brown streaks; pappus sordid-white, 14 mm long, of few unequal hairs, with apically scabrous inner hairs. Flowering July to September.

Forest and subalpine zones, on river terraces, usually in tall herbs, often along forest edges.—*Caucasus*: Ciscaucasia (western part), Eastern Transcaucasia (Bakuriani), Western Transcaucasia, Southern Transcaucasia (Abastumani District). *General distribution*: Asia Minor (former Artvin District). Described from two specimens from Abkhazia (upper reaches of Klych River, Dzhodisvik Range). Type in Florence.

Note. Recently, Petrak (1960) treated this species as a subspecies of *C. pseudopersonata* Boiss. and Bal. from Asia Minor, distinguishing the Western Transcaucasian form primarily by the pubescence of the leaves. We consider it better to treat *S. kusnetzowianum* as a separate species in the series of species close to *C. pseudopersonata*. This entire series of species differs by its very broad, nondecurrent leaves and structure of the involucre bracts from *C. uliginosum* (MB.) MB., to which Petrak relates this species.

Petrak described the hybrid *C. obvallatum* (MB.) MB. × *C. kusnetzowianum* Somm. and Lev.—*C.* × *pratigagum* Petrak in *Vestn. Tifl. Bot. Sada*, XIX (1911) 4.

Alpine meadows.—*Caucasus*: Western Transcaucasia (Adzharia). It differs from *C. obvallatum* by having an almost glabrous stem, broader sinuate-pinnate-toothed leaves with spinulose margins,

solitary, the apical capitula surrounded by a few shorter and less densely short-spinose bracteal leaves.

C. kusnetzowianum differs from the hybrid by having broader and less coarsely toothed leaves and 1–3 long apical leaves with spinulose margins.

63. ***C. sychnosanthum*** Petrak in *Izv. Kavk. Muz.* VIII, 1–2 (1914) 63; *Grossh. Fl. Kavk.* IV, 189; *Kolak. Fl. Abkhazii*, IV, 274; Charadze in *Fl. Gruzii*, VIII, 481.

Perennial. Stem ascending, 1–2 m high, sulcate-ribbed, finely arachnoid-hairy, dark reddish-brown, leafy, with short cymose branches near stem apex. Cauline leaves subglabrous on both sides, weakly arachnoid-hairy beneath on veins, oblong-ovate or ovate-elliptical, pinnatifid or pinnately parted into remote broadly deltoid ovate and short-acuminate, sometimes apically bifid, coarsely toothed segments, with teeth strongly spinescent, serrulate-spinose between teeth; lower cauline leaves narrowed to short, broadly-winged, spatulate petiole, including petiole 37 cm long, 17 cm wide; middle and upper cauline leaves cordate or auriculate, narrowed above, 12–22 cm long, 6–12 cm wide; apical leaves 1–3, shorter than or slightly exceeding capitula, broadly lanceolate to lanceolate, pinnately lobed, spinulose. Capitula terminal on stem and branches, solitary or in 2s, slightly projected above apical leaves, usually 3–5 in corymbose-paniculate inflorescence, subsessile, globose-ovate, 20–24 mm in dia. Involucre glabrous, brownish-reddish-brown, imbricate; bracts lanceolate, strongly tapered to short-spines, yellowish below, brownish-reddish-brown above; inner bracts linearly lanceolate, narrowed into thin scarious tip. Florets purple-red, to 20 mm long; corolla tube narrow, to 8 mm long, parted to deeper than middle. Achenes to 4 mm long; pappus 16 mm long, sordid-white, basally yellowish, with scabrous hair tips. Flowering July to August.

Forest to alpine zone, along streams often as constituent of tall-herb vegetation, now and then forming dense thickets.—*Caucasus*: Western Ciscaucasia (basin of Belaya [white] River), Western Transcaucasia (Lower Svanetia-Lentakhi, Abkhazia, Mzymta River basin). Endemic. Described from Abkhazia. Type in Tbilisi.

Note. In its broad leaves and form of the involucre bracts this species approaches *C. kusnetzowianum* Somm. and Lev. Petrak compares it with *C. svaneticum* Somm. and Lev. and *C. uliginosum* (MB.) MB.; however, *C. sychnosanthum* has almost nothing in common with them.

153 64. ***C. oblongifolium*** C. Koch in *Linnaea*, XVII (1843) 41; Boiss. *Fl. or.* III, 539; *Alb. Prodr. Fl. Colch.* 143; Petrak in *Izv. Kavk. Muz.*

VIII, 1–2, 74; Grossh. Fl. Kavk. IV, 186; Kolak. Fl. Abkhazii, IV, 273; Charadze in Fl. Gruzii, VIII, 482.—*C. uliginosum* β . *glabrum* Ldb. Fl. Ross. II (1846) 736.

Perennial. Stem up to 1.5 m high, ascending, ribbed sulcate, simple or cymosely branched above, scatteredly hairy. Cauline leaves oblong or oblong-ovate, sessile, somewhat cordate, semiamplexicaul, subacute, on both sides glabrous, glaucescent beneath, shallow and sinuately pinnately toothed with simple or bifid unequal teeth, teeth deltoid ovate, tapered to more or less hard spines 2.5 mm long, sinuses spinulose; lower cauline leaves to 27 cm long, 9 cm wide, internodes short; middle cauline leaves lanceolate, to 25 cm long, 7 cm wide, reduced upward, 12 cm long, 4 cm wide; apical leaves 1–4, small, linearly lanceolate, pinnate-long-spinose. Capitula globose-ovate, 1.5–2.5 cm in dia, 2–9 clustered at stem tip, subsessile, on short branches. Involucre subglabrous or weakly arachnoid-hairy, purple; outer involucre bracts yellowish below, purple above, with scarious, scarcely broadened, finely toothed margin, spinulose; inner bracts linearly lanceolate, with scarious, purple, appendicular, slightly bent tip. Florets purple-red, 18 mm long; corolla with narrow tube to 6 mm long; limb parted to middle. Achenes 3 mm long, reddish-brown to brown, basally narrowed; pappus 14 mm long, sordid-white, basally reddish-brown with thin hairs, short plumose almost to tip. Flowering July to August.

Forest and subalpine zones, in wet meadows, on riverbed gravels and in tall-herb vegetation, often forming dense thickets.—*Caucasus*: Eastern Transcaucasia (upper reaches of Liakhvi River), Western Transcaucasia (Gornaya Racha, upper reaches of Rioni River, Abkhazia-Agurepsta). Endemic. Described from Racha. Type was in Berlin; isotype in Leningrad.

65. *C. waldsteinii* Rouy, Fl. Fr. IX (1905) 84; Dostal, Květ. ČSR (1950) 1668; Hermann, Fl. Nord. u. Mitt.—Eur. 1073.—*C. pauciflorum* (Waldst. and Kit.) Spreng. Syst. veg. 3 (1826) 375, non Lam. (1778); DC. Prodr. VI, 649; Boiss. Fl. or. III, 545; Koch, Syn. ed. 3, II (1902) 1544; Klok. in Vizn. Rosl. URSR, 569; Hegi, Ill, Fl. VI, 2, 894.—*Cnicus pauciflorus* Waldst. and Kit. in Willd. Sp. pl. III, 3 (1803) 1677; Waldst. and Kit. Desr. et icon. pl. rar. Hung. II, 175.—Ic.: Waldst. and Kit. l. c. tab. 161; Rchb. Ic. Fl. Germ. XV, tab. 833; Javorka and Csapody, Iconogr. Fl. Hung. 543, fig. 3883; Hegi, Ill. Fl. VI, 2, 894, fig. 596.—Exs.: Herb. norm. No. 2650; Fl. Stir. exs. No. 692.

Perennial. Rhizome thick, strongly branched; stem 75–80 cm high, ascending, sulcate, reddish-brown, thinly and scatteredly arachnoid-hairy, leafy, with large, broad leaves, with elongate inflorescence at

apex comprising 3–4 capitula, densely arachnoid-hairy below capitula. Basal leaves with appressed, scattered, crisped hairs above, lanate along veins beneath, sinuate-crenate-toothed, deeply pinnatisect in lower half, with remote roundish-ovate lobes, abruptly narrowed into long, winged petiole, petiole a half as long as lamina, including petiole 55 cm long, 15 cm wide, ciliate from thin, yellow spines to 3 mm long; cauline leaves usually thinly grayish-arachnoid beneath, appressed and scatteredly crisped hairy above, roundish-ovate, weakly parted into deltoid-ovate subacute lobes, toward base more or less weakly narrowed, auriculate, semiamplexicaul, lower ones to 26 cm long, 18–20 cm wide; middle cauline leaves pinnately lobed, with ovate, subacute segments having sinuate-pinnately lobed, spinulose-ciliolate, deltoid-ovate, subacute lobes, abruptly narrowed into broadly winged short petiole, with large auricles, including petiole 20–27 cm long, 14–16 cm wide; upper leaves roundish-ovate or ovate-lanceolate, unevenly pinnately toothed, latter narrowed into short spines, acuminate, sessile, semiamplexicaul, arachnoid-hairy, almost tomentose below, 6–9.5 cm long, 3.5–4.5 cm wide. Capitula basally with one apical lanceolate, declinate, almost as long as inflorescence or slightly shorter; capitula usually 3–4, clustered at stem tip, subsessile or on short peduncles, apical capitula 2–3 cm in dia, lower ones usually smaller than upper. Outer involucre bracts coriaceous, very tiny appressed-hairy (seen under powerful hand lens), reddish-brown to brown, dark brown along midrib, ovate to ovate-lanceolate, 7–10 mm long, gradually narrowed to thin, short spine; inner bracts membranous, light brown, lustrous, lanceolate, apically narrowed into scarious, slightly reddish-brown to brown tip. Florets dark purple, to 19 mm long, with narrow corolla tube to 7 mm long; limb unequally parted. Achenes dark-reddish-brown, with apical tubercle; pappus light reddish-brown, to 18 mm long, apically with slightly racemelike broadened, toothed, darker reddish-brown inner hairs. Flowering July to September.

Subalpine zone, among scrubs, on talus.—*European Part*: Upper Dniester, Bessarabia. *General distribution*: Central Europe (Eastern Alps and Eastern Carpathians), Balkans. Described from Carpathians. Type in Budapest.

66. **C. hypoleucum** DC. Prodr. VI (1837) 645; Boiss. Fl. or. III, 544; Petrak in Tr. Tifl. Bot. Sada, XII, 1, 28, 42; in Vestn. Tifl. Bot. Sada, 24, 12; Grossh. Fl. Kavk. IV, 187; Charadze in Fl. Gruzii, VIII, 483.—*C. hypoleucum* β . *lazicum* C. Koch in Linnaea, XXIV (1851) 409.—*C. hypoleucum* var. *ponticum* Somm. and Lev. in Nuov. Giorn. Bot. Ital. N. S. II, 1 (1895) 18; in Tr. Peterb. Bot. Sada, XVI, 264; Grossh. Fl. Kavk. IV, 187.—*C. hypoleucum* ssp. *drymeium* Petrak in

Tr. Tifl. Bot. Sada, XII, 1 (1912) 43; Grossh. Fl. Kavk. IV, 187.—**lc.**: Dmitrieva, Opred. Rast. Adzh. Fig. 32.—**Exs.**: Petrak, Cirsioth. Univ. No. 94.

Perennial. Rhizome thick, woody; stem ascending, 1.5 cm high, leafy, sulcate, purple, branched almost from middle, with more or less leafless long branches, scatteredly arachnoid-hairy, densely below capitula. Leaves more or less densely covered above with small papilliform and crisped segmented hairs, white-tomentose beneath, soft, pinnately parted or sinuately pinnately toothed, spinulose; lower cauline leaves large, oblong-ovate, deeply pinnately incised into ovate or oblong-ovate, spinose-unequally toothed, obtuse lobes, basally more or less gradually narrowed into broadly winged, sinuate, spinose, spatulate, more or less short petiole, including petiole 22 cm long, 8 cm wide, auriculate, subacute; middle cauline leaves oblong-ovate, weakly lobate, with roundish, sharp-toothed, long and thinly spinose lobes, auriculate, semiamplexicaul, 16–18 cm long, 6–9 cm wide; upper leaves on long branches 2–3.5 cm long, lanceolate, acute, spinose-toothed, remote; apical leaf somewhat remote from capitula, linear, bent, shorter than involucre. Capitula on long, almost leafless branches, globose-ovate, solitary terminal, 1.5–2.5 cm in dia, occasionally 2 or many, clustered (ssp. *drymenium* Petrak). Involucre purple, finely arachnoid-hairy; outer bracts appressed, deltoid-ovate, tapered to yellowish, short-spine, brownish-green, purple above; inner bracts linearly lanceolate, narrowed to purple, scarious tip, almost 2 times as long as outer, bent at flowering. Florets purple, 18 mm long, somewhat surpassing inner involucre bracts; corolla tube narrow, 5 mm long; limb parted up to 1/3. Achenes stramineous, 4 mm long; pappus 13 mm long, whitish, of few thin hairs with scabrous, scarcely thickened tips. Flowering July to August.

Forest and subalpine zones, often among spruce-fir forests and as component of tall-herb vegetation.—*Caucasus*: Eastern Transcaucasia (Borzhomo-Bakuriani District), Western Transcaucasia (Adzharo-Imeretian Range), Southern Transcaucasia (Abastumani). *General distribution*: Balkans-Asia Minor. Described from Bithynian Olympus in Asia Minor. Type in Geneva; Topotype in Leningrad.

Note. The species varies in the size of the spines, form of the involucre bracts, and texture of the leaves. The type of the species (described from the collections of Osh) is characterized by more coriaceous leaves with hard spines along the margin. Perhaps the Caucasus-Lazistan form, recognized by Sommier and Levier as var. *ponticum* Somm. and Lev., should be treated as a separate species that replaces *C. hypoleucum* DC. in the east.

Hybrids have been described from the Caucasus and adjoining regions of Asia Minor between the following species: *C. hypoleucum* DC., *C. obvallatum* (MB.) MB., and *C. echinus* (MB.) Hand.-Mazz.

1. *C. hypoleucum* DC. × *C. obvallatum* (MB.) MB. f. *woronowii* Petrak in *Izv. Kavk. Muz.* VIII, 1–2 (1914) 77.—*Cirsium* × *woronowii* Petrak in *Vestn. Tifl. Bot. Sada*, 19 (1911) 19.—Exs.: Petrak, *Cirsioth. Univ.* No. 133; *Herb. Fl. cauc.* No. 548.

Described from Adzharia from Yu.N. Voronov's collections. Later reported for Bakuriani.

It differs from *C. hypoleucum* in the following characters: basally narrowed and deeply sinuate-pinnately incised leaves, loosely white-tomentose beneath; solitary, subsessile capitula terminal on elongate branches, in axils of linear-lanceolate, pectinately ciliate-spiny apical leaves; outer involucre bracts with scattered arachnoid-hairs and acuminate spines to 2 mm long; yellowish florets with pink anthers. *C. obvallatum* differs from the hybrid by more sinuately and deeply incised large leaves, which reach stem tip; capitula in clusters of several, very densely ciliate-spiny floral leaves and involucre bracts with dark-colored resinous band.

2. *C. hypoleucum* DC. × *C. obvallatum* (MB.) MB. f. *subhypoleucum* Petrak in *Izv. Kavk. Muz.* VIII, 1–2 (1914) 78.

Described from Kokhta Mountain in the vicinity of Bakuriani where it grows together with related species and f. *woronowii* Petrak. The latter is closer in habit to *C. obvallatum*, but f. *subhypoleucum* Petrak is closer to *C. hypoleucum*, differing by deeply sinuate-repand pinnate leaves and outer involucre bracts.

3. *C. hypoleucum* DC. × *C. echinus* (MB.) Hand.-Mazz.—*C. × rollowii* Petrak and Woron. ex Petrak in *Vestn. Tifl. Bot. Sada*, 24 (1912) 12.

Described from Eastern Anatolia from the former Artvin District (between Salalet and Khinzort). It may be found in Adzharia.

It is similar to *C. hypoleucum* DC. in the broad middle cauline leaves, tomentose hairs beneath, and form of the capitula and florets, but differs by having upper cauline leaves with teeth attenuated into long, thin, yellowish spines, long-spiny, small floral leaves, and outer involucre bracts, with spiny-ciliate margins and ending in yellowish spines to 2 mm long. The color of the corolla varies from yellowish to dirty-purple.

Subsection 2. Sinocirsium Kitam. in *Acta Phytot. et Geobot.* III, 1 (1934) 3; *Comp. Japon.* I (1937) 61.—Rhizome with numerous fibrous roots. Basal leaves rosulate, persisting after flowering; cauline

leaves semiamplexicaul, not decurrent. Capitula medium-sized, erect or nodding; involucre bracts narrow, imbricate, straight, smooth, dorsally with more or less bulged, stramineous dark bend, short-spinescent. Florets with narrow corolla tube, almost as long as limb, sometimes shorter or slightly longer. Achenes 3–4 mm long.

Type of subsection: *C. japonicum* DC.

Note. An Eastern Asian subsection, whose species are distributed in northeastern China, the Soviet Far East, Korea, and the islands of Japan. Kitamura segregated this group of species as a subsection, subordinate to the boreal section *Onotrophe* (Cass.) DC. (= *Cirsium*). The Okhotsk-Beringian species group of the subsection *Borealicola* Kitam. s. str. are closest to the subsection *Sinocirsium* in the structure of the achenes and florets. Both subsections include old, relatively mesophilous series of species, whose members are constituents of forest cenoses, coastal meadow vegetation, and large herb communities.

Series 1. Japonica Kitam. in Acta Phytot. et Geobot. III, 1 (1934) 4; Comp. Japon. I (1937) 62.—Capitula at flowering erect; outer involucre bracts long, densely covered outside with dark glandular hairs.

67. *C. maackii* Maxim. Prim. fl. amur. (1859) 172; Trautv. in Tr. Peterb. Bot. Sada, VIII, 2, 503; Kom. Fl. Man'chzh. III, 750; Kom. and Alis. Opred. Räst. Dal'nevost. Kr. II, 1085; Kitam. Comp. Japon. I, 62.—*C. littorale* var. *ussuriense* Rgl. Tent. Fl. Ussur. (1861) 102; Herder in Bull. Soc. Nat. Mosc. XLIII, 1, 85.—*C. japonicum* ssp. *maackii* (Maxim.) Nakai in Tokyo Bot. Mag. XXV (1911) 61.—*C. japonicum* var. *amurense* Kitam. Cirs. Nov. Orient.-Asiat. (1931) 12.—*Cnicus japonicus* e. *maackii* Maxim. in Bull. Acad. Sc. Pétersb. XIX (1874) 503 and in Mém. Biol. IX, 326; Palib. Consp. Fl. Cor. I, 119.—**Ic.:** Kitam. Comp. Japon. I (1937) pl. XII, fig. 3.

Perennial. Stem ascending, 50–100 cm high, more or less pubescent, especially below, hairs crisped, dark brown, more or less scatteredly floccose-arachnoid-hairy above with dark brown hairs. Basal leaves oblong, narrowed to winged, spiny-ciliate petiole, petiole shorter than lamina, together 19–20 cm long; lamina 4–6 cm wide, sinuately pinnately parted, with broadly-ovate, often 2-parted, unevenly repand-toothed segments with teeth abruptly narrowed to small spines, venation conspicuous, more or less crisped-hairy beneath along midrib, more or less thinly arachnoid-hairy, subglabrous above; cauline leaves oblong elliptical, to 17 cm long, 8 cm wide, incised almost to base into elongate-ovate sinuate, bifid segments, retusely pinnately toothed, with lanceolate or deltoid-ovate subacute lobes, teeth tapered to thin spines 2–4 mm long; lower leaves apically attenuate, basally narrowed into long, narrow-winged spinose petiole; middle and upper cauline leaves

sessile, auriculate; all leaves with appressed spines along margin, with teeth tapered to spines to 3 mm long; upper leaves basally broadened, semiamplexicaul, 9–10 cm long, shallowly pinnatifid, more or less grayish-arachnoid-hairy beneath; apical leaves on more or less short, arachnoid-hairy petioles, linear, uppermost to 2 cm long, long-ciliate-spiny, reaching to base or middle of capitulum. Capitula solitary or 2, on long, slightly curved, tomentose-hairy peduncles, terminal or axillary, few, erect at flowering, 2–3 cm in dia. Involucre dark colored, more or less weakly arachnoid-hairy; involucre bracts lax, lanceolate, spinescent, later weakly curved; outer bracts dorsally bulged with black-purple band, densely covered with blackish glandular hairs; inner bracts narrow, linearly lanceolate, with scarious tips. Florets violet-purple, 21–23 mm long; corolla tube narrow, 12 mm long; limb lobed to 2/3. Achenes 3.5 mm long, light greenish, weakly triquetrous, with filiform elongate disk, basally slightly narrowed; pappus 18.5–25 mm long, whitish, basally sordid-white, with pointed tips of inner hairs. Flowering July to August.

Dry meadows and forested mountain slopes, sometimes in old fields.—*Far East*: Uda River area, Ussuri. *General distribution*: Korean Peninsula, China (northern). Described from mouth of Sungari River. Type in Leningrad.

Note. Apparently, it is a polytypic species for which different varieties were described in Korea and Japan, mainly by Nakai (1912*). In Ohwi's Manual (*Fl. Jap.*, 1953) these varieties are referred to *C. japonicum* DC. *C. maackii* was combined with the latter by Maximowicz in his later work (1874) as *Cnicus japonicus* *ε. maackii* Maxim. According to Kitamura (1934,** 1937), both species can be treated in one series of Manchurian-Japanese species. *C. Maackii* differs from *C. japonicus* DC. by having softer leaves that blacken on drying, and densely glandular outer involucre bracts.

Series 2. Schantarensia Kitam. in Acta Phytot. et Geobot. III, 1 (1934) 4; Comp. Japon. I (1937) 71.—Capitula nodding; involucre bracts glandular.

Species of this series are widely distributed in Eastern Asia; only one species grows in the Soviet Union.

68. *C. schantarensis* Trautv. and Mey. Fl. Ochot. I, 2 (1856) 58; Kom. Fl. Man'chzh. III, 751; Nakai, Fl. Koreana II, 47; Kom. and 159 Alis. Oprod. Rast. Dal'nevost. Kr. II, 1085; Kitam. Comp. Japon. I,

*1911 cited in synonymy above.—Sci. Editors.

**1931 cited in synonymy above.—Sci. Editors.

76.—*C. pendulum* β . *oligocephalum* Rgl. and Till. Fl. Ajan. (1859) 107.—*C. littorale* Maxim. Prim. fl. amur. (1859) 173; Herder in Bull. Soc. Nat. Mosc. XLIII, 1, 85, excl. ϵ . *ussuriense* Rgl.—*C. littorale* δ . *nudum* Rgl. Tent. Fl. Ussur. (1861) 95.—*Cnicus japonicus* ϵ . *schantarensis* (Trautv. and Mey.) Maxim. in Bull. Acad. Sc. Pétersb. XIX (1874) 498 and in Mém. Biol. IX, 326.—**lc.**: Kitam. Comp. Japon. I (1937) pl. XVI, fig. 2.

Perennial. Rhizome short, oblique, thick, with numerous ligneous fibrous roots; stem bases with dark reddish-brown remnants of old leaves. Stems yellowish, ascending, to 70 cm high, sparsely crisped-hairy, with articulate hairs or weakly arachnoid-hairy, sulcate. Leaves in rosettes, on long, weakly winged petioles, broadly ovate, 13–25 cm long, 5.5–9.5 cm wide, obtuse, or acute, basally narrowed to long petiole not longer than lamina, subglabrous above with scattered simple hairs, more or less sparsely arachnoid-hairy beneath, with articulate, crisped hairs along veins, shallow repandly pectinately-toothed, with distant, fine, and tiny spine-like cilia; cauline leaves few, deflected; lower and upper cauline leaves identical in shape, oblong-ovate, deeply pinnately incised to in oblong and broadly deltoid-lanceolate segments, usually 15–18 cm long, 7.5–10.5 cm wide, lower narrowed to short petiole, others semiamplexicaul, more or less glabrous above, scatteredly pilose to finely grayish-arachnoid-hairy beneath, segments sharp-toothed, with spinescent teeth and small, appressed spine-like cilia on margin; apical leaves ovate or ovate-lanceolate, gradually narrowed above to broadly-oblong-lanceolate tip 6–7 cm long. Capitula 1–4, on long tomentose peduncles, nodding from base, with 1–2 very small, more or less linear, apical leaves. Involucre wide open, with more or less horizontal, lower involucral bracts, imbricate, broadly lanceolate, gradually becoming longer from outer to inner ones, outer ones tapered to dark spine, dorsally reddish-brown, thinly hairy, thinly arachnoid-hairy along margin, with broad blackish-purple band above, usually glandular along midrib; inner bracts lanceolate, carinate, with scarious bent tip. Florets dark purple-violet, to 21 mm long; corolla tube to 7 mm long; limb 2 times as long as tube, lobed to 1/3. Achenes yellowish, to 4 mm long, longitudinally weakly striate, with fine narrow tubercle at apex; pappus to 20 mm long, light reddish-brown, tips of inner hairs not plumose. Flowering July to September.

Mixed and coniferous montane forests, also in deciduous forests, along riverbanks.—*Far East*: Uda River area (Bolshoi Shantar and ¹⁶⁰Feklistov islands, Udscoe, Uda Range), Ussuri (basin of Suifun River, in vicinity of Vladivostok), Sakhalin. *General distribution*: China (northeastern). Described from Shantar Island. Type and paratype in Leningrad.

Note. The authors based the description on two of Middendorf's specimens. One of them was collected on Shantar Island and the other in the vicinity of Udscoe. The same species was later described by Maximowicz as *C. littorale* Maxim. but in a broad sense. The variant of *C. pendulum* Fisch. described by Regel and Tilling from Ayan was rightly combined by Herder with *C. schantarense* Trautv. Mey. but, interpreting the species broadly, Herder, in his monographic treatment, created a complex system of subordinate units in *C. littorale* Maxim., combining under this name *C. maackii* Maxim. and *C. schantarense* Trautv. and Mey. Apparently, these varieties belong to the latter species: α . *genuinum* Maxim. β . *asperum* Maxim., γ . *schrenkii* Maxim., δ . *nudum* Rgl. and ϵ . *setosum* Herd.

Maximowicz (1874), in his monographic treatment of the genus *Cnicus* auct. (*Cirsium*), included the name *Cirsium littorale* among the synonyms of *Cnicus japonicus* (DC.) Maxim., considering *C. schantarense* as part of the latter species.

V.L. Komarov noted considerable differences of *C. schantarense* from *C. japonicum*. Kitamura (1934), having paid attention to the capitula of *C. schantarense* that nod from the base, placed it in the separate series *Schantarenisia* Kitam. as distinct from *C. maackii* Maxim. and *C. japonicum* DC., which were referred to the series *Japonica* Kitam. According to Kitamura, the two series constitute the subsection *Sinocirsium* of the boreal section *Onotrophe* (= *Cirsium*). *C. schantarense* varies considerably in pubescence, incision, and texture of the leaves. For *C. littorale*, Maximowicz named forms differing mainly in pubescence: α . *genuinum*—with leaves grayish-pubescent beneath; β . *asperum*—with leaves scabrous above and tomentose beneath; γ . *schrenkii*—with leaves green, shallowly incised, almost glabrous. Apparently, the less incised and weakly pubescent specimens are the shade plants of forest formations. The type of the species is characterized by more or less deeply incised leaves, which are grayish-tomentose beneath. From *C. maackii*, this species is distinguished primarily by having capitula that nod from the base and by the form of the leaves. Elucidation of the taxonomic significance of the separate forms that have been proposed for *C. schantarense* Trautv. and Mey. is not yet possible and will require more thorough investigation of extensive material.

Kitamura reports for Korea the hybrid *C. × heterocanthum* Kitam. *C. pendulum* Fisch. \times *C. schantarense* Trautv. and Mey. (Kitam. in *Acta Phytol. et Geobot.*, III, 1 [1934] 8). For the flora of the USSR this hybrid has not yet been reported, but finding it is possible.

Subsection 3. Apalocentron (Cass.) Charadze comb. nova.—*Onotrophe* sect. *Apalocentron* Cass. in *Dict. Sc. nat.* XXXVI (1825)

161 146.—*Cirsium* sect. *Apalocentron* (Cass.) Kitam. in Acta Phytot. et Geobot. XII, 2 (1943) 102 p. min. p.—Leaves thin, more or less broad, usually almost undivided or more or less deeply pinnately incised, with approximate segments. Capitula surrounded by broad apical leaves, or 1–3, small, narrow, bracteal leaves at base of capitula. Outer involucre bracts with more or less bulged, resinous, dark band or weakly carinate, acuminate. Florets yellowish or red, occasionally white. Perennial plants mostly confined to woodland regions of Central Europe. A few species reach the European Part of the USSR, and only one extends to Western Siberia.

Type of subsection: *C. oleraceum* (L.) Scop.

Note. Apparently, it is a collective species, comparatively recent in origin and readily hybridizing with species of the section *Cirsium*. Individual species tend toward members of the subsections *Sinocirsium*, *Cirsium*, and *Montana*.

69. *C. oleraceum* (L.) Scop. Fl. Carn. ed. 2, II (1772) 124; Ldb. Fl. alt. IV, 12; DC. Prodr. VI, 647; Ldb. Fl. Ross. II, 738; Schmalh. Fl. II, 105; Koch, Syn. ed. 3, II (1902) 1550; Fedtsch. and Fler. Fl. Evrop. Ross. 1012; Schischk. in Fl. Zap. Sib. XI, 2893; Majevski, Fl. ed. 8, 602; Arénes in Bull. Jard. Bruxelles, XXIV, 264; Hegi, Ill. Fl. VI, 2, 898.—*C. pratense* Rupr. Fl. Ingr. (1860) 532.—*Cnicus oleraceus* L. Sp. pl. (1753) 826.—*C. pratensis* Lam. Fl. Fr. II (1778) 14.—*C. bracteatus* Gilib. Fl. Lithuan. III (1781) 184.—*Carduus oleraceus* Gorter, Fl. Ingr. (1761) 129; Vill. His. pl. Dauph. III, 21.—*C. acanthifolius* Lam. Encycl. méth. I (1783) 703.—**lc.**: Rchb. Ic. Fl. Germ. XV, tab. 834; Syreistsch. Ill. Fl. Mosk. Gub. III, 299; Javorka and Csapody, Iconogr. Fl. Hung. 542, fig. 3880; Fiori, **lc.** Fl. Ital. ed. 3, No. 3725; Hegi, Ill. Fl. VI, 2, 898.—**Exs.**: Pl. polon. exs. No. 746; Pl. Suec. exs. No. 1585.

Perennial. Rhizome horizontal, with funiform fibrous roots; stem ascending, more or less branched from middle, 60–150 cm high, sulcate, subglabrous or scatteredly arachnoid-hairy. Leaves elliptical or ovate, green and glabrous above, glaucescent beneath, somewhat arachnoid-hairy on veins; lower cauline leaves 20–40 cm long, 10–30 cm wide, narrowed to winged, more or less elongate petiole, sinuate-pinnately parted into ovate, unevenly toothed segments, teeth tapered to thin spines 2–3 mm long; middle cauline leaves more or less deeply pinnatisect into lanceolate, spinescent approximate lobes, sessile, amplexicaul, usually 15 cm long, 5 cm wide; upper cauline leaves ovate or oblong-ovate, more or less pinnately toothed or almost entire, with spinelike cilia, long-acuminate, usually 10 cm long, 4 cm wide. Capitula globose-ovate, 2–3 cm in dia, in clusters of 2–5 at apices of stem and few, long branches, basally surrounded by yellowish-green

and broadly ovate, in upper capitula more or less lanceolate, apical
 162 leaves; capitula more or less nodding. Involucre finely arachnoid-hairy; outer involucre bracts lanceolate, weakly arachnoid-hairy, narrowed into deflexed yellowish spine, with dark green band above, weakly carinate; inner bracts linearly-lanceolate, glabrous, narrowed into long scarious tip. Florets greenish-yellow, 22 mm long; corolla tube narrow, 8 mm long; limb lobed almost to middle. Achenes 4.5 mm long, pale yellowish-gray; pappus sordid-white, to 19 mm long, hairs with long filiform tips. Flowering July to September.

Commonly in forest zone, occasionally in forest steppe, from time to time in steppe regions; in coniferous and birch-aspens forests, pine forests, along forest edges, among scrubs, in wet meadows, often on edges of swamps.—*European Part*: Dvina-Pechora, Baltic Region, Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper, Volga-Don, Trans-Volga, Upper Dniester; *Western Siberia*: Upper Tobol, Irtysh (Baraba, Zmeinogorsk). *General distribution*: Scandinavia, Central Europe, Atlantic Europe, Western Mediterranean Region (northern Italy), Balkans (northern). Described from Southern Europe. Type in London.

Note. It often hybridizes with species of the section *Cirsium*. Among them, the hybrids between *C. oleraceum* and *C. palustre* that have been reported from the European Part of the USSR are closer in appearance to *C. oleraceum*.

1. ***C. oleraceum*** (L.) Scop. × *C. palustre* (L.) Scop.—*C. lacteum* auct.: Iljin in *Fl. Yugo-Vost.* VI (1936) 408.—**Ic.**: Syreistsch. *Ill. Fl. Mosk. Gub.* III (1910) 300.

Specimens from the Leningrad Region differ from *C. oleraceum* by having more deeply incised, somewhat decurrent leaves. Some specimens (Perm District) have narrower leaves. Plants collected from the Pskov District are closer to *C. palustre*. For specimens from Syzran, M.M. Iljin notes the following characters: Stem branched above; cauline leaves pinnately divided, lower broadly decurrent, upper short-decurrent. Capitula medium-sized, with yellow or reddish florets.

70. ***C. rivulare*** (Jacq.) All. Auct. ad Fl. Pedem. (1789) 10, excl. descr. sec. Mansfeld in Fedde, Repert. 52, 2, 175; Link, Enum. pl. II, 301; Koch, Syn. (1837) 397; Schmalh. Fl. II, 105; Klok. in Vizn. Rosl. URSR, 569; Majeovski, Fl. ed. 8, 605.—*Carduus rivularis* Jacq. Fl. Austr. I (1773) 57, tab. 91.—*Cnicus rivularis* Willd. Sp. pl. III, 3 (1803) 1676.—*Cnicus salisburgensis* Willd. ibid. 1675.—**Ic.**: Rchb. Ic. Fl. Germ. XV, tab. 835, fig. 1; Javorka and Csapody Iconogr. Fl. Hung. 542, fig. 3882.—**Exs.**: Fl. exs. austro-hung. No. 1768; Pl. polon. exs. No. 449; GRF No. 1070.

163 Perennial. Rhizome with numerous thin-funiform roots; stem 75–100 cm high, yellowish, ascending, sulcate, scatteredly crisped-hairy below, thinly arachnoid-hairy above, simple, with long few-leaved peduncle bearing solitary terminal capitula. Leaves subglabrous above and green or sparsely crisped-hairy above, grayish-green and more or less densely crisped-hairy beneath, especially along veins; basal leaves 15–25 long, 5.5–9.5 cm wide, obovate or ovate-lanceolate, narrowed at both ends basally narrowed into more or less short winged petiole, with large remote lobes, tapered to long, thin spines, usually unequally pinnately incised into approximate, deltoid-ovate, broadly deltoid-lanceolate or more or less digitately elongated segments; each segment with subacute deltoid teeth, with dense, short (2–3 mm long) spinelike cilia; apical segments acuminate; lower cauline leaves narrowed at base, auriculate, broadly ovate, very unequally, more or less deeply pinnatisect into oblong, toward middle of lamina almost digitately elongated segments, 9–18 cm long, 6.5–8.5 cm wide, occasionally almost undivided; upper leaves small, lanceolate, 1–2 on common peduncles. Capitula globose-ovate, apical, solitary or in clusters of 2–3, 1.3–2.3 cm in dia, on short peduncles. Involucre imbricate, dark purple, scatteredly arachnoid-hairy; outer involucral bracts ovate-lanceolate, tiny ciliate on margins, spinescent; inner bracts linearly-lanceolate, acuminate. Florets red, to 19 mm long; corolla tube narrow, 8 mm long; limb lobed to middle. Achenes yellowish, 4.5 mm long; pappus sordid-white, with inner hairs toothed at tips. Flowering June to July.

Wet, marshy meadows, coniferous forests in logged areas, black alder forests, and along ditches.—*European Part*: Baltic Region, Ladogo-Ilmen, Upper Volga, Upper Dnieper, Middle Dnieper, Volga-Don, Upper Dniester. *General distribution*: Central Europe. Described from Europe. Type in London.

71. **C. erisithales** (Jacq.) Scop. Fl. Carn. ed. 2, II (1772) 125; Koch, Syn. (1837) 395; Schmalh. Fl. II, 105; Fedtsch. and Fler. Fl. Evrop. Ross. 1012.—*C. glutinosum* Lam. Fl. Fr. II (1778) 27; DC. Prodr. VI, 649.—*C. ochroleucum* auct. non All.: DC. in DC. and Lam. Fl. Fr. ed. 3, IV (1805) 115; DC. Prodr. VI, 648.—*Carduus erisithales* Jacq. Enum. Stirp. Vind. (1762) 279.—*Cnicus erisithales* L. Sp. pl. ed. 2 (1763) 1157; Willd. Sp. pl. III, 3, 1679.— **Ic.**: Rchb. Ic. Fl. Germ. XV, tab. 837; Javorka and Csapody, Iconogr. Fl. Hung. 542, fig. 3881; Fiori, Ic. Fl. Ital. ed. 3, 468, No. 3722; Dostal. Květ. CSR, 1671, tab. 553; Hegi, Ill. Fl. VI, 2, 897, fig. 598 and 898, fig. 599. (foto).— **Exs.**: Fl. exs. austr.-hung. No. 1768; Fl. exs. reip. Bohem.-Slov. No. 633.

Perennial. Rhizome cylindrical, nodulose, oblique, with numerous slender fibrous roots; stem ascending, weakly sulcate, yellowish or

reddish-brown, at apex drooping, branched above, branches few, more or less long, less often simple, with tiny articulate hairs below, finely arachnoid hairy and glutinous above, densely leafy up to middle, almost leafless above. Cauline leaves dark green, subglabrous above or with scattered short papillate hairs, somewhat pale green beneath, with flexuous and articulate hairs along veins, with short papillate hairs throughout, oblong or ovate, often pinnately incised almost to base, into 8–12 oblong, acuminate, finely spiny-ciliate segments on each side, with 3–5 parallel veins; basal leaves to 30 cm long, 15 cm wide, narrowed in more or less short, winged petiole; lower cauline leaves with shorter petiole, to 25 cm long, middle leaves sessile, with cordate amplexicaul base, to 12 cm long; upper leaves usually 2 on elongate stem, strongly reduced, 5 cm long, 2.5 cm wide, pinnately parted or only pinnately toothed; apical leaves at base of capitula or inflorescence, linearly lanceolate, spiny-ciliate. Capitula solitary or 2–5 clustered at apices of stem and branches, nodding. Involucre more or less ovate, about 2.5 cm in dia; involucre bracts lanceolate, spinescent, dorsally and along margin scabrous, very tiny appressed-hairy, with dark resinous stripe outside; outer bracts at flowering appressed, all divergent at fruiting; inner bracts linearly lanceolate, with scarious tip, with fine, resinous dark stripe above, finely hairy outside. Florets usually lemon-yellow, occasionally purple, to 18 mm long; limb longer than narrow corolla tube, lobed almost to middle. Achenes 5 mm long; pappus somewhat shorter than florets sordid-white, with fine, rarely plumose hairs with filiform tips. Flowering July to September.

Grows singly or in groups or thickets in thin forests and scrubs, on stony slopes, along forest edges, in ravines, near springs, in mountain meadows and pastures.—*European Part*: Upper Dnieper, Middle Dnieper (left bank), Upper Dniester, Bessarabia. *General distribution*: Central Europe, Western Mediterranean (Maritime Alps), Balkans (northern). Described from Austria. Type in London.

Subsection 4. Cirsium.—Stem ascending, simple or somewhat branched, less leafy above or with almost leafless floriferous branches. Leaves somewhat coriaceous, or thin, glabrous above, finely or arachnoid-hairy beneath, more or less grayish or whitish-tomentose, undivided or unequally pinnately parted, with few lobes. Capitula medium, solitary on leafless floriferous branches, occasionally in small clusters. Involucre subglabrous; involucre bracts purple above. Florets red, very rarely white.

Perennials, widely distributed in boreal region of Northern Hemisphere and in mountainous areas of Eurasia.

Type of subsection: type of genus and section.

165 Series 1. Heterophylla Charadze.—Cauline leaves sessile.

72. **C. heterophyllum** (L.) Hill. Hort. Kew. (1768) 64; Ldb. Fl. Ross. II, 739 p. p.; Schmalh. Fl. II, 104, excl. var.; Fedtsch. and Fler. Fl. Evrop. Ross. 1011; Schischk. in Fl. Zap. Sib. XI, 2891 p. max. p.; Klok. in Vozn. Rosl. URSS, 569; mishkin, Fl. Khibin, 69; Hegi, Ill. Fl. VI, 2, 885.—*C. heterophyllum* α . *helenioides* DC. and β . *incisum* DC. in Duby, Bot. Gall. I (1828) 288.—*C. heterophyllum* α . *indivisum* DC. p. p. and β . *incisum* DC. Prodr. VI (1837) 653; Iljin in Fl. Yugo-Vost. VI, 406; Kryl. Fl. zap. Sib. XI, 2891.—*Carduus heterophyllus* L. Sp. pl. (1753) 824.—*Carduus helenioides* L. Sp. pl. (1753) 825, excl. pl. sibir.—*Cnicus heterophyllus* (L.) Retz. Fl. Scand. Prodr. ed. 2 (1795) 191; Willd. Sp. pl. III, 3, 1673.—*Cnicus helenioides* (L.) Retz. loc. cit.—Ic.: Rchb. Ic. Fl. Germ. XV, tab. 838; Syreistsch. Ill. Fl. Mosk. Gub. III, 301; Javorka and Csapody, Iconogr. Fl. Hung. 542, fig. 3879; Hegi, Ill. Fl. VI, 2, 885, fig. 587, 886, fig. 588.

Perennial. Rhizome thick, oblique, with funiform fibrous roots and long, slender underground branches; stem 50–150 cm high, ascending, sulcate-ribbed, more or less thinly arachnoid-hairy, white-tomentose below capitula, dark purple, simple or with 1–2 branches above, with solitary terminal capitula. Basal leaves 9–12 cm long, 3.5–4.0 cm wide, lanceolate, narrowed into long petiole; cauline leaves green above, glabrous, appressedly grayish-arachnoid-hairy to white-tomentose beneath, entire or finely toothed and spiny-ciliate; lower leaves 10–30 cm long, 4–8 cm wide, ovate or oblong-lanceolate, narrowed to long, winged petiole, acuminate; middle cauline leaves broadly lanceolate, basally slightly lyrate, with broad amplexicaul auricles; all leaves undivided, in var. *indivisum* DC. or var. *incisum* DC. lower leaves unequally pinnately or somewhat palmately incised into oblong segments; upper leaves entire, lanceolate, semiamplexicaul, long-acuminate, to 12 cm long, 3 cm wide; apical leaves lanceolate or linearly lanceolate, small, 1–2 bracteal leaves at base of capitula. Capitula 3.5–5.0 cm in dia, globose-ovate, basally concave, solitary on long peduncles and axillary branches. Involucral bracts imbricate, outer ones oblong-ovate, yellowish-brownish-green, weakly carinate, scabrous on upper margin, spinulescent; inner ones linearly lanceolate, gradually narrowed into purple, scarious tip, curved at base. Florets 25–30 mm long; corolla tube narrow, to 11 mm long; limb lobed to 1/3, purple-red, rarely whitish. Achenes stramineous, 4 mm long; pappus 21 mm long, sordid-white or brownish-white with few hairs. Flowering July to August.

Thin mixed and larch forests, edges and in forest and alpine meadows; usually in forest zone, occasionally in forest-steppe zone.—

European Part: Karelia-Lapland, Dvina-Pechora, Baltic Region, Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper (left bank), Trans-Volga, Lower Volga; *Western Siberia:* Ob Region, Upper Tobol, Irtysh. *General distribution:* Central Europe, Atlantic Europe. Described from western Europe. Type in London.

Note. The variety with deeply incised cauline leaves predominates in the Baltic Region and in the north of the European part of the USSR, and in the other regions both varieties are found; var. *indivisum* DC. noticeably predominates in Western Siberia. *C. heterophyllum* (L.) Hill is replaced in Eastern Siberia, the Altai, and the mountainous regions of Kazakhstan by the closely related species—*C. helenioides* (L.) Hill, which is distinguished by its entire, broad, coarsely toothed leaves, and aggregated, smaller capitula.

The following hybrids have been reported from the European part of the USSR:

1. *C. heterophyllum* (L.) Hill × *C. palustre* (L.) Scop.—*C.* × *wankelii* Reichardt (cf. Iljin in *Fl. Yugo-Vost.* VI, 409) with small, decurrent, pinnately divided leaves, somewhat smaller capitula in clusters of 1–3, and purple florets.

2. *C. oleraceum* (L.) Scop. × *C. heterophyllum* (L.) Hill.—*C. affine* Tausch (see Iljin in *Fl. Yugo-Vost.* VI, 408). Forms that approach *C. heterophyllum* in habit and are distinguished by yellowish florets and broader leaves have been found in the Leningrad Region (Luga, Tikhvinka) and along the northern limit of the range of *C. oleraceum* (Ust-Sysolsk).

73. *C. helenioides* (L.) Hill, Hort. Kew (1768) 64 p. p.—*C. heterophyllum* auct. non Hill: Ldb. *Fl. Ross.* II (1846) 739 p. p. quoad pl. Siber., Alt. and Baikal; Turcz. *Fl. baic.-dahur.* II, 1, 129; Kryl. *Fl. Zap. Sib.* XI, 2891 p. p.—*C. heterophyllum* ssp. *angarensis* M. Pop. *Fl. Sr. Sib.* II (1959) 753.—*C. heterophylloides* Pavl. *Fl. Tsentr. Kazakhst.* III (1938) 313; Botschantzev in *Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XIX (1959) 628.—*Carduus helenioides* L. *Sp. pl.* (1753) 825 p. p. quoad pl. e “Sibiria” excl. syn europ.—*Cnicus helenioides* Willd. *Sp. pl.* III, 3 (1803) 1674.

Perennial. Rhizome large, horizontal, dark brown, with long woody, funiform fibrous root. Stem 40–130 cm high, ascending, simple, leafy, more or less densely crisped-hairy to lanate, usually tomentose below capitula, finely sulcate. Leaves with scattered flexuous hairs above, at places finely floccose-arachnoid-hairy, more or less densely grayish-tomentose beneath, with more or less distinctly raised thin veins, deeply

biserrate-dentate, with recurved, broadly deltoid teeth, tapered into spines to 2 mm long, finely appressed-spinose between teeth; leaves on short branches at base of stem oblong-lanceolate, weakly toothed, 10–20 cm long, 2–4 cm wide, narrowed into petiole almost as long as lamina, spiny-ciliate; lower cauline leaves broadly oblong-ovate to broadly lanceolate, acuminate, lowermost narrowed into winged petiole, others auriculate, semiamplexicaul, 28–35(60) cm long, 6–13(25) cm wide, coarsely toothed; upper leaves up to 12 cm long, 2.5 cm wide, lanceolate, amplexicaul, weakly toothed and finely spiny-ciliate; apical leaves small, linear, spinose on margins. Capitula globose, 1.3–2.2(3) cm in dia, 2–5 at apices of stem, occasionally solitary, on longer peduncles in corymbose common inflorescence. Involucre subglabrous, dark reddish-brown to brown, imbricate; outer bracts lanceolate, glabrous, ciliolate, dark reddish-brown with almost black midrib, puberulent above, spinescent; inner bracts membranous, linearly lanceolate, with scarious, purple cusp. Florets red, to 22 mm long; corolla tube narrow, about 8–10 mm long; limb lobed to more than 1/2. Achenes curved, yellowish, with brown streaks, to 4 mm long; pappus brownish-sordid-white, to 16 mm long, with inner hairs weakly toothed at apices. Flowering July to August.

Mountain herb slopes, river valleys, deciduous forests, forest edges and lake shores.—*Western Siberia*: Altai; *Eastern Siberia*: Angara-Sayans, Dauria; Far East: Zeya-Bureya; *Central Asia*: Lake Balkhash Region. *General distribution*: northern Mongolia. Described from Siberia. Type in London.

Note. In the Sayans this species replaces the boreal Euro-Siberian *C. heterophyllum* (L.) Hill. For *Carduus helenioides* L., Linnaeus cited the following localities: “Anglia, Siberia.” Apparently, Linnaeus used this name for the entire-leaved forms of *C. heterophyllum* (L.) Hill from Siberia. Smith (Smith in *Engl. Bot.* III [1794] 177; X [1799] 675), who studied the specimen of *Carduus helenioides* in the Linnaean Herbarium, notes that specimens matching the type are not found in Europe and, possibly, the name *Cirsium helenioides* should be excluded from the flora of Europe. Later, Airy-Shaw, having combined the European forms that have been treated as *Cirsium heterophyllum* and *Cirsium helenioides*, restored the name *C. helenioides* (L.) Hill as the earliest combination. Following Smith, he notes that the Linnaean Herbarium contains only one specimen, apparently, from Siberia, which is different from *Carduus heterophyllus*, described from Europe. We think that the name *C. helenioides* (L.) Hill sensu stricto should be retained for the Eastern Siberian mountain species, and in *C. heterophyllum* (L.) Hill, distributed in the boreal regions of Europe and Western Siberia, one can recognize the varieties, segregated

already by De Candolle, var. *incisum* DC. and var. *indivisum* DC., which, evidently, do not have any special taxonomic significance.

It is also necessary to treat *C. heterophylloides* Pavl., described from Kazakhstan by N.V. Pavlov as a synonym of *C. helenioides* (L.) Hill s. str. Its characters agree fully with those of the specimen in the Linnaean Herbarium. We were able to verify this while examining the microfilm of the Linnaean Herbarium in the library of the Botanical Institute of the Academy of Sciences of the USSR. Later, M.G. Popov split off from *C. heterophyllum* (L.) Hill, as a subspecies, the plant from Central Siberia, proposing the name ssp. *angarensis* M. Pop for it. The latter should also be referred to *C. helenioides* (L.) Hill. M.G. Popov indicates that typical *C. heterophyllum* (L.) Hill reaches the Yenisei River in the east and on the south side of the Western Sayans, it is replaced eastward by a separate subspecies. The boundaries of both species in the USSR still need to be worked out.

74. *C. dealbatum* MB. Fl. taur.-cauc. III (1819) 560; C.A.M. verzeichn. 70; DC. Prodr. VI, 653; Ldb. Fl. Ross. II, 740; Boiss. Fl. or. III, 539; Petrak in Tr. Tifl. Bot. Sada, XII, 1, 28; in Izv. Kavk. Muz. VIII, 1-2, 63; Grossh. Fl. Kavk. IV, 186.—*C. heterophyllum* var. *dealbatum* Schmalh. Fl. II (1897) 104.—*C. heterophyllum* β . *dealbatum* Lipsky, Fl. Kavk. (1899) 358.

Perennial. Stem ascending, hard, 70–100 cm high, weakly ribbed and sulcate, brownish-purple, more or less densely floccose-arachnoid-hairy, with large leaves in lower part, usually in upper part with 1–5 elongate, almost leafless branches bearing solitary capitula. Cauline leaves sessile, amplexicaul, middle ones 25–28 cm long; 7.5–9.5 cm wide, broadly ovate, abruptly narrowed from middle into lanceolate, long-acuminate tip, with almost lanceolate point, green above, with scattered arachnoid hairs, at places floccose, more or less densely grayish- or whitish-tomentose beneath, undivided, unequally small-toothed, finely spiny-ciliate, teeth tapered to spines 2 mm long. upper cauline leaves at base of peduncles reduced, auriculate, gradually narrowed above, 9–12 cm long, 3.5–4.5 cm wide; apical leaves (1–2) 40 mm long. Capitula globose-ovate, erect, solitary, 2.5–3.5 cm in dia, with slightly concave base. Involucre dark brown to purple, sparsely arachnoid-hairy, more or less compactly imbricate; outer bracts membranous, ovate-lanceolate, greenish-yellow below, blackish-purple above, tapered to scarcely, noticeable spine, entire below, very finely fimbriate above, about 7 mm long, gradually longer toward inner bracts; inner bracts oblong-lanceolate to linearly-lanceolate, weakly broadened above, transitional to scarious, purple, acuminate, deflexed tips.

169 Florets purple-red, 22–25 mm long; corolla tube 11–12 mm long; limb

lobed to 1/3. Achenes yellowish, to 4 mm long; pappus sordid-white, 19 mm long, with few hairs, inner hairs with slightly longer toothed tips. Flowering July to August.

Moist places, among forests, from mid-montane to subalpine zone.—*Caucasus*: Ciscaucasia (basin of Kuban River and vicinity of Kislovodsk). Endemic. Described from Kislovodsk. Type in Leningrad.

Note. It differs from *C. heterophyllum* (L.) Hill by having broader, always entire cauline leaves, abruptly narrowed from the middle, and strongly elongate, leafless flowering branches bearing larger solitary capitula. It differs from the central Siberian species *C. helenioides* (L.) Hill by having well spaced, larger capitula and acuminate cauline leaves. Moreover, for *C. dealbatum* MB. outer and inner involucre bracts that are somewhat broadened above are characteristic.

Series 2. Cana Charadze.—Cauline leaves auriculate, more or less decurrent.

75. **C. canum** (L.) All. Fl. Pedem. I (1785) 151; Moench, Meth. 556; MB. Fl. taur.-cauc. III, 556 p. p. excl. pl. cauc.; Ldb. Fl. Ross. II, 741 p. p.; Schmalh. Fl. II, 103; Fedtsch. and Fler. Fl. Evrop. Ross. 1011; Schischk. in Fl. Zap. Sib. XI, 2888; Klok. in Vizn. Rosl. URSR, 569; Hegi, Ill. Fl. VI, 2, 883.—*Carduus canus* L. Mant. pl. (1767) 105; L. Syst. veg. ed. 10 (1784) 25; 1 Jacq. Fl. Austr. I, 27.—*Cnicus canus* Willd. Sp. pl. III, 3 (1803) 1664; MB. Fl. taur.-cauc. II, 274 p. p.—**lc.**: Jacq. Fl. Austr. I (1773) 27, tab. 82 and 83; Rchb. Ic. Fl. Germ. XV, tab. 828; Javorka and Csapody, Iconogr. Fl. Hung. 541, fig. 3877; Dostal, Květ. ČSR, 1663, tab. 549, 3; Hegi, Ill. Fl. VI, 2, 884, fig. 586.—**Exs.**: Petrak, Cirsioth. Univ. No. 35.

Perennial. Rhizome short, vertical, with fusiform, thick, long roots from near root neck. Stem to 120 cm high, erect, weakly branched, deeply sulcate, purple in lower part, scatteredly arachnoid-hairy at base of capitula almost tomentose, more leafy in lower part with large, short-decurrent leaves, distant, gradually reducing leaves in upper part; basal leaves oblong-lanceolate, with winged petiole, 25–40 cm long, 4–7 cm wide long-acuminate, on both sides finely arachnoid-hairy or floccose, undivided, occasionally pinnately divided, more or less bicristate-toothed, densely setose, with thin, long and short spiny bristles; lower cauline leaves lanceolate and oblong-lanceolate, 18–20 cm long, 3–5 cm wide, approximate, with broad and short petiole narrowing downward decurrent on stem; middle cauline leaves reduced above, from 7–8 to 4 cm long, elongate to linearly-lanceolate, sessile, with slightly decurrent roundish auricles; all cauline leaves usually undivided or pinnate, subglabrous or thinly arachnoid-hairy, densely

spiny-setose; apical leaves on elongate peduncles, undivided, linear, arachnoid-hairy, with occasional cilia on margins, at base of capitula 0.5–1.0 cm long. Capitula solitary or 2–3 at apices of stem and axillary branches, (1.5) 2–2.5(3) cm in dia, at end of flowering wide open, somewhat nodding. Involucral bracts small, imbricate, outer from ovate-oblong to ovate-lanceolate, tapered into short, purple spines 1.0–1.5 mm long, with dark purple band above, scatteredly arachnoid-hairy on margin, inner ones glabrous, lustrous, purple above, narrowed to slightly scarios, acuminate cusp. Florets red, to 20 mm long; corolla tube to 11 mm long; limb 5-parted to middle. Achenes lustrous, stramineous, 3.5–4.0 mm long, 1.5 mm wide, with narrow edge and conical tubercle; pappus to 14 mm long, sordid-white, with thin, sparsely plumose hairs, inner hairs apically scabrous. Flowering July to August.

Steppe and forest-steppe zones, in alkaline and wet meadows.—*European Part*: Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga, Upper Dniester, Bessarabia, Black Sea Region, Lower Don; *Western Siberia*: Upper Tobol, Irtysh. *General distribution*: Scandinavia (southern Norway), Central Europe, Mediterranean Region (western), Balkans. Described from Austria. Type in London.

Note. This species has not been studied adequately. The form with entire, or more rarely, pinnately incised cauline leaves, more common in Western Europe, predominates in the European Part of the USSR.

The hybrid *C. oleraceum* (L.) Scop. × *C. canum* (L.) All.—*C. tataricum* auct. Iljin in *Fl. Yugo-Vost.* VI (1936) 408—has been reported.

In habit it resembles *C. canum*, differing from it by having yellowish florets and clustered capitula (specimens from Kursk Region and Buguruslan District in Trans-Volga); given reddish florets and the form of the cauline leaves it is closer to *C. canum* (specimen from Ulyanovsk).

76. *C. biebersteinii* Charadze in *Fl. Azerb.* VIII (1916) 409, descr. ross.; in *Zam. po Sist. i Georg. Rast.* Tbil. 23 (1963) 112, diagn.—*C. canum* MB. *Fl. taur.-cauc.* III (1819) 556 p. p.; DC. *Prodr.* VI, 644; Ldb. *Fl. Ross.* II, 741 p. p.; Boiss. *Fl. or.* III, 541 p. p.; Grossh. *Fl. Kavk.* IV, 187, non All.—*Cnicus canus* MB. *Fl. taur.-cauc.* II (1808) 274 p. p. non Willd.

Perennial. Rhizome short, with fascicle of thick fusiform roots; stems ascending, 50–100 cm high, thick, deeply sulcate, floccose, white-tomentose-arachnoid, simple [or] branched above, with 3–4(6) long flowering branches. Leaves very large, crowded in lower part of stem, gradually reduced toward stem apex, on both sides more or less grayish, at places floccose-arachnoid-hairy; basal and lower cauline leaves

broadly-obovate or broadly elliptical, short acuminate, narrowed in more or less short winged petiole, deltoid-sinate-toothed, finely spiny-setose, spines on teeth to 4 mm long; basal leaves to 40 cm long and 10 cm wide; lower cauline leaves 18–25 cm long, 8–10 cm wide, middle ones broadly lanceolate, to 15 cm long and 4 cm wide, with short, usually unequal, basally obtuse, rounded, short-decurrent auricles. Capitula solitary, terminal on stem and axillary branches, latter on strongly elongate peduncles often projected above stem apex, forming depauperate corymbose-paniculate inflorescence; peduncles below capitula tomentose, more or less projected above leaves, after flowering weakly falcately recurved. Involucre 2–2.5 cm in dia; involucre bracts imbricate, ovate-lanceolate to oblong-lanceolate, 5–7 mm long, coriaceous, yellowish-green, with broad dark-purple band above, sparsely arachnoid-hairy, gradually narrowed and weakly recurved, spinulescent; inner bracts oblong-lanceolate, membranous, with lanceolate, usually purple deflexed tip. Florets to 23 mm long; corolla tube 12 mm long; limb lobed to 1/2 into unequal linear lobes. Achenes stramineous, 4 mm long; pappus sordid-white, with occasional, sparsely plumose hairs, inner hairs short-plumose with weakly toothed tip. Flowering August to September.

Lower to middle-montane zone, along irrigation ditches, in flood-plain forests, scrubs.—*Caucasus*: Ciscaucasia Dagestan, Southern Transcaucasia. *General distribution*: Armenia and Kurdistan. Described from Ciscaucasia. Type in Leningrad.

Note. *C. biebersteini* Charadze replaces *C. canum* (L.) All. in the regions of Eastern and Central Ciscaucasia, and also in Southern Transcaucasia, differing from the latter by broader, more coarsely toothed lower leaves, densely grayish-arachnoid-hairy on both sides, and by narrower involucre bracts.

77. ***C. pannonicum*** (L. fil.) Link Enum. pl. II (1822) 299; DC. Prodr. VI, 645; Ldb. Fl. Ross. II, 741; Fedtsch. and Fler Fl. Evrop. Ross. 1011; Klok. in Vozn. Rosl. URSR, 568; Hegi, Ill. Fl. VI, 2, 881.—*C. canum* γ . *pannonicum* Schmalh. Fl. II (1879) 104.—*Carduus pannonicus* L. fill. Suppl. (1781) 348; Willd. Sp. pl. III, 3, 1658.—**lc.**: Jacq. Fl. Austr. II (1774) tab. 127; Rchb. Ic. Fl. Germ. XV (1852) tab. 829; Syreistsch. Ill. Fl. Mosk. (1910) 303; Javorka and Csapody, Iconogr. Fl. Hung. (1933) 541, fig. 3878; Hegi Ill. Fl. VI (1929) 882, fig. 584.—**Exs.**: Fl. exs. austro-hung. No. 212; Fl. exs. reip. Bohem.—Slov. No. 966; Fl. Ital. exs. No. 692; Petrak, Cirsioth. Univ. No. 15; GRF No. 1071.

172 Perennial. Rhizome horizontal, basally with fibrous remnants of old leaves. Stem to 110 cm high, ascending, ribbed, finely arachnoid-

hairy, at places floccose, usually stramineous or greenish, below densely and above sparsely leafy, with long, glabrous peduncles, weakly branched, bearing 1–3 terminal capitula. Leaves oblong-lanceolate or lanceolate-oblong, densely pubescent above, at base hairs tuberculate, flexuous, more or less finely grayish arachnoid-hairy beneath, densely spinose-setose from long, thin, and shorter bristles. Basal leaves entire or toothed, narrowed into short-winged petiole, 13–17 cm long, 3–3.3 cm wide; lower cauline leaves oblong, to 25 cm long, 4.5 cm wide, basally narrowed, short-decurrent with narrow wing, subacute; middle cauline leaves reduced, linearly-lanceolate, usually to 7 cm long, short-decurrent with broad wing; peduncles considerably projected above leaves. Capitula solitary, terminal on stem and 2–3 axillary branches, erect, at end of flowering slightly nodding, 1.5–2.2 cm in dia. Involucre imbricate, scatteredly arachnoid-hairy; outer bracts small, to 3 mm long, gradually longer inward, ovate-lanceolate to oblong-lanceolate, glabrous and lustrous beneath, with blackish-purple band above, spinescent, dorsally bulged, with scattered crisped or arachnoid hairs; inner bracts linearly-lanceolate, with scarious tip, dorsally with thin dark band. Corolla purple-red, 19–22 mm long with narrow tube. 7–9 mm long. Achenes stramineous, with sharp edge and conical tubercle at tip, obliquely truncate, curved; pappus yellowish-whitish with few scabrous inner hairs at apex. Flowering July to August.

Scrubs and forest slopes.—*European Part*: Upper Volga, Middle Dnieper, Volga-Don. *General distribution*: Central Europe, Western Mediterranean Region, Balkans (north). Described from Western Europe. Type in London.

Note. It differs from *C. canum* (L.) All. with which it is often confused, by its narrower and smaller leaves, pubescence, long leafless peduncles, and smaller involucre bracts. A hybrid has been reported from the Tambov and Voronezh regions.—*C. heterophyllum* (L.) Hill × *C. pannonicum* (L. fil.) Link.

Subsection 5. Spanioptilon (Less.) Kitam. in Acta Phytot. et Geobot. III, 1 (1934) 10; Less. Syn. Comp. (1832) 10, pro gen.; DC. Prodr. VI, 621, pro gen.—Sect. *Onotrophe* DC. Prodr. VI (1837) 644 p. min. p.—Subsect. *Borealicola* Kitam. op. cit. 7, p. min. p.—Capitula medium-sized, distant from or approximated to apical leaves; involucre bracts imbricate, usually spinescent, entire, in upper part sometimes membranous and erosely toothed. Corolla tube narrow, almost as long as limb. Perennials with simple or weakly branched stem, not winged, occasionally narrow winged below and usually undivided or somewhat lobate narrow leaves; basal leaves like cauline, usually withering early or persistent.

Type of subsection: *C. lineare* (Thunb.) Sch. Bip.

The species of the subsection are distributed in Eastern Asia, including the Japanese islands, Siberia, and Mongolia. We are broadening the circumscription of this subsection somewhat, by including in it species of the *C. serratuloides* (L.) Hill alliance.

Series 1. Vlassoviana Charadze.—Leaves sessile, grayish-arachnoid-hairy; basal leaves withering early; apical leaves few, narrow, at base of capitula.

78. *C. vlassovianum* Fisch. in DC. Prodr. VI (1837) 653; Ldb. Fl. Ross. II, 741; Maxim. Prim. fl. amur. 175; Kom. Fl. Man'chzh. III, 753; Nakai in Tokyo Bot. Mag. XXVI, 372; Kom. and Alis. Opred. Rast. Dal'nevost. Kr. II, 1085; Kitam. Comp. Japon. I, 87 p. p.; Popov, Fl. Sr. Sib. II, 754.—*C. vlassovianum* α . *genuinum* Herder in Bull. Soc. Nat. Mosc. XLIII, 1 (1870) 8.—*C. vlassovianum* β . *bracteatum* Ldb. Fl. Ross. II (1846) 741; Herder, op. cit. 9; Nakai in Tokyo Bot. Mag. XXVI, 372.—*C. vlassovianum* γ . *laciniatum* Herder, op. cit. 9.—*Cnicus vlassovianus* (Fisch.) Maxim. in Bull. Acad. Sc. Pétersb. XIX (1874) 509 and in Mém. Biol. IX, 329.

Perennial. Rhizome thick, with few, more or less slender, fibrous roots. Stem dark reddish-brown, purple, or greenish, basally covered with remnants of old basal leaves, simple or weakly branched only above, 60–100 cm high, sulcate, more or less scatteredly crisped-hairy, with whitish articulate hairs. Basal and lower cauline leaves lanceolate, 8–20 cm long, 2.8–3 cm wide, narrowed into short petiole, apically attenuated, green above with scattered crisped appressed hairs, weakly scabrous, grayish-arachnoid-hairy to grayish-tomentose beneath, serrulate-dentate, spinous-setose with erect, long and short spines; cauline leaves gradually reduced toward stem apex, 2–9 cm long, sessile; middle ones lanceolately narrowed from more or less broad, almost amplexicaul base; apical leaves lanceolate, few at base of capitula, as long as capitula or shorter. Capitula solitary, terminal on stem and short axillary branches, usually 1.8–2.5 cm in dia. Involucre weakly arachnoid-hairy; outer bracts imbricate, lanceolate, from outer (to 7 cm long) to inner gradually longer, dark green, lustrous, dark purple above, somewhat deflexed, more or less strongly spinescent; inner bracts linearly lanceolate, membranous, with scarious long point. Florets purple, to 20 mm long; corolla tube to 9 mm long; limb lobed to middle. Achenes slightly compressed, to 3.5 mm long, with long narrow tubercle at apex, stramineous, with scattered purple bands; pappus with few bristles to 15 mm long, inner hairs apically toothed. Flowering July to August.

Meadows, glades, forest edges, mainly on sandy soils.—*Eastern*

Siberia: Dauria; *Far East*: Zeya-Bureya, Ussuri. *General distribution*: Mongolia, northern China, Korean Peninsula. Described from Dauria. Type in Geneva.

Note. The Siberian specimens are marked by narrower, entire leaves. Var. β . *bracteatum* Ldb., described by Ledebour, is characterized by having the apical leaves surrounding the capitula and surpassing them. In this character, it approaches *C. coryletorum* Kom. Herder (l. c.) recognizes the following forms for *C. vlassovianum*: *genuinum* Herd., *bracteatum* Ldb., and *laciniatum* Herd., evidently without taxonomic significance.

79. *C. coryletorum* Kom. in *Izv. Glavn. Bot. Sada*, XVI (1916) 179; Kom. and Alis. *Opred. Rast. Dal'nevost. Kr. II*, 1085.—*C. vlassovianum* Kitam. *Comp. Japon. I* (1937) 87 p. p. non Fisch.

Perennial. Rhizome short, with thick, woody, fibrous roots. Stem 50–100 cm high, usually branched from middle, with distant and arcuate-branches, sulcate, weakly ribbed, often purple on ribs, densely leafy, scatteredly hairy or glabrous. Leaves oblong-lanceolate, narrowed from broad base, almost deltoid-lanceolately pointed above; lower cauline leaves sessile, acuminate, unequally toothed, oblong-lanceolate, to 20 cm long, 5 cm wide; middle cauline leaves sessile, 4(8.5)–10 cm long, (1)2.5–3.5 cm wide, with obtuse, semiamplexicaul auricles; all leaves sharply sinuately toothed, teeth bearing short, hard, apical spine; lamina finely spinose with appressed, squarrose, spines, glabrous and dull green above, more or less finely arachnoid-hairy, almost grayish-tomentose beneath; leaves on flowering branches usually smaller, upper of them lanceolate, to 2.5 cm long, 0.7 cm wide, almost reaching base of capitula. Capitula solitary, terminal on stem and branches, in corymbose-paniculate common inflorescence. Involucre (1.5)2–3 cm in dia, weakly grayish-arachnoid-hairy, with basal, unequal, 6–20, linearly lanceolate or linear involucre bracts, usually surpassing capitulum or almost as long; outer bracts firmly appressed, shorter than or almost as long as inner ones, lanceolately-linear, very slightly broadened above, very weakly spinescent, dorsally arachnoid-hairy; inner bracts membranous, lustrous, with purple acute scarious point. Corolla to 17 cm long; corolla tube to 7 mm long; limb deeply 5-parted to middle. Florets whitish, usually with purple staminal tube. Achenes stramineous, apically with long, thin tubercle up to 4 mm long; pappus yellowish-brown, to 19–20 mm long, with apically long-plumose inner hairs. Flowering August to September. (Plate VII, Fig. 2.)

On hummocks in scrubs, in forest meadows, usually in filbert thickets, occasionally in old fields.—*Far East*: Ussuri. Endemic. Described from region of Gulf of America. Type and paratype in Leningrad.



1, 2—*Cirsium glabrifolium* (Winkl.) O. and B. Fedtsch. 3—*C. sieversii* (Fisch. and Mey.) Petrak.

Note. A very distinct species, which approaches *C. vlassovianum* Fisch. but is well distinguished from it by the color of the corolla, form of the larger cauline leaves and the small leaves on the inflorescence branches, as well as by the long apical leaves closely subtending the capitulum like an involucre. The few later collections of this species also are from the Pacific Coastal Region (Olga Bay, Posjet Bay and others). Kitamura (l. c.) includes this species as a synonym of *C. vlassovianum* Fisch. to which it undoubtedly is very close, but from which it is well distinguished by the characters indicated.

Series 2. Asiatica Charadze.—Subsect. *Borealicola* ser. *Erecta* Kitam. in Acta Phytot. et Geobot. III, 1 (1934) 10 p. p.—Plants subglabrous with more or less decurrent lower cauline leaves.

80. *C. serratuloides* (L.) Hill, Hort. Kew. (1768) 64 p. p. non Scop. (1772); Ldb. Fl. alt. IV, 7; DC. Prodr. VI, 652; Ldb. Fl. Ross. II, 742; Kryl. Fl. Alt. III, 693.—*C. asiaticum* Schischk. in Fl. Zap. Sib. XI (1949) 2890; Grubov, Konsp. Fl. Mong. No. 1781; Popov, Fl. Sr. Sib. II, 753.—*Carduus serratuloides* L. Sp. pl. (1753) 825, excl. syn. europ.—*Cnicus serratuloides* Roth. Tent. Fl. Germ. I (1788) 346 p. p.; Willd. Sp. pl. III, 3, 1674, excl. syn. europ.—**lc.**: Gmel. Fl. sibirica, II (1749) tab. 23, fig. 1; Ldb. Ic. pl. Fl. Ross. IV, tab. 375.—**Exs.**: Petrak, Cirsioth. Univ. No. 100.

Perennial. Rhizome thick, covered with numerous fibrous roots. Stem ribbed, with scattered flexuous hairs or subglabrous, to 1 m high, simple or branched above, brownish-purple, leafy to tip. Cauline leaves lanceolate, long, lower ones semiamplexicaul, somewhat decurrent, middle ones sessile, gradually reduced toward stem apex, cordate, semiamplexicaul, short-acuminate, usually undivided, occasionally toothed, tiny spiny-setose, green and usually glabrous above, occasionally with scattered flexuous hairs, somewhat glaucous beneath, glabrous or on veins arachnoid-hairy, 5–14 cm long, 1–3 cm wide. 177 Capitula solitary, terminal on stem and long, sparsely leafy branches, few, 2–3.5 cm in dia. Involucre weakly arachnoid-hairy or glabrous; involucre bracts lanceolate, attenuate into short, slightly deflected spine, dark green above with purple band, sparsely arachnoid-hairy; inner bracts linearly lanceolate, acuminate into scarious, colored tip. Corolla lilac-purple, 22–23 mm long; corolla tube 12 mm long; limb lobed to middle. Achenes reddish-brown, to 3.5–4 mm long; pappus silvery-white, 16 mm long, inner hairs with somewhat pointed tips. Flowering July to August.

Thin coniferous, mixed, and deciduous forests, forest edges, river banks, tall herb meadows. In mountains it reaches to lower belt of

alpine zone.—*Western Siberia*: Ob Region, Upper Tobol, Irtysh, Altai; *Eastern Siberia*: Yenisei, Lena-Kolyma, Angara-Sayans, Dauria; *Far East*: Zeya-Bureya. *General distribution*: Mongolia. Described from Siberia. Type in London.

Note. We refer *C. serratuloides* (L.) Hill to the subsection *Spanioptilon*, bringing this species close, on the one hand, to the eastern Asiatic *C. vlassovianum* in the leaf form and, to some extent, the pubescence of flexuous hairs, which are weakly developed in this species. On the other hand, *C. serratuloides* is related to *C. komarovii* through *C. schischkinii*. The latter species shows some resemblance to *C. mongolicum*, sharply differing from it in leaf form and more winged stems. In *C. serratuloides* variability is manifest in the form of the leaves and the pubescence. Plants from the Yenisei region have entire leaves and larger capitula. In Eastern Siberia, there are forms with toothed and longer spiny leaf margins; in the nature of pubescence they approach *C. vlassovianum*.

Some of them may be considered hybrids between *C. serratuloides* and *C. vlassovianum*.

M.G. Popov (*Fl. Sr. Sib.* II, 759) describes the hybrid *C. serratuloides* × *C. heterophyllum* from the Kuta River with the following characters: leaves, on the average, 10–20 cm long, 5 cm wide, grayish-tomentose beneath, spinose-ciliate, amplexicaul. Capitula solitary.

81. *C. schischkinii* serg. in *Sistemat. Zam. Gerb. Tomsk. Univ.* 2 (1941) 5; Schishk. in *Fl. Zap. Sib.* XI, 2899.—*C. komarovii* Schischk. in *Fl. Zap. Sib.* XI (1949) 2899 p. min. p.

Perennial. Stem 35–80 cm high, branched above, weakly ribbed, with scattered, articulate and flexuous hairs; densely leafy. Leaves oblong or linearly-lanceolate, glabrous above, weakly arachnoid-hairy on midrib, glabrous or scatteredly arachnoid-hairy beneath, with squarrose glandular hairs; middle cauline leaves 14–17 cm long, 2–3 cm wide, shallowly sinuately-pinnately lobed, basally narrowed, with narrow short-decurrent wing, apically attenuated, acuminate; leaf lobes broadly deltoid, distant, sinuate-toothed, teeth strongly tapered to hard, yellowish spines 2–4 mm long, finely spinose-ciliate; upper leaves reduced, lanceolate, sessile, with short wing weakly decurrent, more or less long attenuate, 3.5–8.0 cm long, 0.5–1.5 cm wide; apical leaves reaching base of capitula or distant. Capitula solitary, terminal on stem, or 3–4 on long leafy branches, in corymbose-paniculate general inflorescence, projected above apical leaves. Involucre 2–3.5 cm in dia, weakly arachnoid-hairy; involucre bracts gradually elongated from outer to inner, subglabrous, weakly arachnoid-hairy on margin; outer bracts basally pale yellow, dark green above, 7–12 mm long, long

acuminate into short, weakly deflected spine; middle bracts broadly ovate-lanceolate, purple above, attenuate into short spine, inner ones linear-lanceolate, with purple scarious tip. Corolla dark pink, to 22 mm long; limb lobed to 1/3. Achenes yellowish, 3.5–4 mm long, apically with long tubercle; pappus sordid-white, 18–19 mm long, inner hairs with slightly longer thickened tips. Flowering August.

River valleys in wet meadows.—*Western Siberia*: Altai; *Eastern Siberia*: Angara-Sayans. Endemic. Described from Chulyshman Valley and also from southern slope of Lake Teletskoe. Type in Tomsk; paratype in Leningrad.

Note. It is distinguished from *C. serratuloides* (L.) Hill by its pinnately incised, long-spinescent leaves, and from *C. komarovii* Schischk. by the less winged stem and oblong leaf lobes. The plants collected near the confluence of the Chedygem and Argut rivers and identified by B.K. Schischkin as *C. komarovii* Schischk., apparently are close to *C. schischkinii* Serg. Pubescent plants of this species are reported by L. Sergievskaya as *C. schischkinii* var. *villosum* Serg. (Khemchik River Valley in Tuva Province).

82. *C. komarovii* Schischk. in Bot. Zhurn. SSSR, XXIV, 5–6 (1939) 420 p. max. p.; in Fl. Zap. Sib. XI (1949) 2899 p. max. p.—**Ic.:** Schischk. op. cit. (1939) 421.

Perennial. Rhizome horizontal, thick, nodulose, with funiform, fibrous roots. Stems basally covered with blackish-brown remnants of early-withering basal leaves, ascending, 50–100 cm high, simple or with 2–3 short branches in upper part, densely leafy, more or less scatteredly arachnoid-hairy, especially in lower part, winged from decurrent leaves, wings narrow, almost undivided, toothed, with thin and long-spinescent teeth; cauline leaves broadly linear or linearly lanceolate, repandly and retusely pinnately toothed, finely spinose-ciliate, teeth strongly tapered into hard, yellowish spines, 3–5 mm long, with scattered flexuous hairs above, more or less thinly arachnoid-hairy beneath; middle cauline leaves usually 10–12 cm long, 1–1.5 cm wide, subacute, with more or less long wings decurrent on internodes, leaves gradually reduced toward stem tip, short decurrent, to 5 cm long, narrowly-lanceolate; apical leaf approximate to base of capitula. Capitula solitary, terminal on stem and few axillary branches, short-pedunculate, somewhat projected above subtending leaves, 1.5–2 cm in dia, weakly arachnoid-hairy. Involucral bracts ovate-lanceolate, dark green, sparsely arachnoid-hairy along margin, strongly spinescent, inner ones linear-lanceolate, dark purple above, with scarious, weakly elongate tip. Corolla lilac-purple, to 22 mm long; corolla tube to 10 mm long; limb lobed to 1/3. Achenes unknown; pappus sordid-white,

to 17 mm long, inner hairs with long, scabrous, slightly thickened tips. Flowering July to August.

Stony slopes and screes, reaching to subalpine zone.—*Western Siberia*: Altai (basin of Argut River, Kukurei and Karakem river valleys, Narym Range, Bukhtarma). Endemic. Described from Argut River. Type in Leningrad.

Note. B.K. Schischkin allies *C. komarovii* Schischk. with *C. mongolicum* Petrak, from which it differs by having entire, weakly pubescent leaves. Specimens from the Argut River collected near the Chedygem estuary are barely distinguishable from *C. schischkinii* Serg. and are referred by me to the latter.

Subsection 6. Borealicola Kitam. in Acta Phytot. et Geobot. III, 1 (1934) 7; Comp. Japon. I (1937) 41.—Rhizome with numerous scales. Basal leaves persisting after flowering, as long as middle cauline leaves or shorter; only middle cauline or all leaves decurrent. Capitula solitary, nodding. Involucral bracts long, outer somewhat shorter than inner, more or less deflexed, with short cusp, entire, or bracts imbricate, small, acute.

The members of the subsection *Borealicola* are distributed in Sakhalin, Kamchatka, Hokkaido Island, and the Aleutian Islands. One species—*C. palustre* (L.) Scop.—is distributed in the boreal region of Eurasia.

Type of subsection: *C. kamtschaticum* Ldb.

Series 1. Nutantia Kitam. in Acta Phytot. et Geobot. III, 1 (1934) 7; Comp. Japon. I (1937) 41.—Capitula nodding, on long peduncles.

83. **C. kamtschaticum** Ldb. ex DC. Prodr. VI (1837) 644; Ldb. Fl. Ross. II, 736; Nakai in Tokyo Bot. Mag. XXVI, 360; Hultén, Fl. Kamtsch. III, 214; Kom. Fl. Kamch. III, 182; Kitam. Comp. Japon. I, 42 p. p.; Hultén, Fl. Aleut. Isl. 334; Vasiliev, Fl. i Pal. Komand. Ostr. 193.—*C. kamtschaticum* a. *genuinum* Herder in Bull. Soc. Nat. Mosc. XLIII, 1 (1870) 84.—*Cnicus kamtschaticus* a. *genuinus* Maxim. in Bull. Acad. Sc. Pétersb. XIX, (1874) 495 and in Mél. Biol. IX, 310.—*C. kamtschaticum* var. *alata* Trautv. in Tr. Peterb. Bot. Sada, IX, 2 (1886) 478.—**lc.**: Matsumura, Shokubutsumei, No. 883; Gmel. Fl. sibirica, II, tab. 24.

Perennial. Rhizome short, woody. Stem more or less sulcate, finely arachnoid-hairy, almost tomentose above, usually few-branched with 1–2 short branches in leaf axils, 50–200 cm high, leafy to tip. Leaves broadly ovate or ovate-lanceolate, subglabrous above, with more or less scattered, simple hairs, weakly arachnoid-hairy beneath, on veins,

venation prominent, coarsely pinnately-toothed to pinnately lobed, with tiny appressed spines on margin, toothed with tiny, erect spines; basal and lower cauline leaves 23–25 cm long, petiolate, including petiole 35 cm long and to 13 cm wide; pinnately incised to deeper than middle into antrorse, large, ovate, weakly toothed lobes, 4–5 on each side, basally narrowed into winged or long spiny-toothed petiole to 20 cm long, short-decurrent; middle cauline leaves basally narrowed, somewhat decurrent, with more or less auriculate or long and broad wings, 15–18(38) cm long, (7)10–13(26) cm wide, pinnately divided to less than 1/2 into ovate lobes, 7 on each side; upper leaves reduced, semiamplexicaul, shallowly pinnately toothed or almost undivided, glabrous or finely arachnoid-hairy; apical leaves 1–2, almost as long as capitula or somewhat longer, usually broadly lanceolate. Capitula solitary or 2–3, terminal on stem and long axillary branches, nodding at end of flowering, on tomentose, slightly drooping peduncles. Involucre more or less floccose-arachnoid-hairy, 1.5–2.5 cm in dia, at fruiting expanding to 5 cm, wide open; involucre bracts linear above, slightly deflected, finely spinescent, beneath finely, above weakly arachnoid-hairy, outer ones shorter than inner, about 17 mm long, middle ones usually brownish-reddish-brown or dark purple. Florets dark violet, rapidly turning brown, usually with white staminal tubes to 18 mm long; corolla tube 7 mm long; limb long, lobed to 2/3. Achenes reddish-brown, weakly triquetrous, with thin apical tubercle, to 5 mm long; pappus to 15 mm long, brownish to reddish-brown, inner hairs apically long-scabrous, weakly papillate. Flowering July to September.

Alpine shrub belt, birch forests, coastal meadows, as component of tall-herb community.—*Far East*: Okhotsk, Kamchatka (and Commander Islands), Sakhalin (and Kuril Islands). *General distribution*: Beringia (Aleutian Islands). Described from Kamchatka. Type in Leningrad.

Note. The species has been understood broadly. It has included *C. weyrichii* Maxim. as a variety. Vassiliev refers this species to the 181 Okhotsk-Kamchatka type of distribution area, considering it to be in the group of forest species. Evidently it is variable in the winged nature of the stem. Vassiliev reported var. *alatum* Trautv. for the Commander Islands.

A white corolla has been reported for *C. kamschaticum* Ldb. ex DC., V.L. Komarov (1930) reports for Kamchatka a dark purple corolla in this species, in contrast to the pure white staminal tubes that apparently impart a whitish cast to the florets in the capitulum.

84. *C. weyrichii* Maxim. Prim. fl. amur. (1859) 174; Makino in Tokyo Bot. Mag. XVIII, 299; Nakai in Tokyo Bot. Mag. XXVI, 361.—

C. kamtschaticum Kitam. Comp. Japon. I (1937) 41 p. p. non Ldb.—*C. kamtschaticum* β . *weyrichii* Herder in Bull. Soc. Nat. Mosc. XLIII, 1 (1870) 84.—*Cnicus weyrichii* Maxim. in Bull. Acad. Sc. Pétersb. XIX (1874) 495 and in Mém. Biol. IX, 310.—**lc.**: Tolmatchev. O. Fl. o. Sakhalina (1959) 56, Fig. 32.

Perennial. Rhizome thick, with brownish scales and long, ligneous, fibrous roots. Stem 1–2 m high, hard, ascending, somewhat flexuous above, sulcate, purple, more or less sparsely hairy, leafy. Basal leaves sparsely crisped-hairy above, thinly arachnoid-hairy beneath, grayish-green; lower cauline leaves to 35 cm long, 18 cm wide, deeply sinuate to pinnately incised into elongate, broadly-lanceolate segments, remotely spinose-serrate-dentate, narrowed into short auriculate, spiny-ciliate petiole, decurrent as narrow wings; middle cauline leaves to 25 cm long, cordately narrowed below, pinnately incised to middle into oblong-lanceolate, acuminate segments, usually 4 on each side; upper ones oblong-lanceolate, narrowed below and incised or almost undivided, long-acuminate, subsessile; all leaves very finely appressed-spiny-ciliate, at apices of teeth and segments with spines 3 m long. Capitula 2–3.5 cm in dia, solitary, terminal at tips of stem and long branches, usually on tomentose peduncles, in paniculate-corymbose general inflorescence. Outer involucral bracts linearly narrowed from broad base, brown imbricate, scarcely arachnoid-hairy, outer and middle ones with narrowly filiform tip, short-spinescent, almost as long as inner; inner bracts linearly-lanceolate, narrowed into scarious tip. Corolla dark purple, 17–21 mm long; corolla tube to 7.5 mm long; limb 5-parted to 1/3. Achenes dark reddish-brown, 3.5–4.0 mm long, compressed, weakly triquetrous, basally narrowed, apically slightly obliquely truncate, with long, thin tubercle at apex; pappus pale reddish-brown, to 19 mm long, inner hairs longer than outer, with toothed, slightly thickened tips. Flowering July to September. (Plate IX.)

182 One of main components of Sakhalin tall-herb community, which grows in zone of coastal and valley forests, as also in marshy places and scrubs.—*Far East*: Sakhalin (mostly southern part of island). *General distribution*: Japan (Nippon, Yezo). Described from vicinity of Due Port. Type in Leningrad.

Note. The Sakhalin-Hokkaido element of the flora (according to Tolmatchev) has been combined by a number of authors with *C. kamtschaticum* Ldb. ex DC., from which it is well distinguished by the form of the leaves, involucral bracts, and lax inflorescence.

85. **C. pectinellum** A. Gray, On the Bot. Jap. (1859) 395; Nakai in Tokyo Bot. Mag. XXVI, 361; Kitam. Comp. Japon. I, 44.—*C. pectinellum* α . *typicum* Nakai and β . *modestum* Nakai in Tokyo Bot.

Mag. XXVI (1912) 361.—*C. pectinellum* var. *mamiyanum* Miyabe and Kudo, Fl. Saghal. (1915) 273.—*C. mamiyanum* Koidz. pl. Sachal. (1910) 124; Nakai in Tokyo Bot. Mag. XXVI, 321.—*Cnicus pectinellus* (A. Gray) Maxim. in Bull. Acad. Sc. Pétersb. XIX (1874) 491 and in Mém. Biol. IX, 358.—**lc.**: Kitam. Comp. Japon. I (1937) pl. XV, fig. 2.

Perennial. Rhizome horizontal, nodulose, thick, with ligneous, long, fibrous roots. Stem 50–150 cm high, ascending, sulcate, crisped-hairy, narrow-winged or sharply carinate, throughout or only below with long and fine yellowish spines on edges, leafy, with long internodes. Leaves deeply pinnatisect into linear segments, narrowed into more or less winged, thinly spinose petiole, decurrent as narrow wing or long spines; middle cauline leaves to 17 cm long, upper ones basally narrowed, sessile, reduced, with short-decurrent, as narrow spinose wing, pinnatisect, acuminate; apical leaves almost undivided, linearly-lanceolate; all leaves glabrous above, more or less thinly grayish-arachnid-hairy beneath (especially upper leaves), very tiny spinose-ciliate or longer scattered spines; apical leaves linear, approximate to base of capitula, as long as them, or somewhat longer. Capitula nodding from base, solitary or in 2's on short tomentose peduncles, forming corymbose general inflorescence. Involucre at fruiting divergent, at flowering 1.5–2.0 cm in dia, more or less whitish-tomentose; involucre bracts linearly lanceolate, outer ones somewhat shorter than inner, narrowed into long, thin spinescent tip, deflexed in upper part, more or less floccose-arachnoid. Florets pink; corolla to 16 mm long; corolla tube to 6 mm long; limbs unevenly lobed up to middle. Achenes reddish-brown to brown, 4 mm long, with thin apically extended disk; pappus to 13 mm long, light reddish-brown, darker tips of inner modified to short-toothed bristles. Flowering July to August.

183 Bogs, swampy birch forests, boggy meadows, forest edges, in foothills and intermontane valleys.—*Far East*: Sakhalin (southern part, Kuril Islands). *General distribution*: Japan (Nippon, Yezo). Described from Japan.

Note. *C. pectinellum* A. Gray, with its finely incised leaves, spinose-winged stem, tomentose pubescence, and smaller capitula is well distinguished from *C. weyrichii* Maxim., which is widespread in the southern part of Sakhalin. A relatively large amount of material of this species was collected by M.G. Popov, among which there are specimens with finely incised leaves or broader leaf segments, which approach *C. weyrichii*. The possibility is not ruled out that on Sakhalin these species hybridize with each other. Such specimens were collected by M.G. Popov near the villages of Klyuch and Kochuma. *C. pectinellum* A. Gray is known from Sakhalin on the basis of a small number of specimens from its southern part and needs further inves-

tigation. The specimen collected by E.G. Pobedimova and G. Konovalova on the Kuril Islands differs somewhat from the typical specimens and on closer study may prove to be a new species close to *C. pectinellum* A. Gray.

Series 2. Erecta Kitam. in Acta Phytot. et Geobot. III, 1 (1934) 7 p. max. p.; Comp. Japon. I (1937) 46.—Capitula erect, aggregated at stem apices.

Species of this series are distributed in Japan (Hokkaido, Hondo), in the north of Eastern Asia, Europe, and Beringia. From this series we exclude *C. serratuloides* (L.) Hill, which is close to species of the subsection *Spanioptilon* Kitam.

86. *C. palustre* (L.) Scop. Fl. Carn. ed. 2, II (1772) 128; Ldb. Fl. alt. IV, 6; DC. Prodr. VI, 645; Ldb. Fl. Ross. II, 733; Fedtsch. and Fler. Fl. Evrop. Ross. 1010; Iljin in Fl. Yugo-Vost. VI, 403; Schischk. in Fl. Zap. Sib. XI, 2887; Klok. in Vizn. Rosl. URSR, 569; Hegi, Ill. Fl. VI, 2, 878.—*C. palustre* β . *umbrosum* Kauffm. Mosk. Fl. Ed. 2 (1889) 274; Fedtsch. and Fler. Fl. Evrop. Ross. 1011.—*Carduus palustris* L. Sp. pl. (1753) 822.—*C. altissimus* Gilib. Fl. Lithuan. III (1781) 186.—*Cnicus palustris* Willd. Fl. Berol. Prodr. (1787) 260; Sp. pl. III, 3, 1662.—*Onotrophe palustris* Cass. in Dict. Sc. nat. XXXVI (1825) 147.— *Ic.*: Gmel. Fl. sibirica, II (1749) tab. 23, fig. 2; Rchb. Ic. Fl. Germ. XV, tab. 831; Syreistsch. Ill. Fl. Mosk. Gub. III, 304; Fedtsch. and Fler. loc. cit. Fig. 1013; Javorka and Csapody, Iconogr. Fl. Hung. 541. fig. 3875; Hegi, l. c. Taf. 271, fig. 4.— *Exs.*: GRF No. 1671; Fl. Gall. et Germ. exs. No. 677; Herb. norm. No. 84; Pl. Suec. exs. No. 1582.

Perennial. Rhizome with funiform roots. Stem erect, 60–150 cm high, with sinuate-toothed wings, dark purple above, finely arachnoid-hairy, leafy, near apex usually with smaller leaves, occasionally branched from base to apex, with long leafy branches (var. *umbrosum* Kauffm.). Leaves linearly-lanceolate, 4–15 cm long, 0.5–3.0 cm wide, pinnately divided or pinnately incised into rhombic, lobate-toothed segments, scatteredly hairy above, more densely so beneath along veins with long, crisped hairs, thinly spiny-ciliate along margin. Rosulate leaves narrowed into short petiole; Cauline leaves narrowly sinuate, thinly spiny-ciliate decurrent wings, wings in upper part lacerated and long-spinose. Capitula 9–15 mm in dia, aggregated at apices of stem and branches, into corymbose-paniculate common inflorescence. Involucral bracts scatteredly arachnoid-hairy along margin, dark purple above, outer ones ovate, to 2.5 mm long, spinescent, inner ones linearly lanceolate, scarious at apex, colored. Florets to 14 mm long,

lilac-purple, corolla limb 8 mm long, lobed to 1/3 into narrowly linear lobes. Achenes smooth, stramineous or purple (f. *erythrocarpum* Iljin), 2.5–3.5 mm long; pappus sordid-white, hairs thin, to 11 m long. Flowering April to September.

Mostly in coniferous and deciduous forest zone, occasionally in forest-steppe; wet meadows, swamps and their edges, sometimes in scrubs.—*European Part*: Dvina-Pechora, Baltic Region, Ladoga-Ilmen, Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga, Upper Dniester, Bessarabia, Lower Don; *Western Siberia*: Ob Region, Upper Tobol, Irtysh; *Eastern Siberia*: Angara-Sayans (reported for Krasnodar Territory). *General distribution*: Scandinavia (to 67°50' N. Lat.), Central Europe, Atlantic Europe (northern part), Mediterranean Region (western), North America (introduced). Described from western Europe. Type in London.

Note. Readily forms hybrids with species of the section *Cirsium*. From the European Part of the USSR, the following hybrids have been reported:

1. *C. heterophyllum* × *C. palustre*: Trautv. in *Tr. Peterb. Bot. Sada*, VIII, 2 (1883), Nos. 3105, 3117.
2. *C. oleraceum* × *C. palustre*: Trautv. *ibid.*, Nos. 3116, 3118.
3. *C. palustre* × *C. rivulare*: Trautv., *ibid.*, No. 3120.

Subsection 7. Orthocentrum (Cass.) Charadze comb. nova; DC. Prodr. VI (1837) 641, pro sect.—*Orthocentron* Cass. in *Dict. Sc. nat.* XXVII (1823) 184, pro subgen., XXV (1825) 173 and XXXVI (1825) 480, pro gen.—Capitula ovate. Involucral bracts oblong-ovate, soft and scatteredly pilose or glabrous, imbricate, subulate or abruptly narrowed into thin, straight or slightly deflexed, more or less short spine. Florets red, very rarely whitish; corolla tube usually shorter than limb or longer. Anther filaments with papillose or fine hairs. Stem winged, with leaves decurrent on internodes, occasionally leaves sessile or scarcely decurrent, glabrous, weakly arachnoid-hairy or mostly grayish-tomentose, more or less deeply pinnately incised, occasionally weakly pinnately toothed.

Type of subsection: *C. siculum* Spreng.

Note. This subsection includes species distributed in West Asia, the Mediterranean Region, the Caucasus, and in the steppe regions of Eurasia. In the species of the subsection *Orthocentrum* (Cass.) Charadze, the filaments are finely papillate (visible under a strong magnifying glass) and not glabrous, as reported by Cassini. Evidently, on this

basis *C. libanoticum* DC. was referred by De Candolle to the section *Onotrophe* (Cass.) DC. (= *Cirsium*), in which finely hairy filaments are characteristic. In not attaching great significance to the nature of the pubescence of the filaments in the present case, I believe that the circumscription of the subsection should be broadened to include the species of the section *Onotrophe* (Cass.) DC. (= *Cirsium*) that are close in habit, with more or less winged stems and relatively shallowly incised leaves.

Series 1. Pubigera Charadze.—Leaves more or less glabrous, pinnately toothed or pinnately lobed; upper cauline leaves sessile, lower ones weakly decurrent with narrow wing. Capitula solitary or in clusters of 2–3, 15–30 mm in dia.

This series includes Asia Minor species. One grows in Southern Transcaucasia, and the other is distributed in the Greater Caucasus.

87. *C. depilatum* Boiss. and Bal. in Boiss. Fl. or. III (1875) 543; Somm. and Lev. in Nuov. Giorn. Bot. Ital. N. S. II, 1, 18; Grossh. Fl. Kavk. IV, 189; Charadze in Fl. Gruzii, VIII, 482.—*C. pubigerum* var. *pubigerum* Petrak in Mitteil. Thüring. Bot. Gesellsch. II, 1 (1960) 26 p. p.—**Exs.:** Petrak, Cirsioth. Univ. No. 90.

Perennial. Stem ascending, to 2 m tall, sulcate, sparsely arachnoid-hairy, branched above. Cauline leaves semiamplexicaul, with auricles weakly decurrent, oblong-ovate or ovate, apically narrowed, erose-toothed or lobed with spinescent teeth, scatteredly fine hairy on both sides or glabrous, sometimes sparsely floccose-arachnoid-hairy along veins; middle cauline leaves approximate, 16–23 cm long, 4–5 cm wide; apical leaves 3–6 cm long, distant. Capitula solitary, 15–30 mm in dia, at apices of stem and branches, projected above subtending leaves, sometimes forming lax paniculate general inflorescence. Involucre subglabrous, with occasional, thin, arachnoid hairs; involucre bracts imbricate, outer ones 5–6 mm long lanceolate to ovate-lanceolate, spinescent, with scarcely deflexed spine, dorsally with blackish-purple band, inner ones linear-lanceolate, narrowed into thin scarious tip. Florets pink; corolla 19–22 mm long, limb 12–14 mm long. Achenes reddish-brown, 3.5 mm long; pappus whitish, to 16 mm long, its inner hairs thin, somewhat long. Flowering August.

Near streams, in depressions and on gravel beds, often forming thickets, in mid-montane and subalpine zones.—*Caucasus:* Southern Transcaucasia, Eastern Transcaucasia (former Borzhomi District, Southern Ossetia). *General distribution:* Asia Minor. Described from Dzhimil in Lazistan. Type in Geneva.

186 **Note.** Petrak (1960) considers *C. depilatum* Boiss. and Bal. identical with *C. pubigerum* DC. He treats the latter species broadly and

includes a number of varieties, of which, for the Caucasus, he cites var. *pubigerum*, combining the original specimens of *C. pubigerum* DC., *C. depilatum* Boiss. and Bal., and *C. elbrusense* Somm. and Lev. However, in the *Flora Orientalis* Boissier distinguished *C. pubigerum* from *C. depilatum* by the smaller capitula and involucre bracts.

The considerable material from the former Artvin and Oltu districts makes it possible to distinguish two species, one of which, with narrower, more or less decurrent or sessile leaves and relatively small capitula, I consider to be *C. pubigerum* DC. In the Caucasus, I think it is possible to distinguish *C. depilatum* Boiss. and Bal. and *C. elbrusense* Somm. and Lev. Moreover, to *C. pubigerum* DC. we also refer the specimen from the former Oltu District cited by Petrak as *C. pubigerum* var. *elbrusense* (Somm. and Lev.) Petrak and mistakenly identified by him with the type of *C. elbrusense* Somm. and Lev. This same specimen was described by A.V. Fomin (*Izv. Kavk. Mus.* III, 1902, 281) as *C. oltense* Fom.

88. **C. hygrophiloides** Charadze in Zam. po Sist. i Geogr. Rast. Tbil. 22 (1961) 76.—*C. uliginosum* Grossh. Fl. Kavk. IV (1934) 187 p. p. non MB.—*C. elbrusense* Charadze in Fl. Gruzii, VIII (1952) 485 p. p. quoad pl. ex Achalchevi, non Somm. and Lev.

Perennial. Stem hard, ascending, to 1.5 m high, sulcate, with occasional arachnoid hairs, branched. Leaves oblong, more or less deeply sinuate-pinnately lobed with deltoid, bifid lobes, strongly tapered into yellow, hard spines to 11 mm long, finely spinose, glabrous or sparsely arachnoid-hairy beneath; basal leaves oblong-elliptical, 30–33 cm long, 10–12 cm wide, acuminate, narrowed into short-winged petiole, on both sides, especially beneath, with scattered, thin, lanate hairs, deeply pinnately parted into elongate, distant and coarsely toothed, obtuse segments, with apical spines to 6 mm long; cauline leaves oblong-lanceolate, spinescent, more or less narrowed downward and with wings short-decurrent, 20–25 cm long, 7–9 mm wide, upper leaves reduced, somewhat surpassing capitula. Capitula 2–3 cm in dia, solitary or in clusters of 2–3, terminal on stem and branches, in corymbose paniculate general inflorescence. Involucre with occasional arachnoid hairs; outer bracts broadly ovate to oblong-ovate, greenish, with broad blackish-purple band above, 7–9 mm long, subglabrous or with occasional arachnoid hairs, spinescent, inner lanceolate, narrowed into acute, scarious tip. Florets purple; corolla 21–22 mm long; limb to 12 mm long, lobed to 1/3. Achenes brownish, with light yellow bands, to 4 mm long; pappus 16–17 mm long, whitish, its inner hairs scarcely spreading racemously at apex, somewhat longer than outer. Flowering July to August.

River terraces, near springs in wet places.—*Caucasus*: Ciscaucasia (mountains of Ingushetia, Northern Ossetia), Eastern Transcaucasia (upper reaches of Aragvi River). Described from eastern Georgia (Mlet drainage). Endemic. Type in Tbilisi.

Note. It is distinguished from *C. depilatum* Boiss. and Bal. by more deeply incised leaves, short-spinescent involucre bracts, and darker-colored florets. From *C. pubigerum* DC. s. l., it is distinguished by broader leaves and larger capitula.

Series 2. Hygrophila Charadze.—Stem winged; leaves glabrous, decurrent, more or less deeply pinnately lobed. Capitula clustered at apices of stems, occasionally solitary, 15–25 mm in dia.

89. *C. hygrophilum* Boiss. Diagn. pl. or. ser. I, 10 (1849) 89; Fl. or. III, 549; Charadze in Fl. Azerb. VIII, 410; Petrak in Mitteil. Thüring. Bot. Gesellsch. II, 1, 24.

Perennial. Stem ascending, branched, densely leafy, winged, with scattered occasional hairs. Leaves green above, glaucescent beneath, glabrous, with scattered simple hairs; cauline leaves linearly oblong, deltoid-sinate and pinnately lobed, with bisected, toothed, approximate lobes, 11 mm long, teeth long tapered to yellowish spine; apical leaves small, approximate to capitula, equalling surpassing them. Capitula terminal or axillary, solitary, to 20 mm in dia, clustered at apices of stem and branches. Involucre bracts green, with purple band above, glabrous, sparsely floccose-pubescent; outer bracts oblong, with straight or somewhat deflexed, yellowish, spine 1.5 mm long, inner linearly lanceolate, with elongate, scarious cusp. Florets purple, 19 mm long; corolla limb to 11 mm long. Achenes to 4 mm long; pappus sordid white. Flowering July to August.

Subalpine zone, in wet meadows and along mountain streams.—*Caucasus*: Southern Transcaucasia (Nakhichevan ASSR). *General distribution*: Armenia and Kurdistan, Iran. Described from northern Iran. Type in Geneva.

Note. This species was mistakenly cited by Petrak and later by A.A. Grossheim for the upper reaches of the Kuban River. The Desulavi specimen cited by Petrak (*Izv. Kavk. Muz.* VIII, 1–2, 69) from the upper reaches of the Kuban (Uchkulan) is referred to *C. elbrusense* Somm. and Lev., which is distinguished from *C. hygrophilum* by more vigorous growth, strongly branched stem in the upper part, capitula usually clustered at the stem tips and rising above the apical leaves. Later, Petrak (in *Mitteil. Thüring. Bot. Gesellsch.* II, 1, 24) allies *C. hygrophilum* Boiss. with *C. pubigerum* var. *paphlagonicum* Petrak;

188 this species is distinguished from the latter by broadly winged stems

that are densely leafy to the tip, long-spinose leaves, the upper of which surround the capitula and somewhat surpass them.

90. *C. elbrusense* Somm. and Lev. in Nuov. Giorn. Bot. Ital. N. S. II, 1 (1895) 16; in Tr. Peterb. Bot. Sada, XVI, 263; Grossh. Fl. Kavk. IV, 188; Oprod. Rast. Kavk. 486, quoad pl. kubanensem.—*C. hygrophylum* auct. non Boiss.: Petrak in Izv. Kavk. Muz. VII, 1–2 (1914) 69; Grossh. Fl. Kavk. IV, 185.—*C. pubigerum* var. *elbrusense* (Somm. and Lev.) Petrak in Mitteil. Thüring. Bot. Gesellsch. II, 1 (1960) 20 p. p. quoad pl. e Kükürtlü.

Perennial. Stem winged, hard, ascending, sulcate, weakly branched above, densely leafy, glabrous or with occasional arachnoid hairs, to 1.5 m high, wings sinuate-lobed, spiny-toothed. Lower leaves to 23 cm long, narrowed into short petiole, pinnately lobed, with broad, toothed and spinescent lobes; middle cauline leaves oblong-lanceolate or elliptical, coriaceous, pinnately parted with 2-, 3-, occasionally 5-sect, elongate segments, lobes tapered to hard spines 5–7 mm long, glabrous on both sides, occasionally arachnoid-hairy, long-acuminate, auriculate, more or less long-decurrent, sinuate-toothed, more or less coarsely spiny-ciliate; upper leaves to 15 cm long, 6 cm wide. Capitula 1.5–2.5 cm in dia, solitary or 2–4 on short branches, at stem tips, sessile in axils of long leaves; forming racemose-paniculate general inflorescence; apical leaves at bases of capitula small, finely incised. Involucral bracts spinescent, outer ones ovate, to 5 mm long, scatteredly arachnoid-hairy in upper part, with blackish purple band; inner bracts linearly lanceolate, acuminate, with scarious tip. Florets purple; corolla 18–19 mm long; limb 11–12 mm long. Achenes to 3–4 mm long, light reddish-brown; pappus silvery-white, to 15 mm long. Flowering July to August.

Mid-montane and subalpine zones, as small thickets, occasionally as solitary plants, in depressions in wet places and near springs.—*Caucasus*: Ciscaucasia (upper reaches of Kuban). Endemic. Described from Kyukyurtal in basin of Kuban River. Type in Florence.

Note. This species was described from incomplete specimens from the Kyukyurtal Gorge. The absence of subsequent collections and the somewhat inaccurate description have created confusion in the interpretation of this species. For example, Petrak referred to it the Oltu specimen from the *C. pubigerum* DC. s. 1. complex; apparently, typical specimens of *C. elbrusense* Somm. and Lev. from the Kuban were referred by the same author to *C. hygrophylum* Boiss., because of their absence in the region of the Main Range. New collections from the upper reaches of Kuban have confirmed the specific status of *C. elbrusense* Somm. and Lev., which is among a number of Elbus

189 endemics. The Oltu specimen is well distinguished by its less incised, slightly decurrent leaves, and entirely glabrous, wingless internodes. Later, Petrak broadened the circumscription of *C. pubigerum* DC. by including *C. elbrusense* Somm. and Lev. as a variety, with which I cannot agree.

91. *C. albowianum* Somm. and Lev. in Tr. Peterb. Bot. Sada, XII, 1 (1892) 153, XVI (1900) 264; Petrak in Mitteil. Thüring. Bot. Gesellsch. II, 1, 22; Grossh. Fl. Kavk. IV, 185.—*C. svaneticum* var. *albowianum* (Somm. and Lev.) Charadze in Fl. Gruzii, VIII, (1952) 484.

Perennial. Stem ascending, to 1 m high, sulcate, sparsely arachnoid-hairy, usually densely leafy, with spinose wings along edges, short branches above bearing 1–3 terminal capitula. Lower cauline leaves usually linearly lanceolate, narrowed at both ends, glabrous, very finely, scatteredly hairy only on midrib above, amplexicaul, decurrent, broad wings, usually sinuately-pinnately parted into deltoid-ovate, unequally 3–4–5-toothed segments, their lobes basally deltoid or deltoid-lanceolate, spinescent, unevenly spiny-ciliate; middle and upper cauline leaves gradually reduced, like lower. Capitula at tips of stem and branches solitary or 2, of which 1 subsessile, undeveloped, on strongly reduced peduncles, globose-ovate, to 15 mm in dia, with 1 short-decurrent, linearly-lanceolate, distant, spinose toothed apical leaf. Involucral bracts glabrous or only basally scatteredly arachnoid-hairy, outer ones ovate-oblong, abruptly tapered to straight or horizontally deflexed, thin spine, like middle bracts, dorsally with blackish-purple glandular band above; inner bracts elongate, gradually narrowed into long scarious tip. Florets reddish-violet, 20–25 mm long; limb 5-lobed to middle, 2 times as long as corolla tube. Achenes unknown; pappus somewhat shorter than florets, sordid-white, hairs plumose, apically tiny setose and somewhat thickened. Flowering August.

Upper forest zone, at about 2,000 m.—*Caucasus*: Western Transcaucasia (Upper Svanetia). Endemic. Described from Svanetia. Type in Florence.

Note. Known only from the collections of Sommier and Levier. Judging from the diagnosis and detailed description of this species given by Petrak, it stands closest to *C. elbrusense* Somm. and Lev., differing only by solitary and not clustered, terminal capitula, as in the latter. The species needs to be investigated further.

Series 3. Elodea Charadze.—Stem winged. Leaves glabrous or finely arachnoid hairy. Capitula to 15 mm in dia.

- 190 92. *C. apiculatum* DC. Prodr. VI (1837) 642; Bornm. in Beih. Bot. Centralbl. XX, Abt. II, 2, 162; Charadze in Fl. Turkm. VII, 244.—*C. apiculatum* ssp. *glaberrimum* Petrak in Oest. Bot. Zeitschr. LX, 2 (1910) 460.—*C. libanoticum* Boiss. Fl. or. III (1875) 548 p. p. non DC.—Exs.: Sint. It. transcasp.-pers. No. 960.

Perennial. Stem ascending, hard, branched above, to 100 cm tall, winged, without or with tiny scattered hairs, wings more or less deeply orbiculate-lobate, with short and long, hard, yellowish spines to 8 mm long. Leaves glabrous, glaucescent, oblong- or linearly lanceolate, pinnatifid to pinnately lobed, with orbicular lobes, acuminate; basal leaves narrowed into long petiole, together 28 cm long; lower cauline leaves to 10 cm long, 2.5 cm wide; all leaves auriculate, decurrent on petiole as lobate wings, acuminate, with short and long yellowish spines. Capitula to 15 mm in dia, solitary at tips of reduced peduncles and 3–5 clustered at tips of stem and long branches, forming racemose-umbellate general inflorescence. Involucral bracts ovate-lanceolate to linearly lanceolate, pale yellow, with dark spot above, tapered to slightly recurved spines 2.5–3 mm long lacking or with occasional arachnoid hairs. Florets pale pink, to 18 mm long. Achenes pale yellow, to 3.5 mm long; pappus with thin, basally scaly hairs, to 15 mm long. Flowering July to August.

Swampy meadows, along mountain streams.—*Soviet Central Asia*: mountainous Turkmenia (Karaul, Sulyuki, Kusika). *General distribution*: Armenia and Kurdistan, Iran. Described from Iran from collection of Belangé. Type unknown.

Note. The species is close to *C. elodes* MB. and is distinguished by stiffer, narrower leaves, spines crowded at the tips of stem and branches, larger capitula, and weakly colored involucral bracts. The specimen of this species collected by Bornmüller along the border with Iran was referred by him first to *C. elodes* as var. *glaberrimum* Bornm. and later to *C. apiculatum* DC. Boissier combined *C. apiculatum* DC. and *C. libanoticum* DC. under the latter name, adding to it, as a synonym, *C. kotschyianum* Boiss., described, like *C. libanoticum* DC., from Lebanon. The specimen, distributed by Kotschy (Pl. Pers. austr. No. 789) as *C. apiculatum* DC., has a critical annotation by Boissier, which reveals that *C. apiculatum* DC. is not present in the Herbarium of De Candolle and the distributed specimen was referred to the above species only on the basis of the diagnosis. Later, Boissier (*Fl. or.*) cites this specimen under the name *C. libanoticum* DC.

In the Herbarium of the Botanical Institute of the Academy of Sciences of the USSR, one specimen from Iran (from Bunge's herbarium) is preserved, which we are inclined to consider identical with the type of *C. apiculatum* DC. From the specimens collected by

Kotschy (*C. kotschy anum* Boiss., *C. apiculatum* DC., and also *C. libanoticum* DC. from Hamadan), this specimen differs in several characters and is similar to Bornmüller's specimen from Sulyukli. The major differences of *C. libanoticum* DC. are its more or less dense, finely pilose stems and leaves, narrower racemose inflorescence, and others. I am inclined to consider *C. apiculatum* DC. as a species replacing *C. libanoticum* DC. in northern Iran and Turkmenia, the range of which covers the mountains of Lebanon and southern Iran.

93. *C. elodes* MB. Fl. taur.-cauc. III (1819) 555, excl. syn. Gmel.: C.A.M. in Mém. Acad. Sc. Pétersb. VI, sér. sc. nat. VI, 52; Charadze in Fl. Azerb. VIII, 409.—*C. desertorum* auct. fl. cauc. non Fisch. ex Link: Petrak in Izv. Kavk. Muz. VIII, 1–2 (1914) 73; Grossh. Fl. Kavk. IV, 185; Charadze in Fl. Gruzii, VIII, 486.—*C. setigerum* Grossh. Opređ. Rast. Kavk. (1949) 484, non Ldb.—*Cnicus palustris* var. β . MB. Fl. taur.-cauc. II (1808) 274.

Perennial. Root funiform or slightly tuberculate. Stem ascending, weakly ribbed, 35–90 cm high, yellowish, glabrous, occasionally scatteredly hairy below, leafy to tip and sinuately broadly winged, from middle with more or less paniculate-cymose, long curved branches, with 3–5(7) small capitula clustered at their tips. Cauline leaves glabrous, smooth or tuberculate, with thin, hard spines, 3–5–7 mm long, oblong-elliptical; basal leaves 15–16 cm long, 3.5 cm wide, narrowed into short petiole, toothed or shallowly-pinnately lobed, more or less spiny-ciliate; lower cauline leaves like basal leaves, decurrent with broad wing; leaves from middle to upper gradually reduced, oblong-lanceolate to linearly-lanceolate, decurrent; apical leaves deeply pinnately lobed, with broad, sharply toothed segments, smaller, linear. Capitula 8–10(12) mm in dia, 12–15 mm long, clustered on short, small-leaved and winged, spinose peduncles, forming corymbose-paniculate general inflorescence. Involucral bracts small, lower ones 3 mm, middle ones to 7 mm long, oblong-lanceolate, lustrous, stramineous, with purple-brownish subapical band, tapered thin, weakly decurved, more or less elongate spines, weakly arachnoid-hairy; inner involucral bracts linearly-lanceolate, narrowed into scarious, weakly recurved tip. Florets red, to 17 mm long; corolla tube to 7 mm long; limb unevenly 5-parted up to middle. Achenes 2.5–3.0 mm long, stramineous; pappus sordid-white with thin, entirely plumose outer hairs and scabrous-tipped inner hairs. Flowering July to August.

Wet places, roadsides, in lowlands and foothills, in steppe and semidesert regions.—*Caucasus*: Ciscaucasia (eastern part), Eastern Transcaucasia, Southern Transcaucasia. *General distribution*: Armenia and Kurdistan, Iran and Afghanistan (northern). Described from vicinity of Shemakha. Type in Leningrad.

Note. This species replaces *C. alatum* (S.G. Gmel.) Bobr. in the 192 eastern part of Ciscaucasia and Transcaucasia. The possibility of its occurrence in regions adjoining Southern Transcaucasia is also not ruled out. It is distinguished by entirely glabrous stems and leaves and particularly by the form of the involucre bracts, which are gradually narrowed into thin spines and are lacking the floccose pubescence along the margin characteristic of *C. alatum* (S.G. Gmel.) Bobr.

94. *C. alatum* (S.G. Gmel.) Bobr. in Bot. Zhurn. SSSR, XLIII, 11 (1958) 1547.—*C. desertorum* Fisch. ex Link, Enum. pl. hort. Berol. II (1822) 300; Spreng. Syst. veg. 3, 371; Ldb. Fl. Ross. II, 734; C.A.M. in Mém. Acad. Sc. Pétersb. VI, sér., sc. nat. VI, 50; Trautv. in Bull. Soc. Nat. Mosc. XXXIX, 2, 376; in Tr. Péterb. Bot. Sada, VIII, 1, 500; Schischk. in Fl. Zap. Sib. XI, 2888.—*C. desertorum* var. *subintegerrima* Trautv. and var. *sinuatolobuta* Trautv. in Bull. Soc. Nat. Mosc. XXXIX, 2 (1866) 376.—*C. setigerum* Ldb. Ic. pl. Fl. Ross. I (1829) 9; Fl. alt. IV, 5; DC. Prodr. VI, 642; Ldb. Fl. Ross. II, 734; C.A.M. op. cit. 51; Iljin in Fl. Yugo-Vost. VI, 404.—*C. elodes* auct. fl. Ross. eur. non MB.: Ldb. op. cit. II (1846) 733 p. p.; O. and B. Fedtsch. Perech. Rast. Turk. IV, 284; Fedtsch. and Fler. Fl. Evrop. Ross. 1011; Klok. in Vizn. Rosl. URSR, 569.—*C. elodes* β . *setigerum* Kryl. Fl. Alt. III (1904) 692.—*C. elodes* var. *sinuato-lobatum* and var. *subintegerrimum* O. and B. Fedtsch. op. cit. (1911) 284.—*Serratula alata* S.G. Gmel. Reise, I (1770) 155.—*Carduus desertorum* Fisch. ex Steud. Nomencl. bot. ed. 2, I (1841) 283.—**Ic.:** Rchb. Iconogr. bot. tab. 986, No. 1317; Ldb. Ic. pl. Fl. Ross. tab. XXXV; S.G. Gmel. Reise, I, tab. XXXV.

Perennial. Rhizome long-tuberous or with funiform roots. Stem solitary, straight, more or less branched only in upper part, yellowish, sulcate, pubescent, especially below, with more or less scattered crisped hairs, 30–100 cm high, leafy to tip, winged to middle; wings lacerated in upper part, entire or weakly sinuately toothed, lobed in upper part of stem, with hard, tiny and longer yellowish spines. Leaves coriaceous, ovate-elliptical to oblong-lanceolate, almost undivided (var. *subintegerrimum* (Trautv.) Charadze) or sinuately-lobed (var. *sinuato-lobatum* (Trautv.) Charadze), subentire or bicrenate-dentate, ciliate from short, hard, and thin spines up to 3 mm long, verrucose above, scatteredly pilose or more or less glabrous beneath; basal leaves more or less broadly oblong-lanceolate, narrowed into short, narrowly-winged petiole, subacute, weakly toothed, scatteredly pilose or subglabrous, to 30 cm long and 4 cm wide; lower cauline leaves like basal, decurrent on stem by broad wings; middle and upper leaves strongly reduced, oblong, more or less deeply sinuately lobed, long-spinose; apical leaves

on elongate branches of corymbose inflorescence small, shortly-decurrent, with lobed wings. Capitula 11–15 mm in dia, solitary or 2–3 at tips of stem and branches, forming corymbose-paniculate general inflorescence. Involucral bracts, from outer ovate and oblong-ovate to inner linearly-lanceolate, greenish-yellow, with purple to reddish-brown band above and more or less floccose-white hairy; outer bracts tapered into hard, straight or slightly deflexed, short spine, compactly imbricate; inner bracts narrowed into scarious, colored, thin point. Florets pink; corolla 18–19 mm long, corolla tube 7–8 mm long, limb 5-parted almost to middle. Achenes to 3 mm long, pale yellow, smooth, lustrous; pappus of fewer hairs, basally white, slightly brownish, 12–13 mm long, inner hairs with slightly thickened, short-setose tips. Flowering July to August.

Wet alkaline meadows, in lowlands and foothills, in steppe and semidesert zone.—*European Part*: Volga-Kama, Middle Dnieper, Volga-Don, Trans-Volga, Bessarabia, Lower Don, Lower Volga; *Western Siberia*: Upper Tobol, Irtysh; *Soviet Central Asia*: Aralo-Caspian Region, Baltic Region, Syr-Darya, Tien Shan. Described from Lower Don (Pyatiiz-benskaya). Type in Leningrad.

Note. The name *C. alatum* (S.G. Gmel.) Bobr. was first proposed by E.G. Bobrov, who restored Gmelin's name for this plant in a new combination. He excluded this species from the Caucasian species *C. elodes* MB., which is usually identified with *C. alatum* under the name *C. desertorum* Fisch. ex Link and sometimes with *C. setigerum* Ldb. At the same time, authors of the Russian flora have treated this same plant under the name *C. elodes* MB., described from the Caucasus. Moreover, *Serratula alata* S.G. Gmel. was treated by Marschall-Bieberstein as a synonym of *C. elodes* MB. and then by Meyer as a synonym of *C. setigerum* Ldb. At present, it seems better to treat the southern vicariant races of *C. alatum* as separate species: the Caucasian one, *C. elodes* MB., and the Irano-Turkmenian one, *C. apiculatum* DC. Despite great variation, these species are distinguished by a suite of small morphological differences imparting to them a distinctive appearance. I agree with E.G. Bobrov that the nature of the thickening of the root fibers from funiform to tuberous, on which an attempt was made to distinguish *C. desertorum* from *C. setigerum*, evidently does not have much importance, since it is found to be mixed all over its range.

Series 4. *Leucopsia* Charadze.—Plants with grayish or white arachnoid hairs. Leaves more or less arachnoid-hairy on both sides or only beneath, broadly decurrent. Capitula 18–25 mm in dia.

95. *C. svaneticum* Somm. and Lev. in Nuov. Giorn. Bot. Ital. N. S. II, 1 (1895) 20; in Tr. Peterb. Bot. Sada, XVI (1900) 265; Petrak in Tr. Tifl. Bot. Sada, XII, 1, 30; in Izv. Kavk. Muz. VIII, 1–2, 63; Grossh. Fl. Kavk. IV, 185; Charadze in Fl. Gruzii, VIII, 484, excl. var.—*C. svaneticum* var. *ramosum* Somm. and Lev. op. cit. (1895) 20; op. cit. (1900) 266; Grossh. op. cit. 185.—*C. leucopsis* var. *caucasicum* 194 Somm. and Lev. Nuov. Giorn. Bot. Ital. N. S. II, 1 (1895) 20.—*C. leucopsis* Petrak in Mitteil. Thüring. Bot. Gesellsch. II, 1 (1960) 29 p. p. non DC.—Exs.: Petrak, Cirsioth. Univ. No. 91.

Perennial. Stem tall, sulcate, many-branched above or from middle (var. *ramosum* Somm. and Lev.), arachnoid-hairy, to 1.5 m high, lacerate-winged. Leaves soft, coriaceous, green, floccose, and finely arachnoid-hairy above, grayish or whitish-, more or less densely arachnoid-hairy to tomentose beneath, sinuate-toothed or pinnately lobed, more or less long-spinose; lower leaves elongated, broadly-lanceolate or sinuately-lobed almost to middle, with bifid, deltoid ovate lobes, narrowed into petiole, decurrent on stem by lacerated wings, to 25 cm long; middle leaves oblong-lanceolate, apiculate, shallowly sinuately-lobed, with broadly deltoid, toothed lobes, spinulose, basally narrowed, decurrent on petiole, 15–18 cm long; apical leaves apically toothed, teeth tapered to more or less long, thin, yellowish spines, linear-lanceolate, acuminate. Capitula 18–25 mm in dia, solitary or 2–3 at tips of stem and branches. Involucre subglabrous, basally weakly arachnoid-hairy; outer involucre bracts ovate or ovate-lanceolate, spinescent, subglabrous, sparsely arachnoid-hairy along margin, with black or purple band above; inner bracts lanceolate, narrowed into scarious tip. Florets purple-violet; corolla 15–16 mm long, limb 9 mm long. Achenes dark reddish-brown, 3.5 mm long; pappus to 12 mm long, with whitish hairs, basally brown. Flowering July to August.

Upper forest and subalpine zones, in clusters or small thickets near streams, along forest edges and on alluvium.—*Caucasus*: Ciscaucasia (western part and Elbrus District), Western Transcaucasia (Abkhazia, Svanetia, Gornaya Racha). Endemic. Described from Svanetia. Type in Florence.

Note. It varies greatly in the form and pubescence of the leaves; the mid-montane forms have narrower, deeply incised leaves, subglabrous above; the subalpine forms have broad, shallowly incised leaves, grayish-arachnoid-hairy above. Petrak (1960) unites *C. svaneticum* Somm. and Lev. with the Asia Minor *C. leucopsis* DC. undoubtedly a very closely related species. However, *C. leucopsis* DC., is distinguished by smaller capitula (13–17 mm across), pale reddish florets, and a corolla more deeply cut than in *C. svaneticum*, as well as by coriaceous leaves. The isolated range of our species in the

secluded gorges of Western Transcaucasia and the Central Caucasus is cut off from the range of the Asia Minor *C. leucopsis* DC.

195 96. *C. uliginosum* (MB.) MB. Fl. taur.-cauc. III (1819) 555; Boiss. Fl. or III, 544; Somm. and Lev. in Nuov. Giorn. Bot. Ital. N. S. II, 1, 19; Grossh. Fl. Kavk. IV, 187; Petrak in Mitteil. Thüring. Bot. Gesellsch. II, 1, 29.—*Cnicus uliginosus* MB. Fl. taur.-cauc. II (1808) 274.

Perennial. Stem tall, to 1.5 m high, hard, ascending, sulcate, branched above, usually sparsely and inflorescence more densely arachnoid-hairy, with internodes to middle spinose-winged. Leaves oblong-ovate, to 17 mm long, 8 cm wide, narrowed toward tip, shallowly sinuate to pinnately lobed, narrowed toward tip, shallowly sinuate to pinnately lobed, with subacute, bisected lobes tapered into hard spines 3–5 mm long; leaves glabrous above or weakly arachnoid-hairy, grayish-arachnoid-hairy beneath, more or less long decurrent; upper leaves small, linear, deeply pinnately incised, not surpassing capitula. Capitula at tips of elongate stem and branches, in clusters of 2–4(5), occasionally solitary, 12–120 mm in dia. Involucral bracts oblong-lanceolate; outer ones 5–6 mm long, with purple band above, with short weakly deflected, spinous tip, weakly arachnoid-hairy, inner ones linear-lanceolate, narrowed into scarious tip. Florets purple; corolla 16–17 mm long, limb 10–11 mm long. Achenes dark brown, to 3 mm long; pappus silvery-white, to 13 mm long. Flowering August.

Depressions, in wet places near streams in mid-montane and sub-alpine zones.—*Caucasus*: Ciscaucasia (central part). Endemic. Described from vicinity of Kislovodsk. Type in Leningrad.

Note. This species was erroneously cited for several districts of Transcaucasia instead of *C. hygrophiloides* Charadze or *C. oblongifolium* C. Koch, from which it is well distinguished by leaves that are more or less grayish-arachnoid-hairy beneath and decurrent on the stem. Petrak (Petrak in Mitteil. Thüring. Bot. Gesellsch. II, 1 [1960] 29) allies *C. uliginosum* (MB.) MB. with *C. kusnetzowianum* Somm. and Lev. and *C. sychnosanthum* Petrak with which, however, it has very little in common, especially in the shape of involucral bracts.

Series 5. Subinermia Charadze.—Stem winged. Leaves more or less grayish-arachnoid-hairy or whitish-tomentose. Capitula to 15 mm in dia.

97. *C. subinermis* Fisch. and Mey. in Mém. Acad. Sc. Pétersb. VI, sér., sc. nat. VI (1849) 55; Charadze in Fl. Azerb. VIII, 393.—*C. duriusculum* C. Koch in Linnaea, XXIV (1851) 410.—*C. elodes* auct.

non MB.: DC. Prodr. VI (1837) 642; Ldb. Fl. Ross. II, 733; Boiss. Fl. or. III, 547; Somm. and Lev. in Nuov. Giorn. Bot. Ital. N. S. II, 1, 15; Grossh. Fl. Kavk. IV, 185.—*C. elodes* β . *indivisum* DC. Prodr. VI (1837) 642; Boiss. Fl. or. III, 547; Somm. and Lev. op. cit. 15; Petrak in Vestn. Tifl. Bot. Sada, Nov. Ser. 2, 42; Grossh. Fl. Kavk. IV, 185.—*C. leucopsis* β . *indivisum* C.A.M. and γ . *cinarescens* C.A.M. Cirs. Rut. (1849) 54.—*C. leucopsis* var. *indivisa* Trautv. in Tr. Peterb. Bot. Sada, II (1873) 556.

Perennial. Rhizome with string-like roots. Stem erect, to 75 cm high, branched above, leafy to tip, more or less broadly-winged, grayish-arachnoid-hairy. Leaves green above, scatteredly whitish-verrucose, 196 puberulent, occasionally finely arachnoid-hairy, beneath grayish- or more or less densely arachnoid-hairy, almost entire or coarsely toothed to pinnately lobed (var. *duriusculum* (C. Koch) Charadze), oblong, to 35 cm long, 9 cm wide, narrowed into elongate winged petiole; cauline leaves ovate, oblong-ovate or broadly-lanceolate, 12–25 cm long, 4–10 cm wide, more or less long-tapered in upper part, acuminate, more or less decurrent on stem with broad, entire, occasionally lacerated, thin, spinulose wings; apical leaves usually not surpassing capitula. Capitula 12–15 mm in dia, in clusters of 3–7 at tips of stem and branches forming corymbose-paniculate general inflorescence. Involucral bracts small, outer ones 3–4 mm long, ovate or ovate-oblong, narrowed into short spine, glabrous, with blackish apical macula, finely floccose-arachnoid-hairy, inner bracts linearly-lanceolate, narrowed into scarious, purple tip Corolla purple, to 15 mm long; limb 9 mm long, lobed to more than 1/3. Achenes to 3 mm long; pappus sordid white, to 11 mm long, with thin and sparse hairs, inner hairs surpassing outer, with scabrous tips. Flowering July to September.

Mid-montane and subalpine zones, in ravines, occasionally in forests, in moist places.—*Caucasus*: Eastern Transcaucasia (southern part), Southern Transcaucasia. *General distribution*: Asia Minor, Armenia and Kurdistan. Described from Dilizhan. Type in Leningrad.

Note. In the form of the leaves, pubescence, and a number of other characters, this species sharply differs from *C. elodes* MB. Its range is restricted to the southern part of Transcaucasia and Lazistan and in Asia Minor to the adjoining part of eastern Anatolia. The species is highly variable in the spinosity and incision of the leaves. The name *C. subinermis* Fisch. and Mey. must take priority for this species, although under this new name an extreme shade form has been described, which is almost devoid of spines on the lamina. The form described by C. Koch from eastern Anatolia under the name *C. duriusculum* C. Koch has a more xeromorphic habit.

The Lagov plants preserved in the Herbarium of the Botanical Institute of the Academy of Sciences of the USSR from Dagestan and

the vicinity of Tbilisi are doubtful and have not been confirmed by later collections.

Hybrid forms are known, which have been described by Petrak as hybrids between *C. elodes* and *C. obvallatum* from the Gyunei shore of Lake Sevan (Shakhdag Mountain). They are distinguished by several characters that are intermediate between the parent species.

1. *C. subinermis* Fisch. and Mey. \times *C. obvallatum* (MB.) MB.—*C. elodes* \times *C. obvallatum* f. *delizhanicum* Petrak, f. *obvallatum* Petrak and f. *subelodes* Petrak in Vestn. Tifl. Bot. Sada, Nov. Ser. 2 (1926) 45–48.—Leaves broad, shallowly sinuate-toothed, weakly arachnoid-hairy beneath, cuneate and short-decurrent on stem. Capitula at apices of stem and widely deflected branches, in clusters of 2–5, 13–17 mm in dia; involucre bracts spinescent with slightly deflected or recurved spine, surrounded by smaller, pinnately incised apical leaves, surpassing capitula.

Southern Transcaucasia (Gyunei).

98. *C. rhabdotolepis* Petrak in Vestn. Tifl. Bot. Sada, Nov. Ser. 2 (1926) 49; Grossh. Fl. Kavk. IV, 186; Oprod. Rast. Kavk. 485.

Perennial. Stems large, ascending, to 1 m high, sulcate, densely leafy, more or less densely grayish arachnoid-hairy, winged, with sinuate-toothed, long-ciliate and thinly spinose, arachnoid-hairy wings, above with reduced axillary branches. Cauline leaves elongately elliptical, acuminate, basally narrowed, decurrent on stem, with more or less broad, densely ciliate-spinose wings, spines to 12 mm long; lower and middle cauline leaves 12–15 cm long, 4–6 cm wide, pinnately parted into ovate-deltoid, approximate segments with 2–3-fid, deltoid, spinescent lobes with yellowish spines to 5–7 mm long, coarsely crenate-toothed, ciliate-spinous, grayish-arachnoid-hairy above, white-arachnoid-hairy or loosely tomentose beneath. Capitula clustered at apices of branches and forming racemose general inflorescence; capitula numerous at stem apices, sessile, in axils of smaller apical leaves, usually not surpassing them, or 3–4, at tips of axillary branches, usually not longer than cauline leaves or somewhat longer; involucre subglabrous, 10–14 mm in dia; involucre bracts small, outer and middle ones ovate to ovate-lanceolate, glabrous, very sparsely arachnoid-hairy, narrowed into short erect spine, with blackish-purple band above; inner bracts linearly-lanceolate, narrowed into scarious, purple tip. Florets purple, 16–17 mm long; corolla limb 9–10 mm long, lobed to 1/3. Achenes light-reddish-brown, to 3 mm long; pappus sordid white, with thin hairs, to 12 mm long. Flowering July to August.

At altitudes of 2,100–2,200 m, on slopes near springs.—*Caucasus*: Southern Transcaucasia (vicinity of Nor-Bayazet and Gyunei shore of

Lake Sevan). Endemic. Described from Nor-Bayazet. Type in Erevan; isotype in Tbilisi.

Subsection 8. Aciculata Charadze in Addenda XXVII, 605.—Leaves with thin, short and long spines on margins, pinnately parted or almost entire. Stem simple or weakly branched above, usually leafy to tip. Capitula medium-sized, basally with few pinnate-spinose apical leaves, shorter than capitula or much longer, surrounding capitula like involucre. Involucral bracts ovate to linearly-lanceolate, narrowed into short spine or point.

Type of subsection: *C. obvallatum* (MB.) MB.

Note. The species of the subsection are distributed in the Caucasus, Asia Minor, and to some extent in West Asia. The origin of these species is associated with the Caucasian Mountain region from where they could have spread to the south. In the development of the thin ciliate spines on the leaves and the long thin spines of the floral bracts, the species of the subsection approach the Central Asian species of the section *Echenais* (Cass.) Petrak, but in other characters, especially the structure of involucral bracts, they must be related to the section *Cirsium* and in habit stand closer to the subsection *Acaulia* Rouy.

99. *C. obvallatum* (MB.) MB. Fl. taur.-cauc. III (1819) 559; C.A.M. Verzeichn. 70; DC. Prodr. VI, 661; C. Koch in Linnaea, XXIV, 408; Ldb. Fl. Ross. II, 744; Boiss. Fl. or. III, 541; Somm. and Lev. in Nuov. Giorn. Bot. Ital. N. S. II, 1, II; Grossh. Fl. Kavk. IV, 186; Charadze in Fl. Gruzii, VIII, 512; in Fl. Azerb. VIII, 412.—*C. obvallatum* α . *pinnatipartitum* C. Koch and β . *pinnatilibum* C. Koch, loc. cit. (1851).—*Cnicus obvallatus* MB. Fl. taur.-cauc. II (1808) 279.—**Exs.:** Petrak, Cirsioth. Univ. Nos. 92, 134; Herb. Fl. cauc. No. 200.

Perennial. Rhizome nodulose, oblique, with numerous long, ligneous roots. Stem 100–150 cm high, ascending, with short branches above, more or less densely crisped-hairy, leafy to tip, brownish-purple. Leaves ovate-oblong or elliptical, sinuate to pinnately parted to middle or deeper into ovate, 2-fid or coarsely toothed lobes, more or less long-spinose, with deltoid-ovate, teeth narrowed into yellow, hard spines, 5–7 mm long, with isolated tiny spines between teeth, glabrous and bright-green above, with whitish prominent venation, pale green beneath, more or less densely crisped-hairy along veins; basal leaves to 30 cm long, 10 cm wide, pinnately incised into approximate, oblong-ovate segments, basally narrowed into more or less long, spatulate petiole; cauline leaves sessile, with broad, amplexicaul auricles, middle leaves pinnately parted, 10–15 cm long, 4–8 cm wide; upper leaves shallowly pinnately lobed, with approximate, long-spinescent teeth;

apical leaves at base of capitula many, linearly-lanceolate or linear, whitish-green, toothed ciliate, with long and thin spines, surrounding involucre as spathe and usually not surpassing it. Capitula solitary or in clusters of 2-3 at tips of stem and branches. Involucre globose-ovate, to 2-2.5 cm in dia, glabrous; involucre bracts imbricate, from outer ovate-oblong to inner oblong-lanceolate, glabrous, stramineous beneath, weakly carinate above, greenish-brown, spinescent with yellowish spine. Florets 18 mm long, whitish or pale yellow; corolla with narrow tube 8.5 mm long, limb lobed almost to 2/3. Achenes 4.5 mm long, with thin, reddish-brown streaks; pappus 16 mm long, slightly brownish- to light reddish-brown or sordid-white, with thin, sparse, plumose hairs, inner hairs with filiform tips. Flowering July to September.

Subalpine zone, as a component of tall-herb vegetation, in mountain pastures as weed.—*Caucasus*: throughout high-mountain regions. *General distribution*: Asia Minor, Armenia and Kurdistan, Iran. Described from Kabarda. Type in Leningrad.

Note. It is variable in the form of the cauline leaves and the length and number of the flora bracts. Var. *iranicum* Bornm. (Parsa, *Fl. Iran*, III, 1943) has been described for Iran.

C. obvallatum (MB.) MB. readily hybridizes with species of the sections *Cirsium* and *Echenais*. Among them the following merit mention.

1. *C. subinerme* Fisch. and Mey. \times *C. obvallatum* (MB.) MB.—*C. elodes* \times *C. obvallatum*, 1) f. *delizhanicum* Petrak in *Vestn. Tifl. Bot. Sada*, Nov. Ser. 2 (1926) 45, 2) f. *obvallatiforme* Petrak, *ibid.* 46, and 3) f. *subelodes* Petrak *ibid.* 47.

Caucasus: Southern Transcaucasia. All three forms are described from Shakhdag Mountain on the Gyuinei shore of Lake Sevan (collections of Grossheim and Edelmeyer).

The three hybrids described by Petrak from Bozdag are intermediate between *C. obvallatum* (MB.) MB. and *C. subinerme* Fisch. and Mey. The following can be considered intermediate characters: more or less decurrent leaves, varying from almost entire to deeply pinnately divided; spinosity of leaves; nature of their pubescence, from almost glabrous to more or less arachnoid-hairy, yellowish color of the corolla in specimens lacking characteristic, broadened apical leaves; or the presence of apical leaves surpassing capitula.

2. *C. simplex* C.A.M. \times *C. obvallatum* (MB.) MB.—*C. \times kozlowskyi* Petrak in *Izv. Kavk. Muz.* VIII, 1-2 (1914) 76; Kolak. *Fl. Abkhazii*, IV (1949) 276.—**Exs.**: Pl. or. exs. No. 174.

Caucasus: Western Transcaucasia (Abkhazia), Southern Transcaucasia (Bakuriani).

The hybrid was described by Petrak from specimens from Bakuriani and later observed by A.A. Kolakovsky in the Katsirkha Range together with the parental species. Kolakovsky notes a wide range of variation in the hybrid forms and the presence of a series of intermediates from the one species to the other. Variation in the form of the leaves has been reported—from narrower as in *C. simplex*, to relatively broad and deeply pinnately divided, which approaches *C. obvallatum*, but usually almost glabrous beneath. With reddish florets and the presence of dark brown bands on the involucre bracts, the hybrid forms are closer to *C. simplex* and with the broader leaf lobes look like *C. obvallatum*.

100. *C. simplex* C.A.M. Verzeichn. (1831) 70; in Mém. Acad. Sc. Pétersb. VI, sér., sc. nat. VI, 49; DC. Prodr. VI, 652; Ldb. Fl. Ross. II, 742; Boiss. Fl. or. III, 542, excl. var.; Petrak in Tr. Tifl. Bot. Sada, 200 XII, 1, 29, 45; in Vestn. Tifl. Bot. Sada, 24, 12; in Izv. Kavk. Muz. VIII, 1–2, 62, excl. spp.; Grossh. Fl. Kavk. IV, 188, excl. var.; Charadze in Fl. Gruzii, VIII, 511.—*Exs.*: Petrak, Cirsioth- Univ. No. 132.

Perennial. Rhizome with string-like roots, densely covered with remnants of basal leaves. Stem ascending, 15–50 cm high, weakly flexuous, simple, lacking simple hairs, but with scattered crisped hairs, often purple, leafy to tip. Leaves glabrous on both sides, entire or sinuate-toothed, densely ciliate, with thin, more or less long spines; basal leaves numerous, broadly-lanceolate or oblong-obovate to linearly-lanceolate, 9–25 cm long, 17–25 mm wide; cauline leaves like basal, gradually reduced toward stem tip, surpassing internodes; apical leaves lanceolate, long-spinose, as long as capitula or somewhat surpassing them. Capitula solitary at tips of stem, or 2–3, subsessile, obconical, with florets 2.5 cm long, and 1.5 cm in dia in middle. Involucre bracts usually dark purple, from outer ovate to middle oblong-lanceolate, short-spinose; inner bracts linearly-lanceolate, narrowed into scarious tip. Florets purple-red, to 20 mm long; limb to 12 mm long. Achenes light reddish-brown, 3.5 mm long; pappus silvery-white, slightly yellowish basally, with few, thin, apically scabrous hairs. Flowering July to August.

Alpine and occasionally subalpine zone, in swampy meadows, near streams, on overgrown moraines, usually to 2,700 m.—*Caucasus*: Ciscaucasia, Eastern and Western Transcaucasia. Endemic. Described from Western Caucasus. Type in Leningrad.

101. *C. armenum* DC. Prodr. VI (1837) 647; Somm. and Lev. in Nuov. Giorn. Bot. Ital. N. S. II, 1, 17.—*C. simplex* β . *armenum* Boiss.

Fl. or. III (1875) 543.—*C. simplex* ssp. *armenum* Petrak in Izv. Kavk. Muz. VIII, 1–2 (1914) 63.—*C. simplex* var. *armenum* Grossh. Fl. Kavk. IV (1934) 188.—Exs.: Sint. It. Orient. No. 7169.

Perennial. Rhizome horizontal, short. Stem leafy, 30–45 cm high, sulcate, purple, simple, with scattered arachnoid hairs. Leaves linearly-lanceolate, subglabrous or with more or less scattered arachnoid hairs on both sides, pinnately lobed, with deltoid- or rotund-toothed lobes, densely long ciliate-spinous, usually with longer, hard, and short thin spines; basal leaves to 25 cm long and 2.8 mm wide, narrowed at base into winged petiole; cauline leaves sessile, with auricles decurrent on petioles, acuminate, surpassing internodes; apical leaves at base of inflorescence, somewhat surpassing it. Capitula at tips of stems, in clusters of 4–5, occasionally solitary, 2.3–2.8 mm in dia, subsessile, forming racemose-capitate general inflorescence. Involucral bracts
201 elongately lanceolate, greenish, subglabrous or with weakly scabrous, narrowed into elongate, yellowish spine; inner bracts linearly lanceolate, spinulose. Florets yellowish; corolla about 18 mm long; limb about 12 mm long. Achenes 3.5 mm long; pappus yellowish-white, with few thinly setose hairs at apex. Flowering July to August.

Swampy meadows, in subalpine zone.—*Caucasus*: Southern Transcaucasia. *General distribution*: Asia Minor, Armenia and Kurdistan. Described from Erzerum. Type in Paris; isotype in Leningrad.

Note. The isolated range together with stable morphological characters, such as, for example, the yellow color of the corolla, dentition of the leaves, and the presence of sturdier spines, give this species a distinct appearance, readily distinguishing it from *C. simplex* C.A.M. The latter species extends to the region of the Western Caucasus and Transcaucasia. *C. armenum* DC., described from eastern Anatolia, geographically replaces *C. simplex* C.A.M.

Subsection 9. Acaulia Petrak in Beih. Bot. Central-bl. XXXV, II, 2–3 (1917) 258; Kitam. in Acta Phytot. et Geobot. III, 1 (1934) 3.—Plants stem less or almost stem less, occasionally with distinct stem, and then stem short, leafy, simple. Capitula clustered at stem tip, occasionally solitary, usually more or less numerous, in center of basal rosette, usually with floral leaves at base, occasionally without them, globose or ovate-oblong, medium- or large-sized. Involucral bracts scatteredly hairy or subglabrous; outer and inner involucral bracts usually appressed, with straight or somewhat falcately recurved tip, short-spinescent, occasionally with long, hard spine, sometimes scabrous and ciliate on margin from middle to tip, gradually longer from outer to inner; inner bracts linear, long-acuminate, sometimes with unevenly incised-toothed, more or less expanded ligulate tip. Pappus almost as

long as florets, scarcely longer or shorter. Achenes not more than 4 mm long.

Type of subsection: *C. acaule* (L.) Scop.

The species of the subsection are distributed in North America and Eurasia.

102. *C. esculentum* (Sievers) C.A.M. in Mém. Acad. Sc. Pétersb. VI, sér., sc. nat. VI (1849) 42 (excl. var. β .) diagn.; in Beitr. Pfl. Russ. Reich. 5, 43; Nym. Consp. Fl. Eur. I, 407; Korsh. Tent. Fl. Ross. or. 247; Schischk. in Fl. Zap. Sib. XI, 2894.—*C. esculentum* α . *sibiricum* C.A.M. op. cit. (1849) 43, a) *Acaule* C.A.M. op. cit. 43, and b) *Caulescens* C.A.M. op. cit. 44.—*C. esculentum* var. *acaulis* Trautv. in Bull. Soc. Nat. Mosc. XXXIX, 2 (1866) 377; Schischk. op. cit. 2895.—*C. gmelini* Tausch in Flora, XI, 31 (1828) 482; Turcz. Fl. baic.-dahur. II, 1, 127.—*C. acaule* Ldb. Fl. alt. IV (1838) 11, excl. syn. p. max. p. non Scop.—*C. acaule* β . *sibiricum* Ldb. Fl. Ross. II (1846) 743; Schmalh. Fl. II, 106.—*C. acaule* γ . *gmelini* DC. Prodr. VI (1837) 652.—*Cnicus esculentus* Sievers in Pall. Neust. Nord. Beitr. III (1796) 362; Georgi, Besch. Russ. Reich. III, 4, 1225.—*Cnicus gmelini* Spreng. Hist. Rei Herb. II (1808) 270.—**lc.**: Gmel. Fl. sibirica, II (1749) tab. XXV.

Perennial. Rhizome reduced, turnip-shaped, with numerous fibrous roots. Stem to 35 cm high (var. *caulescens* Trautv.), sulcate, crisped-hairy or plants stemless (var. *acaule* Trautv.). Basal leaves numerous, narrowed into spinose-toothed elongate petiole, elongately oblong-lanceolate, 12–30 cm long, on both sides densely covered with flexuous hairs, arachnoid-hairy beneath along midrib, more or less deeply pinnately incises into broad, ovate-deltoid crenate-toothed lobes, spinulose along margin, teeth, spinulescent; cauline leaves smaller than basal, somewhat decurrent, with spinose-toothed petiole; apical leaves at base of capitula 1–3, small, almost as long as capitula or somewhat longer. Capitula clustered at stem tip in capitate inflorescence, occasionally solitary, axillary, on short peduncles (var. *caulescens* Trautv.), often subsessile, clustered in center of basal rosette, usually 5–12 (var. *acaule* Trautv.), oblong, to 3 cm in dia, cm long. Involucre glabrous, with elongate bracts; outer bracts ovate-lanceolate to broadly-lanceolate, lower bracts to 10 mm long, gradually elongating inward, narrowed into long obtuse tip, spinulescent, yellowish or greenish, sometimes purple, denticulate-ciliate; inner bracts elongate, more or less linearly-lanceolate, narrowed into recurved scarious point. Florets red, to 27 mm long; corolla tube to 14 mm long; limb unequally 5-fid. Pappus sordid-white, to 28 mm long, almost as long as florets or somewhat longer, with numerous filiform hairs; achenes to 4.5 mm long, yellow-

ish-grayish, compressed, indistinctly finely ribbed throughout. Flowering July to September.

Steppe region, on solonchaks, in wet saline meadows, along river banks, in low-herb vegetation of mountain meadows.—*European Part*: Volga-Kama, Middle Dnieper, Volga-Don, Trans-Volga, Black Sea Region, Lower Don, Lower Volga; *Western Siberia*: Upper Tobol, Irtysh, Altai; *Eastern Siberia*: Angara-Sayans, Dauria; *Soviet Central Asia*: Lake Balkash Region, Dzhungaria-Tarbagatai. *General distribution*: Dzhungaria-Kashgaria, Mongolia (northern). Described from Soviet Central Asia (Lake Balkhash Region). Type in Leningrad.

Note. It is distinguished from the closely related species distributed in Eurasia by the numerous capitula clustered at the stem tip, elongate, more or less large involucre bracts, and pappus a little longer than the florets with fruits.

The following hybrid is known: *C. vulgare* (Savi) Ten. × *C. esculentum* (Sievers) C.A.M.—*C. ispolatovii* Iljin (*C. lanceolatum* × *C. esculentum*) in *Izv. Bot. Sada Akad. Nauk SSSR*, XXX, 3–4 (1932) 351.—By its tall stem and decurrent leaves and also by the form of the involucre bracts it is closer to *C. vulgare* (Savi) Ten.

It resembles *C. esculentum* (Sievers) C.A.M. in having the capitula clustered in a dense inflorescence at stem tip.—*European Part*: Trans-Volga (Buguruslan District).

103. ***C. rhizocephalum*** C.A.M. Verzeichn. (1831) 70; in *Mém. Acad. Sc. Pétersb.* VI ser., sc. nat. VI (1849) 46; DC. *Prodr.* VI, 651; Ldb. *Fl. Ross.* II, 744; Boiss. *Fl. or.* III, 542; Bornm. in *Beih. Bot. Centralbl.* XX, Abt. II, 2, 162; Grossh. *Fl. Kavk.* IV, 488; Charadze in *Fl. Gruzii*, VIII, 512; in *Fl. Turkm.* VII, 242.—*C. rhizocephalum* β. *caulescens* Boiss. l. c. (1875) 542; Lipsky, *Fl. Kavk.* (1899) 359.—*C. rhizocephalum* γ. *sinuatum* Boiss. loc. cit. p. p. (excl. syn.).—*C. grumosum* Fisch. and Mey. in C.A.M. op. cit. (1849) 48.—*C. esculentum* β. *caucasicum* C.A.M. op. cit. (1849) 44; C. Koch in *Linnaea*, XXIV, 405.—*C. esculentum* var. *caucasicum* Grossh. *Fl. Kavk.* IV (1934) 188.—*C. esculentum* var. *caucasicum* f. *caulescens* Grossh. *Fl. Kavk.* IV (1934) 188.—*C. esculentum* ssp. *caucasicum* (C.A.M.) Petrak in *Tr. Tifl. Bot. Sada*, XII, 1 (1912) 45.—*C. acaule* Ldb. *Fl. Ross.* II (1846) 743 p. min. p. non Scop.—*Exs.*: *Herb. Fl. cauc.* No. 198; Petrak, *Cirsioth. Univ.* No. 131.

Perennial. Rhizome short, thick, with cluster of string-like roots. Plants stemless, with capitula clustered in center of rosette in inflorescence, or stem short, to 25 cm high (var. *caulescens* Boiss.), simple or with short branches, weakly angular, more or less densely crisped-hairy with articulate hairs. Basal leaves numerous, rosulate,

elongately elliptical or oblong-lanceolate, 7–25 cm long, 2–3 cm wide, short-acuminate, narrowed into short narrow-winged petiole with thin yellowish spines, 3–5 (10) mm long, pinnately parted into approximate, roundish or deltoid-ovate, indistinctly 2–3-fid lobes, toothed, abruptly narrowed into more or less long spine to 10 mm long, usually shallowly-pinnately parted, occasionally almost entire, subglabrous above or with scattered flexuous hairs along midrib, pubescent beneath; cauline leaves distant, linearly-lanceolate, lobate, long-spinose, basally narrowed, with narrow wing decurrent on stem; apical leaves at base of capitula linearly-lanceolate or narrowly-linear, long pinnate-spinose, usually 2–3, as long as capitula or surpassing them. Capitula ovate, 1.5–3.5 cm in dia, in clusters of 3–5(7) in center of basal rosette, often forming racemose general inflorescence. Involucre glabrous, imbricate, usually greenish or purple above; bracts lanceolate, outer ones appressed, narrowed into thin, yellowish, spines, 5 mm long, sparsely ciliolate from middle to tip along margin; inner bracts linearly-lanceolate, gradually longer from middle to inner, narrowed into short, purple tip. Florets 25–27 (28) mm long, pink, occasionally whitish; limb slightly shorter than corolla tube, inequally 5-fid to middle. Pappus at end of flowering and fruiting almost as long as florets, usually to 27 mm long, sordid-white, with numerous, apically plumose, filiform hairs; achenes yellowish, with reddish-brown streaks, to 4 mm long. Flowering July to September.

Mid-montane to alpine zone, in wet places, usually as weed in low-herb meadows and secondary carpet-like meadows of subalpine and alpine zones.—*Caucasus*: throughout Caucasus; *Soviet Central Asia*: mountainous Turkmenia. *General distribution*: Armenia and Kurdistan, Iran. Described from Eastern Caucasus (Tfandag). Type in Leningrad.

Note. It varies greatly in the leaf lobing and the length of the spines of the outer involucreal bracts and leaves; stemless forms predominate. From *C. esculentum* (Sievers) C.A.M., to which this species was referred in part by authors of the Caucasian flora as var. *caucasicum* C.A.M., it is distinguished by the form of the narrower bracts, usually tapered to more or less elongate spines, fewer capitula, a pappus not longer than the florets, and other small differences. From the European species *C. acaule* (L.) Scop., it is well distinguished by the root system and the imbricate, narrower outer involucreal bracts. *C. frickii* Fisch. and Mey., described from the Caucasus, differs from this species by having somewhat taller growth and larger terminal capitula.

C. rhizocephalum C.A.M., reported for eastern Anatolia and Kurdistan, has been cited for Iran (Parsa) and also for Afghanistan (Petraik, Kitamura). Possibly, *C. brevipapposum* Tschern. described

from Soviet Central Asia and close to *C. rhizocephalum* C.A.M., grows in Afghanistan. Specimens resembling *C. brevipapposum* Tschern. are also known from the Caucasus, and, possibly, they were cited by Meyer as *C. esculentum* β . *caucasicum* α) *rhodanthum* C.A.M. (op. cit. 1849, 44).

104. *C. frickii* Fisch. and Mey. in Mém. Acad. Sc. Pétersb. VI sér., sc. nat. VI (1849) 47; Grossh. Fl. Kavk. IV 188; Charadze in Fl. Gruzii, VIII, 512.—*C. esculentum* ssp. *frickii* Petrak in Tr. Tifl. Bot. Sada, XII, 1 (1912) 29.

Resembles the preceding species; differs from it in the following characters: stem well developed, to 50 cm high; capitula solitary, terminal, to 5 cm in dia, and smaller axillary; strongly elongated leaves, pinnately divided in broadly-deltoid, toothed, long-spinose lobes; yellowish(?) florets. Flowering August.

Forest zone.—*Caucasus*: Southern Transcaucasia. Described from southern Georgia (Tsalka). Endemic. Type in Leningrad.

105. *C. brevipapposum* Tschern. in Fl. Uzbek. VI (1962) 517, 373, Plate XXXIV, Fig. 2.—*C. acaule* auct. non Scop.: O. and B. Fedtsch. Perech. Rast. Turk. IV (1911) 248 p. p.—*C. esculentum* auct. fl. As. Med. et Cauc. p. p. non C.A.M.

Perennial. Rhizome short, thick. Basal leaves numerous, deeply (up to midrib) sinuate-pinnately divided into 4–5-toothed ovate-deltoid lobes; teeth subacute, with thin, hard spines, usually to 5 mm long; cauline leaves thinly spinose-ciliate, glabrous on both sides, on midrib crisped-hairy, more or less long-acuminate, on short, long-spinose petioles, oblong-lanceolate, lower leaves 10–12 cm long, up to 3 cm wide. Capitula to 2 cm in dia, in clusters of up to 5 in center of basal rosette. Involucre more or less purple; outer involucre bracts glabrous, smooth along margin or scabrous from middle; middle bracts to 14 mm long, ovate-oblong, weakly narrowed above into elongate, obtuse, spinescent tip with scarcely noticeable spine; inner bracts to 20 mm long, linearly lanceolate, glabrous, acute. Corolla to 23 mm long; limb to 10 mm, inequally 5-fid almost to 1/2. Pappus shorter than florets, to 17 mm long, sordid-white, reddish-brown to brown below, with few more or less equal hairs, inner hairs with filiform tips. Flowering July to August.

Mountain meadows.—*Caucasus* (rarely in high-mountain regions); *Soviet Central Asia*: Tien Shan, Pamiro-Alai. Described from pamiro-Alai. *General distribution*: ?Asia Minor. Type in Tashkent.

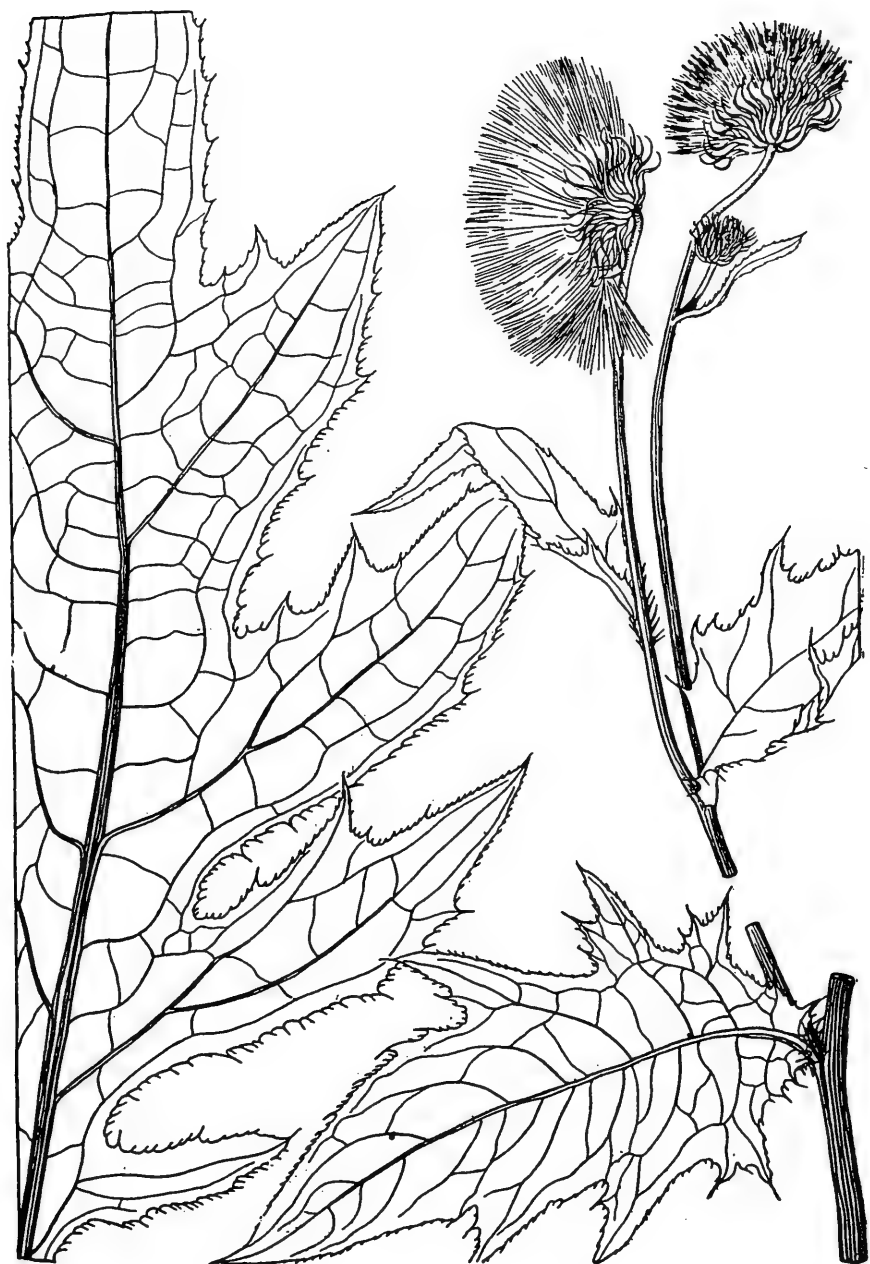
Note. It differs from *C. rhizocephalum* C.A.M. by having involucre bracts that are smooth along the margin, with a scarcely noticeable

apical spine and reddish florets. From *C. esculentum* (Sievers) C.A.M., it differs by having a short pappus and smaller capitula.

106. *C. acaule* (L.) Scop. Fl. Carn. ed. 2, II (1772) 131 (acaulos); Lam. Fl. Fr. II (1778) 26 (acaulos); All. Fl. Pedem. I, 153; DC. Prodr. VI, 652 p. p. excl. var.; Koch, Syn. (1837) 398, ed. 3, II (1902) 1544; Fedtsch. and Fler. Fl. Evrop. Ross. 1012.—*C. acaule* var. *genuina* Briq. and Cav. in Burnat. Fl. Alp. Mar. VII (1931) 47.—*C. acaule* var. *acaule* Arénes in Bull. Jard. Bruxelles, XXIV, 4 (1954) 267.—*C. allionii* Sch. and spenn. Fl. Frib. III (1829) 1079.—*Carduus acaulis* L. Sp. pl. ed. 2 (1763) 1156.—*Cnicus acaulis* Willd. Fl. Berol. Prodr. (1787) 260; Willd. Sp. pl. III, 3 (1803) 1681.—*Onotrophe acaulis* Cass. in Dict. Sc: nat. XXXVII (1825) 148.—*lc.*: Rchb. Ic. Fl. Germ. XV (1852) tab. 840, I and II (var. *caulescens*); Coste, Fl. Fr. II (1903) 375; Fiori and Paol. Ic. Fl. Ital. (1904) 453; Fedtsch. and Fler. loc. cit. Fig. 1014; Javorka and Csapody, Iconogr. Fl. Hung. 540, fig. 3872; Hegi, Ill. Fl. VI, 2, fig. 577, 578.—*Exs.*: Hult. Pl. Suec. exs. (1946) No. 1584.

Perennial. Rhizome oblique, somewhat thickened, ligneous, with long string-like roots. Plants almost stemless or with stems 7–9 cm high. Stems leafy, more or less crisped-hairy, solitary of 2–3, occasionally elongate shoots in center of basal rosette with solitary terminal capitula. Leaves rosulate, 12–16(20) cm long, oblong, to 3 cm wide, sinuate-pinnately lobed almost to base, with approximate, roundish, 2–3-fid lobes, often with subacute strongly spinescent teeth with spines to 5 mm long, setose-spinose; leaves narrowed into strongly reduced long-spinose petiole, subacute; cauline leaves 6.5–10.0 cm long, up to 2.5 cm wide, sessile, subglabrous or scatteredly hairy above, more or less densely pubescent with crisped, articulate, brownish hairs beneath on veins; upper cauline leaves small, 2–4 cm long. Capitula subsessile, in rosula of basal leaves, solitary or 2–3, on short peduncles, oblong, 1.3–2.3 cm in dia, 3.0–3.3 cm long. Involucre imbricate; outer bracts ovate or ovate-lanceolate, subobtusate, spinulescent, ciliolate on upper margin; inner bracts linearly-lanceolate, 2 times as long as middle, slightly broadened at apex, scarious, subacute, with distinct spine. Florets red; corolla to 32 mm long; corolla tube about 20 mm long, limb inequally 5-parted to deeper than middle. Pappus 25 mm long, sordid-white, whitish above, with apically scabrous inner hairs; achenes 3–4 mm long. Flowering August to September.

Dry low-herb meadows, pastures, along forest edges, heathers, roadsides, from lowlands to alpine zone.—*European Part*: Baltic Region, Ladoga-Ilmen, Upper Dnieper. *General distribution*: Scandinavia, Central Europe, Atlantic Europe, Mediterranean, Balkans (northwestern). Described from western Europe. Type in London.



Note. It differs from the closely related species by having outer involucre bracts that are shorter than the inner ones and 1–3 capitula on each plant, and from *C. esculentum* (Sievers) C.A.M. it is distinguished also by the pappus, which is not as long as the florets, and by an unthickened rhizome.

Section 6. Pseudo-eriolepis (Nakai) Kitam. in Acta. Phytot. et Geobot. III, 1 (1934) 2; Comp. Japon. I, 37.—*Pseudo-eriolepis* Nakai in Tokyo Bot. Mag. XXVI (1912) 357, pro subgen.—*Breea* Sch. Bip. ex Maxim. in Bull. Acad. Sc. Pétersb. XIX (1874) 510 and in Mém. Biol. IX, 331 p. p. pro subgen. non *Breea* Less. (1832) pro gen.—Capitula nodding, lacking leaves. Involucre ovate, basally bulged; involucre bracts deflexed, linear, spinescent, outer 1/2 as long as inner. Florets with long filiform corolla tube, 4–5 times as long as limb almost to base 5-parted. Pappus at fruiting almost as long as florets. Basal leaves withering early; cauline leaves not decurrent on stem, pinnatifid.

Type of section: *C. pendulum* Fisch.

Note. Of the two eastern Asian species of this section, only one is widespread in Eastern Siberia and in the Far East. *C. pendulum* Fisch., in the structure of florets, exhibits affinity to the section *Cephalonoplos* (Neck.) DC. With its large nodding capitula and form of the involucre bracts and leaves, it approaches members of the subsection *Sinocirsium* Kitam.

107. ***C. pendulum*** Fisch. in DC. Prodr. VI (1837) 650; Ldb. Fl. Ross. II, 739; Maxim. Prim. fl. amur. 173, excl. syn. β . *oligocephalum* Trautv. and Mey.; Rgl. Tent. Fl. Ussur. 95; Turcz. Fl. baic.-daur. II, 1, 126; Korsh. in Tr. Peterb. Bot. Sada, XII, 2, 361; Kom. Fl. Man'chzh. III, 749; Nakai in Tokyo Bot. Mag. XXVI, 357; Kom. and Alis. Oprod. Rast. Dal'nevost. Kr. II, 1085; Kitam. Comp. Japon. I, 37; Popov, Fl. Sr. Sib. II, 752.—*Cnicus pendulus* Maxim. in Bull. Acad. Sc. Pétersb. XIX (1874) 510 and in Mém. Biol. IX, 332.—**lc.:** Makino, Nature Col. Wild. Pl. II (1933) 82, var.; Terasaki, Jap. Bot. Illustr. Album (1933) 487.

Perennial. Rhizome with numerous ligneous roots. Stem hard, 1–2 m high, sulcate, weakly angular, more or less branched, sparsely hairy below, more or less densely arachnoid-hairy above, thinly grayish-tomentose below capitula. Leaves glabrous, larger below, numerous, deeply twice pinnately incised into unevenly sinuate-toothed lobes, glaucescent beneath, spiny-setose, teeth and lobes narrowed into spines to 4–5 mm long; basal leaves withering early, oblong-elliptical, 25–35 cm long, 7–8 cm wide, gradually narrowed into petiole; lower cauline

leaves to 15 cm long, short-petiolate or sessile, upper leaves reduced, to 5 cm long, sessile. Capitula nodding from base, numerous, in racemose-paniculate inflorescence in upper part of stem and on axillary branches. Involucre basally with roundish prominence, at beginning of flowering 1.5–2.5 cm in dia, at fruiting 3.5–5.0 cm in dia, scarcely arachnoid-hairy; involucre bracts narrowly-linear or linearly-subulate, dark green or brownish-purple, spinulescent; inner bracts narrowly-linear, membranous, apically scarious, slightly deflected. Florets red, numerous, usually somewhat exerted from capitula; corolla to 23 mm long or slightly shorter, with long, narrow tube, 3–4 times as long as broad limb more than 1/2 lobed. Pappus 20–21 mm long, light reddish-brown; achenes 3.5 mm long, brownish, above with narrow border, basally narrowed. Flowering July to September.

Moist meadows, forest edges, near streams, in river valleys, along banks of peat bogs.—*Eastern Siberia*: Angara-Sayans (Irkutsk, Balagansk), Dauria; *Far East*: Zeya-Bureya (Amur-Bureya Lowland), Uda River area (Lower Amur), Ussuri (along Amur and Ussuri rivers), Sakhalin. *General distribution*: China (northeastern), Japan (Nippon, Yezo), Korean Peninsula. Described from Dauria. Type in Geneva; isotype in Leningrad.

Note. *C. pendulum* Fisch. stands alone among the eastern Asian species of the genus, distinguished by narrow, elongate, outer involucre bracts, a very narrow corolla tube several times as long as its limb, and numerous capitula nodding from the base. Japanese botanists attach a somewhat exaggerated importance to these characters. For example, Nakai (1912) places this species in the separate subgenus *Pseudo-eriolepis* Nakai, although Kitamura (1934) considers it possible to treat *Pseudo-eriolepis* as a section. Nodding capitula are not typical of either the European or the Siberian species of the genus, but are found in the eastern Asian species as well as in the group of Caucasian species usually placed in the Mediterranean-Western Asian section *Epitrachys* DC. and segregated by us as the section *Caucasigena* Charadze. *C. pendulum* Fisch. in the structure of its corolla approaches species of the *C. arvense* (L.) Scop. alliance. Regel and Tilling described a variety β . *oligocephalum* Rgl. and Till. from Ayana; this variety, in fact, should be transferred to *C. schantarensis* Trautv. and Mey., which was correctly pointed out already by Herder. Varieties α . *genuinum* Herd., β . *microcephalum* Herd. and γ . *recurvum* Regl. described by Herder in *C. pendulum* apparently have no taxonomic importance.

Section 7. Cephalonoplos (Neck.) DC. Prodr. VI (1837) 643; Endl. Gen. pl. (1836–1840) 478; Turcz. Fl. baic.-dahur. II, 1 (1856) 125; O.

Hoffm. in Pflanzenfam. IV, 5 (1893) 322.—*Cephalonoplos* Neck. Elem. Bot. I (1790) 68, pro gen.; Nevsky in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 4 (1937) 290; Kitam. Comp. Japon. I (1937) 134.—*Cirsium* subgen. *Cephalonoplos* Nakai in Tokyo Bot. Mag. XXVI (1912) 355.—*Cirsium* sect. *Breea* (Less.) Boiss. Fl. or. III (1875) 525.—*Breea* Less. Syn. Comp. (1832) 9.—*Cnicus* Benth. in Benth. and Hook. f. Gen. pl. II (1873) 468 p. p.—*Cnicus* subgen. *Breea* Sch. Bip. ex Maxim. in Bull. Acad. Sc. Pétersb. XIX (1874) 510 and in Mél. Biol. IX (1874) 331 p. p.—*Carduus* Baill. Hist. des Plantes, VIII (1882) 74 p. p.—Plants dioecious; capitula homogamous with numerous florets. Involucre oblong; involucre bracts many-rowed, imbricate, appressed, outer ones with short spinescent tip, inner ones elongate, apically scarious. Limb in staminate florets 5-parted to more than 1/2 corolla tube 2 times as long as limb; filaments papillose or glabrous. Pistillate florets filiform; corolla tube 4–5 times as long as limb, 5-parted almost to base. Pappus at flowering shorter than corolla, at end of flowering 210 elongating and at fruiting longer than florets; achenes 4 mm long. Perennial plants with rooted underground stem; stem strongly branched above.

Type of section: *C. arvense* (L.) Scop.

Note. The majority of authors treats *Cephalonoplos* as part of *Cirsium*. The structure of florets characterized by a long and narrow corolla tube, which is several times as long as the limb, development of unisexual florets in the capitula, and dioecy, serves as the justification of some authors, such as Kitamura (1937, 1939) and Nevskii (1937), for placing species of the section *Cephalonoplos* in a separate genus. Among present-day *Cirsium*, we find transitions to species of *Cephalonoplos*. The closest to them in the length of the pappus and structure of the corolla is the eastern Asian *C. pendulum* Fisch., which otherwise has little in common with this group. A pappus almost as long as florets is also characteristic of the members of the subsection *Acaulia* Petrak. Evidently, *C. arvense* (L.) Scop. often forms hybrids with members of the section *Cirsium*, which also provides a basis for putting this group of species in a separate genus. A study of the pollen of the genus *Cirsium* (Shtepa, 1961) also showed that in the structure of the pollen the species of this section should be referred to *Cirsium* Mill.

108. ***C. setosum*** (Willd.) MB. Fl. taur.-cauc. III (1819) 560 p. p. excl. pl. cauc.; DC. Prodr. VI, 643; Ldb. Fl. alt. IV, 10; Schischk. in Fl. Zap. Sib. XI, 2896 p. max. p.—*C. setosum* β . *subulatum* Ldb. Fl. alt. IV (1833) 10.—*C. setosum* var. *subulatum* Schischk. op. cit. 2897.—*C. arvense* auct. p. p. non Scop.: Ldb. Fl. Ross. II (1846) 734;

Klok. in Vozn. Rosl. URSR, 569.—*C. arvense* γ . *setosum* Ldb. Fl. Ross. II (1846) 753; Kryl. Fl. Alt. III (1904) 697.—*C. arvense* *C. setosum* Schmalh. Fl. II (1897) 106.—*C. arvense* var. *setosum* Kom. Fl. Man'chzh. III (1907) 749; Fedtsch. and Fler. Fl. Evrop. Ross. 1012; Nakai in Tokyo Bot. Mag. XXVI, 355; Miyabe and Miyake Fl. Saghal. (1915) 272.—*C. arvense* ssp. *setosum* Iljin in Fl. Yugo-Vost. VI (1936) 408.—*C. arvense* γ . *setosum* f. *subulatum* Ldb. Fl. Ross. II (1846) 735.—*C. arvense* γ . *integrifolium* Wimm. and Grab. Fl. Siles. II, 2 (1829) 92; Koch, Syn. (1837) 400.—*C. laevigatum* Tausch in Flora, XI, 31 (1828) 483 (excl. syn. Gmel.).—*C. argunense* DC. Prodr. VI (1837) 644; Turcz. Fl. baic.-dahur. II, 1, 125.—*Cnicus setosus* Bess. Prim. Fl. Galic. II (1809) 172.—*Cnicus arvensis* γ . *setosus* Maxim. in Bull. Acad. Sc. Pétersb. XIX (1874) 51 and in Mém. Biol. IX, 333.—*Serratula setosa* Willd. Sp. pl. III, 3 (1803) 1664.—*Cephalonoplos setosum* (MB.) Kitam. in Acta Phytot. et Geobot. III, 1 (1934) 8; Comp. Japon. I, 135.— *Ic.*: Gmel. Fl. sibirica, II (1749) tab. XXII; Rchb. Ic. Fl. Germ. XV (1852) tab. 842, II; Sorn. Rast. SSSR, IV (1934) 287, Fig. 477.

Perennial. Rhizome vertical, robust, often with numerous rooted branches. Stem erect, (40)50–130 cm high, robust, weakly sulcate, usually ribbed, arachnoid-hairy above, glabrous below, with upward-spreading branches. Basal leaves withering after flowering; cauline leaves crowded in middle of stem, oblong-lanceolate or ovate-lanceolate, (5)10–20 cm long, 1.7–5.5 cm wide, obtuse, with tiny spines on margin, basally narrowed gradually, sessile, sometimes with winged lobes in lower part of stem, short-decurrent (var. *subulatum* Ldb.), undivided or coarsely and distantly sinuate-toothed tiny spiny-ciliate along margin, glabrous on both sides, usually green above, occasionally scatteredly somewhat floccose-arachnoid-hairy, pale green beneath or arachnoid-hairy; cauline leaves gradually reduced above, oblong-lanceolate or lanceolate, basally cuneately narrowed, spiny-ciliate, in inflorescence strongly reduced, usually undivided, 1.5 cm long, 0.5 cm wide. Capitula unisexual, numerous, in lax corymbose inflorescence, on slender peduncles, erect; staminate capitula ovate, to 13 mm long, 10 mm in dia, pistillate ones to 20 mm in dia, 16–20 mm long. Involucre weakly arachnoid-hairy, purple, basally obtuse; involucre bracts appressed, imbricate, lowermost strongly reduced, oblong-lanceolate, subacute, spinulescent, middle ones lanceolate, like outer brownish-purple above, narrowly scarious on margin; inner bracts linear, apically scarious, somewhat broadened, acuminate. Female florets 17 mm long, somewhat broadened, acuminate. Female florets 17 mm long, with corolla tube 3–5 times as long as limb, limb 5-parted almost to base. Pappus shorter than corolla, to 11 mm long, at fruiting to 22–24 mm;

pappus hairs brown, apically deflected, slightly thickened, plumose; achenes yellowish to reddish-brown, 2.5 mm long, compressed. Flowering July to August.

Forest and steppe zones; forest edges, riverbanks, on post-forest meadows, weed in fields, crops, along roads, old fields.—*European Part*: Dvina-Pechora, Ladoga-Ilmen, Volga-Kama, Trans-Volga, Lower Volga; *Western Siberia*: all regions; *Eastern Siberia*: all regions; *Far East*: Okhotsk, Zeya-Bureya, Uda River area, Ussuri, Sakhalin. *General distribution*: Central Europe, Dzhungaria-Kashgaria, Mongolia, Japan, northern China. Described from Silesia. Type in Berlin.

109. **C. incanum** (S.G. Gmel.) Fisch. ex MB. Fl. taur.-cauc. III (1819) 561; Fisch. Cat. Hort. Gorenk. 35, nom.; Ldb. Fl. alt. IV, 9; DC. Prodr. VI, 643; Grossh. Fl. Kavk. IV, 178; Schischk. in Fl. Zap. Sib. XI, 2898; Klok. in Vozn. Rosl. URSR, 570; Charadze in Fl. Gruzii, VIII, 516; in Fl. Turkm. VII, 244; in Fl. Azerb. VIII, 413.—*C. incanum* var. *pinnatilobum* Sosn. ex Grossh. l. c. (1934).—*C. arvense* δ . *incanum* Ldb. Fl. Ross. II (1846) 753; Kryl. Fl. Alt. III, 697.—*C. arvense* var. *incanum* O. and B. Fedtsch. Perech. Rast. Turk. IV (1911) 287.—*C. arvense* δ . *vestitum* Wimm. and Grab. Fl. Sil. II, 2 (1829) 92; Koch Syh. (1837) 400.—*C. arvense* ssp. *vestitum* Petrak in Schedis (1913); Arénes in Bull. Jard. Bruxelles, XXIV, 4, 272.—*C. arvense* var. *commune* f. *incanum* Beck. v. Monagg. Fl. Nied.-Oest. (1890) 1239.—*C. arvense* Vierh. in Oest. Bot. Zeitschr. LVII, 3 (1907) 108 p. p.—*C. arvense* ssp. *incanum* Iljin in Fl. Yugo-Vost. VI (1936) 408.—*Serratula incana* S.G. Gmel. Reise, I (1770) 155.—*S. ciliata* MB. Fl. taur.-cauc. II (1808) 267.—*Ic.*: S.G. Gmel. Reise, I, tab. 36; Rchb. Ic. Fl. Germ. XV (1852) tab. 842, III.—*Exs.*: Petrak, Cirsioth, Univ. Nos. 81, 82, 83.

Perennial. Rhizome virgate, with horizontal branches, rooting and developing rosula of almost undivided broadly elliptical leaves. Stems ascending, sulcate, thinly white-tomentose above, cymosely branched, to 100 cm high. Lower cauline leaves ovate or broadly-elliptical, 7–8 cm long, 3–4 cm wide, undivided or shallowly sinuate pinnately parted, white-tomentose, beneath, green above, glabrous or thinly arachnoid-hairy, ciliolate-spiny, narrowed at both ends, sessile, with long-spinescent oblong or obtuse lobes, spinose at base of leaves; upper leaves strongly reduced. Capitula 1–4, at tips of stem and branches on long peduncles, in corymbose inflorescence, usually oblong, apically narrowed, with florets exerted from capitula, pappus hairs in pistillate capitula longer than florets. Involucral bracts greenish, with short, purple, usually deflected spine, weakly arachnoid-hairy below; outer and middle bracts ovate, inner ones linearly-lanceolate. Corolla lilac-

red, to 15 mm long; corolla tube long, narrow, in pistillate florets much longer than limb; limb up to base 5-parted. Pappus sordid-white; achenes 3 mm long. Flowering May to August.

Forest-steppe and steppe zones, in mountains from lowlands to mid-montane zone, grows in thickets or singly along roads, on old fields, terraces in ravines of rivers and as weed in fields.—*European Part*: Crimea and southern regions of Ukraine; *Caucasus*: All regions; *Soviet Central Asia*: mountainous Turkmenia. *General distribution*: Central Europe (south), Balkans-Asia Minor, Armenia and Kurdistan, Iran. Described from eastern Ciscaucasia. Type in Leningrad.

110. *C. ochrolepideum* Juz. in Sorn. Rast. SSSR, IV (1935) 278; Charadze in Fl. Turkm. VII, 245.—*C. arvense* ssp. *hookerianum* Petrak in schedis.—*Cephalonoplos ochrolepideum* Nevsky in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 4 (1937) 290.—*C. arvense* var. *horridum* O. and B. Fedtsch. Perech. Rast. Turk. IV (1911) 287 p. p.

Perennial. Rhizome virgate, with lateral rooting branches, to 1–1.5 m long; stem yellowish, to 120 cm high, branched above, more or less arachnoid-hairy below capitula. Leaves oblong-lanceolate or broadly lanceolate, coriaceous, 8 cm long, 1.5–2 cm wide, glabrous on both sides, glaucescent or more or less finely arachnoid-hairy beneath; 213 unequally pinnately lobed, with crenate lobes, spinose, lobes and teeth tapered to spines up to 5 mm long. Capitula oblong, with florets 2.5 cm long, 13–15 mm in dia, with pale yellowish, glabrous, involucre bracts, sometimes (in staminate capitula) violet; outer bracts ovate or ovate-lanceolate, spinescent, inner narrow, linearly-lanceolate. Florets lilac; corolla to 15 cm long, corolla tube to 11 mm. Pappus hairs basally brown, to 20 mm long; achenes smooth or very weakly longitudinally sulcate, to 3.5 mm long. Flowering July to August.

Grain fields, on irrigated lands, in cotton fields along irrigation channels.—*Soviet Central Asia*: mountainous Turkmenia, Pamiro-Alai, Syr-Darya, Tien Shan. *General distribution*: Dzhungaria-Kashgaria. Described from Kugitang. Type in Leningrad.

111. *C. arvense* (L.) Scop. Fl. Carn. ed. 2, II (1772) 126; Wimm. and Gr. Fl. Siles, II, 2, 92 p. p. (*α. horridum* and *β. mite*); DC. Prodr. VI, 643, excl. var. b. Koch, Syn. (1837) 400 (*α. horridum* and *β. mite*); Ldb. Fl. Ross. II, 734 p. p.; Boiss. Fl. or. III, 552 p. p.; Vierh. in Oest. Bot. Zeitschr. LVII, 3, 107 p. p. (f. *mite* and f. *horridum*); Grossh. Fl. Kavk. IV, 177; Klok in Vizn. Rosl. URSR, 569 p. p.; Charadze in Fl. Gruzii, VIII, 515; in Fl. Azerb. VIII, 412; Hegi, Ill. Fl. VI, 2, 903; Majeovski, Fl. ed. 8, 602 p. p.—*C. arvense* ssp. *arvense* Arénes in Bull. Jard. Bruxelles, XXIV, 4 (1954) 269.—*C. arvense* ssp.

rubricaula Novopokr. in Engl. Bot. Jahrb. LXII (1929) 317.—*C. rubricaula* Novopokr. *ibid.* in adnot.—*C. horridum* Stank. in Stank. and Tal. Oprod. Vyssh. Rast. (1949) 664, non MB.—*Serratula arvensis* L. Sp. pl. (1753) 820; Willd. Sp. pl. III, 3, 1646.—*S. spinosa* Gilib. Fl. Lithuan. III (1781) 184.—*Cnicus arvensis* Hoffm. Deutschl. Fl. ed. 2, II (1804) 130.—*Carduus arvensis* Robins. Brit. Fl. (1777) 163.—*Breea arvensis* Less. Syn. Comp. (1832) 9.— **Ic.:** Rchb. Ic. Fl. Gern. XV (1852) tab. 842, I; Vierh. in Oest. Bot. Zeitschr. LVII, 3 (1907) 109 (f. *horridum* and f. *mite*); Javorka and Csapody, Iconogr. Fl. Hung. (1933) 541, fig. 3873 (*C. arvensis* f. *horridum*); Fiori, Fl. Ital. III (1933) No. 3712; Dostal. Květ. CSR (1950) 1673, tab. 554; Hegi, Ill. Fl. VI, 2 (1929), Taf. 271, fig. 1, pag. 889, fig. 605.— **Exs.:** Pl. Ital. exs. No. 993 (var. *horridum* Wimm. and Gr.); Petrak, Cirsioth. Univ. No. 59 (Var. *horridum* Wimm. and Gr.); Schultz. Herb. norm. n. s. No. 1853.

Perennial. Rhizome virgate, with horizontal rooting suckers. Stems hard, ascending, 50–150 cm high, sulcate and weakly angular, often reddish, glabrous or sometimes with scattered hairs, with short, vegetative, axillary branches below, branched above, below capitula often grayish-arachnoid-hairy. Leaves glabrous, glaucescent beneath or more or less finely arachnoid hairy, oblong or oblong-lanceolate; lower leaves 7–17 cm long, 1.5–4.5 cm wide, narrowed into more or less short petiole; upper leaves sessile, gradually reduced toward stem apex, narrowed at both ends, more or less deeply sinuately-pinnately parted
214 with roundish obtuse lobes, with 2–5 mm long spines; usually leaves soft, internodes lacking spines (f. *mite*) or more or less coriaceous and leaves at base of stem with long and thin spines, merging on internodes (f. *horridum*). Capitula ovate-oblong, 10–15 mm in dia, numerous on long, small-leaved peduncles, forming paniculate general inflorescence. Involucre imbricate, greenish or dark purple; outer involucral bracts thinly arachnoid-hairy on margin, with short deflected spine at apex; inner bracts linearly-lanceolate, acuminate, with scarious, purple tip. Florets lilac-pink; corolla to 15 mm long; corolla tube long, narrow, limb strongly reduced in pistillate capitula. Pappus sordid-white, yellowish below, hairs 20–22 mm long; achenes 2.5–4.0 mm long, yellowish or reddish-brown. Flowering July to September.

Forest and steppe regions, more rarely in mountainous areas; grows along forest edges, along roads, in old fields and crops as a weed.—*European Part:* in southern regions sporadically, in the north — Baltic Region; *Caucasus:* all region. *General distribution:* Scandinavia, Central Europe, Atlantic Europe, Mediterranean, Balkans-Asia Minor, North America (introduced). Described from western Europe. Type in London.

Note. Great variability and the presence of intermediate forms often make a clear delimitation of the species of the *C. arvensis* (L.)

Scop. alliance difficult. Out of the numerous forms and varieties reported for Western Europe, A.A. Grossheim cites the following varieties for the Caucasus: var. *commune* Beck., var. *mite* Koch, var. *horridum* Koch, var. *setosum* Koch, var. *obtusilobum* Beck.

Evidently, following Vierhapper (op. cit.), it is necessary to consider the varieties *mite* and *horridum* closest to the typical form of *C. arvense*. Vierhapper recognizes four forms: f. *mite*, f. *horridum*, f. *vestitum*, and f. *incanum*. He considers the typical form of the species the most widespread in Europe as being intermediate between *horridum* and *mite*. He distinguishes f. *vestitum* Wimm. and Grab. from *C. incanum*. The synonymy given for the four forms, however, needs verification. We recognize *C. incanum* (S.G. Gmel.) Fisch. ex MB., and f. *vestitum* Wimm. and Grab. should be considered a synonym of it. Usually, all more or less pubescent forms were treated by authors of the Russian flora as a variety of *C. incanum*. *C. incanum* is the southern vicariant race of *C. arvense* (L.) Scop. It usually has leaves that are almost entire and grayish-arachnoid-hairy or white-tomentose beneath. The western European *C. arvense*, in turn, shows considerable polymorphism, including the forms *horridum*, *mite*, and a thinly arachnoid-hairy one, but, unlike *C. incanum*, has more deeply pinnately divided leaves. *C. arvense* is replaced in the east by *C. setosum* (Willd.) MB., which is widely distributed from Eastern Europe through Siberia and Eastern Asia to the Japanese Islands. This species with almost entire leaves is replaced in the east of its range by a pinnately-
 215 toothed form and in Dauria by a form with winged stems, described as *C. argunense* DC. and usually treated as var. *subulatum* Ldb. of *C. setosum*. The latter, cited by Bieberstein for the Caucasus, apparently should be excluded from its flora. *C. incanum* (S.G. Gmel.) Fisch. ex MB. usually grows in the Caucasus; forms of *C. arvense* are occasionally found: f. *mite* and a weakly arachnoid-hairy one called var. *vestitum* Wimm. and Grab. by European authors. *C. horridum* (Willd.) Stank., split off by S.S. Stankov from *C. arvense*, cannot be treated as separate, the more so because f. *horridum* is considered by some authors as the type form of *C. arvense*. The name *C. horridum* (Willd.) Stank. is a later homonym: cf. *C. horridum* (MB.) MB. and *C. horridum* (Adams) Petrak. Separation of *C. rubricaula* Novopokr., reported from the northern Caucasus, on the basis of the stem color is also unacceptable. In the mountain regions of Soviet Central Asia, the pubescent forms of *C. ochrolepideum* Juz. are widespread; these usually were referred to *C. incanum* (S.G. Gmel.) Fisch. ex MB., but the glabrous forms (including the type of species) to var. *horridum*. True *C. arvense* f. *horridum*, more widespread in the Mediterranean region, is found only sporadically in the south of the European Part of the USSR and in the Baltic Regions.

GENUS 1593. *Notobasis* Cass.^{1, 2}

Cass, in Dict. Sc. Nat. XXV (1822) 225; XXXV (1825) 171.

Capitula medium-sized, at stem tips and in axils of upper leaves, surrounded by apical leaves modified into pinnately incised spines, subsessile at stem tip, in clusters of few, below on short peduncles solitary, unisexual and many-flowered. Involucre broadly ovate or ovate-globose, 1.5–2(2.5) cm in dia, weakly arachnoid-hairy; involucre bracts many-rowed, imbricate, coriaceous, glabrous on outside, with numerous pale, punctate, sessile glands or linearly-subulate outer to lanceolate, longer inner, terminated at tip in straight or somewhat deflected spinule, innermost bracts long-acuminate, on both sides pubescent in upper part. Receptacle with narrow, linear, long scales. All florets tubular, purple, somewhat surpassing involucre, with 5-parted glabrous corolla; peripheral florets outwardly resembling bisexual, fertile, middle florets but with undeveloped ovary and empty (lacking pollen) anthers, sterile, because of which capitula considered heterogamous. Anthers with short, fimbriate basal appendages, apical appendages acute; stamen filaments flattened, covered with papilliform hairs. Style fused to tip, very shortly-lanate, entirely exerted from staminal tube, branched or unbranched, bifid with collar of hairs at base of branches. All achenes alike, obliquely obovate, 5–6 mm long, rounded above, lacking corona, with flat, oval, upper scar of attachment, smooth, entirely glabrous; hilum slightly oblique, slit-like, pappus 3 times as long as achenes, whitish, yellowish below, simple, fragile, falling entirely, plumose, soft bristles, more or less of same length, connate at base in ring. Annual herbs with erect stem and spiny, sinuate-lobate, amplexicaul leaves.

A monotypic genus.

1. *N. syriaca* (L.) Cass. in Dict. Sc. nat. XXXV (1825) 171; DC. Prodr. VI, 660; Ldb. Fl. Ross. II, 2, 746; Boiss. Fl. or. III, 553; Grossh. Fl. Kavk. IV, 177 and Opred. Rast. Kavk. 481; Gadjeiev in Fl. Azerb. VIII, 389.—*Carduus syriacus* L. Sp. pl. (1753) 823.—*Cirsium syriacum* (L.) Gaertn. De fruct. II (1791) 383.—*C. bracteatum* Link in Linnaea, IX (1834) 380.—*Cnicus syriacus* (L.) Willd. Sp. pl. III, 3 (1803) 1683 p. p. excl. syn. Bauh.—**IC.**: Gaertn. l. c. tab. 163, fig. 2; Schur. Bot. Handb. ed. 2 (1808) tab. 229; Fiori and Paol. Iconogr. fl. Ital. 2 (1899–1904) 452.—**Exs.**: Petrak, Cirsioth. Univ. fasc. IV, No. 34; Fl. Terr. Israel. exs. No. 581; Fl. Palaest. exs. No. 197.

¹Treatment by S.K. Czerepanov.

²From the Greek words *notos*—back, and *basis*—base; named for oblique achenes.

Annual. Stem (20) 30–70 cm (probably even more) high, erect, sulcate, usually simple, rough, entirely sparsely arachnoid-hairy. Leaves oblong, sinuate-lobate, with deltoid, strongly spiny lobes, glabrous above, very weakly arachnoid-hairy beneath, lower leaves short-petiolate, others sessile, amplexicaul. Capitula at tips of stem and in axils of upper leaves, surrounded by apical leaves modified into pinnately incised spines and surpassing capitula, at stem tip subsessile, clustered, on short peduncles and solitary below. Involucre broadly-ovate or ovate-globose, 1.5–2.2 cm long and 1.5–2(2.5) cm in dia, weakly arachnoid-hairy; involucre bracts smooth, with numerous, pale, punctate, sessile glands, from linearly-subulate outer to oblong-lanceolate, longer inner, terminating in straight or somewhat deflected short spine; innermost bracts long-acuminate, on both sides pubescent in upper part. Florets purple. Achenes pale reddish-brown, obliquely obovate, 5–6 mm long, 4–4.5 mm wide, glabrous; pappus 15–17 mm long. Flowering May to July.

- 218 Dry slopes, weedy places, near roads, old fields, edges of crop fields, up to lower mountain zone.—*Caucasus*: Eastern Transcaucasia, Talysh. *General distribution*: Mediterranean, Balkans-Asia Minor, Armenia and Kurdistan (former Karsk Region). Described from Syria. Type in London.

GENUS 1594. *Picnomon* Adans^{1, 2}

Adans. Fam. II (1763) 116; Cass. in Dict. Sc. nat. XL (1826) 187; DC. Prodr. VI (1837) 634.—*Cirsium* sect. *Acarina* DC. in Duby, Bot. Gall. I (1828) 286 p. min. p.

Capitula homogamous, homochromous, medium-sized, more or less oblong. Involucre ovate-conical; outermost involucre bracts foliaceous, considerably longer than florets, imbricate, appressed, with cuneately narrowed, plumose, echinate, recurved appendages, innermost squamose, with weakly toothed appendage, spinulose. Receptacle densely long-squamose. Florets all fertile, bisexual; corolla pink-purple; stamens filaments glabrous or glandular. Style branches free above, divergent. Achenes obcuneate, weakly angular, lustrous, slightly flattened, with very narrow almost slit-like lower hilum above, with distinct 5-lobed, stalked tubercle with roundish lobes; pappus as long as corolla, consisting of sericeous, lustrous, finely plumose hairs, somewhat thickened above, many-rowed, connate at base in ring and falling off

¹Treatment by S.G. Tamamschian.

²From the Greek word *picno*—dense, densely flowered.



1—*Lamyra echinocephala* (Willd.) Tamamsch.; 2—*Ancahia igniaria* (Spreng.) DC.; 3—*Modestia mira* (Iljin) Charadze and Tamamsch.

entirely. Annual-biennial plant with erect, weakly branched stem, and narrow spinous-toothed, alternate, decurrent leaves.

A monotypic genus.

1. **P. acarna** (L.) Cass. in Dict. Sc. nat. XL (1826) 188; Grossh. Fl. Kavk. IV, 190; O. and B. Fedtsch. Perech. Rast. Turk. IV, 282.—*Carduus acarna* L. Sp. pl. (1753) 820.—*Cnicus acarna* L. Sp. pl. ed. 2 (1763) 1158.—*Carthamus canescens* Lam. Fl. Fr. II (1778) 10.—*Carlina acarna* MB. Fl. taur.-cauc. II (1808) 282.—*Cirsium acarna* Moench, Meth. Suppl. (1802) 226; Boiss. Fl. or. III, 549; Schmalh. Fl. II, 104.

Annual or biennial. Plants 15–40 cm high, appressed-thinly arachnoid-hairy or grayish, sometimes whitish-pubescent. Stem white, sulcate, almost entirely covered with narrow, subentire, oblong, spiny-ciliate wings, densely leafy, usually branched above. Lower leaves deciduous, middle and upper ones to 10–11 cm long, 13–15 mm wide, lanceolate, ciliolate, weakly pinnate-sinate, with long, deflected, yellowish spines, 8–9 cm long, coriaceous, decurrent, with prominent reticulate veins beneath, and thin, white, glabrous midrib above, on both sides uniformly thinly whitish- or grayish-pubescent. Capitula clustered at stem tips in corymbose-paniculate inflorescence, narrowly-
219 oblong, sessile, solitary or in clusters of 2–4; apical leaves with long spines. Involucral bracts appressed, densely pubescent. Corolla pinkish or purple, raised above pappus hairs, 12–13 cm long; corolla tube considerably longer than limb. Achenes 4–5 mm long, about 2 mm wide in upper part; pappus white or grayish 3–4 times as long as achenes, with narrow squamiform bristles and sericeous, thin hairs. Flowering July to August.

Dry, abandoned places, near roads.—*European Part*: Crimea; *Caucasus*: all regions; *Soviet Central Asia*: mountainous Turkmenia, Syr-Darya. *General distribution*: southern Europe, eastern Mediterranean, Armenia and Kurdistan, Iran and Afghanistan. Described from Europe. Type in London.

GENUS 1595. **Lamyra** Cass.^{1, 2}

Cass. in Bull. Soc. Philom. Paris (1812) 168; in Dict. Sc. nat. XXV (1822) 218, XLI (1826) 305.—*Platyraphium* Cass. in Dict. Sc.

¹Treatment by S.G. Tamamschian.

²From the Greek word *lamyros*—prickly-pointed.

nat. XXXV (1825) 173, XLI (1826) 305.—*Chamaepeuce* Dc. Prodr. VI (1837) 657 p. p.

Capitula many-flowered, tubuliforms, homogamous and homochromous. Involucre ovate; bracts imbricate, more or less herbaceous or stiff, with basal callose thickening, always cuspidate, appressed, or outer deflected. Receptacle somewhat fleshy, bulged, with numerous, free, unequal bristles. Corolla almost symmetrically lobed above, open; filaments hairy, basal anther appendages long, subulate, membranous, lobed. Style branches very short. Achenes initially with thick pericarp, becoming hard and woody with progressive maturation, ovate-hemispherical or more or less pyriform, glabrous, lacking ribs, and with or without inconspicuous veins, reddish-brown or black, yellowish or gray, often with marbled pattern; hilum broad, roundish or somewhat trapezoid, sometimes slightly truncate, upper scar flat or with barely noticeable border, horizontal or slightly truncate; pappus many-rowed, of white, almost equal, thin, fine barbate bristles, thickened above, often plumose, basally connate, falling entirely. Biennial or perennial herbs with alternate, entire, pinnately parted or lobate, usually prickly leaves, more or less densely tomentose beneath, glabrous above, coriaceous, sometimes lustrous and stiff; stem glabrous or pubescent, simple or branched.

Type of genus: *Lamyra casabonae* (L.) Tamamsch.

The genus includes about 10 highly ornamental species, distributed in Southern Europe and Asia Minor. Of these, one species is found in the USSR.

- 220 1. ***L. echinocephala*** (Willd.) Tamamsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI (1954) 470.—*L. angustifolia* Cass. in Dict. Sc. nat. XXV (1822) 221.—*Cnicus echinocephalus* Willd. Sp. pl. III, 3 (1803) 1685; MB. Fl. taur.-cauc. II, 280.—*Serratula echinocephala* Poir. in Lam. Encycl. meth. VI (1804) 561.—*Cirsium echinocephalum* MB. Fl. taur.-cauc. III (1819) 559; Spreng. Syst. veg. 3, 374; Boiss. Fl. or. III, 551.—*C. wachtangii* Woron. in Byull. Kavk. Muz. XI (1917) 20.—*Chamaepeuce echinocephala* DC. Prodr. VI (1837) 660; Ldb. Fl. Ross. II, 746; Grossh. Fl. Kavk. IV, 190.—*C. wachtangii* Grossh. Fl. Kavk. IV (1934) 190.—Exs.: Petrak, Cirsioth. Univ. fasc. X, No. 97; GRF No. 1369 (sub *Chamaepeuce echinocephala* DC.); Herb. Fl. cauc. No. 599.

Perennial. Stem erect, 15–50 cm high, simple or cymosely branched above, cylindrical, weakly sulcate, tomentose, densely leafy, occasionally with single capitulum. Leaves glabrous, coriaceous, weakly rugose, and dark- or light-green above, snow-white-tomentose beneath, lanceolate, pinnately incised to narrowly-linear or deltoid lobes with

long tip and revolute margins, in upper part of stem more or less semiamplexicaul, midrib above, in lower part, thickened and densely tomentose, throughout glabrous beneath; terminal leaf lobe usually broader than laterals and 2–3 or 5–6 times as long, ensiform or lanceolate, occasionally subulate. Capitula terminal, 4–5 cm long, broadly-cylindrical at flowering, on short peduncle. Involucral bracts glabrous, stiff in mature capitula, appressed, narrowed above and terminating in thin spine almost as long as bract; outermost bracts deflected, middle ones straight, appressed, inner ones purple, scarious. Florets dark pink or purple, to 3–3.5 cm long; stamen and style strongly exerted from corolla. Achenes large, to 5 mm long, thickened above, 3 mm wide, roundish in cross section, narrowed below, truncate, obliquely pyriform, often with black marbled pattern on dark gray surface, upper scar of attachment slightly oblique, so that corolla and pappus somewhat lateral; pappus much shorter than corolla, but longer than tube. Flowering July to August (September). (Plate X, Fig. 1.)

Stony screes and steep slopes, on rocks.—*European Part*: Crimea; *Caucasus*: Ciscaucasia, Western Transcaucasia. Described from Crimea. Type unknown; isotype in Leningrad.

Note. A highly ornamental plant, strongly varying in the color of the achenes and the form and size of the leaf lobes, especially the terminal lobe. The broader and considerably longer terminal lobe compared to the lateral lobes served as the basis for Yu.N. Woronov to treat the specimens from Georgia as a separate species.

The species of *Chamaepeuce* reported for Soviet Central Asia, in fact, belong to the genus *Cirsium* (cf. Tamamschian in *Zam. po Sist. i Geogr. Rast. Tbil.*, 22 (1961)).

221 GENUS 1596. *Lamyropappus* Knorr. and Tamamsch.^{1, 2}

Knorr. and Tamamsch. in *Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XVI (1954) 463.

Capitula homogamous, homochromous, large, solitary at tips of stems. Involucre globose-ovate; involucral bracts numerous, imbricate, appressed, stiff, with stiff, straight or recurved tip. Receptacle shallow-alveolate, with numerous long bristles on edges of alveoli. Florets numerous, slightly zygomorphic, bisexual. Lower appendages of anthers long, caudate, subentire, weakly parted only at tip to 2–3 bristles;

¹Treatment by S.G. Tamamschian.

²From the similarity of the pappus to that of the genus *Lamyra*.

filaments glabrous, almost smooth. Style exerted from corolla, style branches almost inconspicuous. Achenes 9–11 mm long, 3 mm wide, weakly deltoid, more or less flattened, weakly longitudinally sulcate, slightly narrowed at ends, slightly truncate; hilum straight or slightly oblique; upper scar patellate, horizontal, with scarcely noticeable remnants of corolla and style in middle (tubercle); pappus rowed, with light green, yellowish, plumose bristles racemosely thickened above, later pointed, scarcely exerted from involucre bracts. Perennial herbs with entire, coriaceous, large leaves.

A monotypic genus as yet known only from Soviet Central Asia.

1. **L. schakaptaricus** (B. Fedtsch.) Knorr. and Tamamsch. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI (1954) 466.—*Cirsium schakaptaricum* B. Fedtsch. in O. and B. Fedtsch. Perech. Rast. Turk. IV (1911) 287.—**lc.**: Knorr. and Tamamsch. op. cit. 465.

Perennial. Rhizome thick, ligneous, branched, stems basally white-lanate, covered with tomentose remnants of previous years leaves, numerous, to 75 cm high, weakly branched, cylindrical, sulcate, floccose-tomentose, with solitary capitula. Leaves numerous, dense below, sessile, in upper part distant, highly variable in size and form, lower ones large, broadly-obovate, 14–15 cm long, 9.0–9.5 cm wide sessile; petiole flat, ampliate below, 5–6 cm long, 1.0–1.5 cm wide, in lower part weakly grooved, basally crenate, with occasional thin spines; upper leaves oblong-obovate, ovate, elliptical, or lanceolate, 1.5–8.0 cm long, 0.6–3.5 cm wide; apical leaves reduced to spinules; all cauline leaves sessile, sometimes weakly decurrent, coriaceous, glabrous above, light green veins with plumose hairs, lateral veins terminating at margin to hard spines, densely white-tomentose-lanate beneath, with prominent midrib. Capitula very large, 5.0–5.5 cm long, 2.5–3.0 cm in dia. 222 In involucre of numerous, dense, appressed, imbricate bracts; outer bracts oblong-obovate or spatulate above, with recurved tips, middle and inner ones linear with straight tip. Florets large, 3.0–3.2 cm long; corolla light violet. Pappus considerably shorter than corolla, 2.5 cm long; achenes light gray, light reddish-brown, or with dark reddish-brown spots or bands on lighter background or all straight or slightly truncate, usually 1/2 as long as pappus. Flowering July to September.

River valleys on chalk deposits, on gypseous strata and red clays.—*Soviet Central Asia*: Lake Balkhash Region (southwestern part), Tien Shan (southern part), Syr-Darya (eastern part). Endemic. Described from Shakaptar. Type in Leningrad.

GENUS 1597. *Ancathia* DC.^{1, 2}

DC. in Guill. Archiv. bot. II (1833) 331; Prodr. VI, (1837) 557.

Capitula homogamous, homochromous. Involucre ovate globose; involucre bracts imbricate, outer and middle bracts recurved, inner ones appressed, almost entirely scarious, dry, purple or flame-red, very much like inner bracts of genus *Carlina*, lanceolate, acuminate. All florets similar, bi-sexual, pink or purple; corolla obliquely 5-lobed, corolla tube almost as long as limb. Filaments glabrous; basal appendages of anthers on both sides with bushy-tailed.

Achenes glabrous, oblong, more or less narrowed below, ribbed-angular, longitudinally sulcate on sides, dark reddish-brown or almost black; hilum oblique, upper scar angular with thin toothed edge; pappus usually two-rowed, falling off entirely, hairs connate below, almost equal, thinly plumose. Perennial herbs with short, usually simple, sometimes branched, solitary or many stems with peduncles bearing single capitula; leaves linear or linearly-lanceolate, alternate, almost entire but with sharp spines on revolute margin, glabrous above, like stem densely grayish- or whitish-tomentose beneath.

A monotypic genus.

1. *A. igniaria* (Spreng.) DC. in Guill. Archiv. bot. II (1833) 331; Prodr. VI, 557; Ldb. Fl. Ross. II, 681; O. and B. Fedtsch. Perech. Rast. Turk. IV, 265; Grossh. Fl. Kavk. IV, 190.—*Cirsium igniarium* Spreng. Syst. Veg. 3 (1826) 375; Ldb. Fl. alt. IV, 10; Kryl. Fl. Zap. Sib. XI, 2900.—*Cnicus igniarius* Benth. in Benth. and Hook. f. Gen. pl. II (1873) 469.—*Ic.*: Ldb. Ic. pl. Fl. Ross. V, tab. 477; DC. in Deless. Ic. Sel. IV, tab. 73.

223 Perennial. Rhizome vertical, mostly branched, to 1.5 cm thick. Stems straight, solitary or several, sometimes spreading, simple or with few branches, whitish-tomentose, un-winged. Leaves linear or narrowly-lanceolate, 5–20 cm long, 3–15 cm wide, lower leaves withering before flowering, middle and upper ones more or less decurrent, weakly amplexicaul, entire, with strongly revolute lamina, with 2, 3 or large number of hard, acute, yellowish spines on margin above, lustrous, sometimes weakly arachnoid-hairy, mostly glabrous, white-tomentose beneath; uppermost cauline leaves reduced, usually subtending capitula. Capitula solitary terminal on peduncles, large, 2.5–4.0 cm in dia. Involucre arachnoid-floccose; bracts imbricate, many-rowed; all bracts stiff, lanceolate, narrow, with long, hard spine, outermost bracts recurved, middle ones straight, inner ones thin, membranous, orange or

¹Treatment by S.G. Tamamschian.

²From the Greek word *ankos*, meaning spiny, sticky [or clinging].

- hard, spiny tip, longer than bracts, spiny tip sometimes weakly developed 1. **M. darwasica** (Winkl.) Chardze and Tamamsch.
- + Capitula solitary, at stem tip, on long peduncles. Involucre narrower, at fruiting obconical, whitish-pubescent from beginning to maturity; involucre bracts with inconspicuous tip; only inner bracts of unopened capitula terminating in more or less hard tip.
..... 2. **M. mira** (Iljin) Charadze and Tamamsch.

1. **M. darwasica** (Winkl.) Charadze and Tamamsch. in Zam. po Sist. i Geogr. Rast. Tbil. 19 (1956) 41.—*M. jucunda* Charadze and Tamamsch. l. c.—*Cnicus darwasicus* Winkl. in Tr. Peterb. Bot. Sada, IX, 2 (1886) 427.—*C. jucundus* Winkl. l. c.—*Saussurea darwasica* Lipsky in Tr. Peterb. Bot. Sada, XXVI, 2 (1910) 437 p. p.; O. and B. Fedtsch. Perech. Rast. Turk. IV, 234.—*S. jucunda* O. and B. Fedtsch. l. c.—*Cirsium darwasicum* Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, III (1922) 59.—*C. jucundum* Iljin, ibid. 58.

Perennial. Plants snow-white or greenish, densely tomentose. Stems numerous, branched, occasionally simple, straight, with 2–6 capitula. Leaves undivided, oblong-elliptical, occasionally lanceolate, lower ones usually larger, 10–12 cm long (excluding decurrent part), 2.0–2.5 cm wide, strongly decurrent such that stem broad-winged over internode, cuspidate greenish and weakly pubescent or grayish above, more or less densely grayish-pubescent beneath, like stem densely white- or grayish-tomentose. Capitula large, at fruiting almost 4 cm long, about 2 cm in dia. Involucre at fruiting more or less campanulate; outer involucre bracts small, 1–2 mm long, middle ones longer, both, long with deflected, long spine, inner bracts much longer, 2.0–2.8 cm long, whitish below, colored above, with thick midrib and 2 thin lateral veins, continued into tip but not spiny, ciliolate in elongated part, often darker at tip, remaining part stramineous. Corolla pink, scarcely exerted from pappus. Pappus as long as inner involucre bracts, before falling off far exerted from involucre, with achenes 3.5–3.8 cm long; achenes almost white, pale or reddish-brown, 7–9 mm long. Fruiting August to September.

Mountain and high-mountain slopes along river valleys, on gypsiferous limestone slopes, sometimes on sands and gravelly sediments.—*Soviet Central Asia*: Pamiro-Alai (southern and southeastern parts). Endemic. Described from Tadzhikistan. Type in Leningrad.

2. **M. mira** (Iljin) Charadze and Tamamsch. in Zam. po Sist. i Geogr. Rast. Tbil. 19 (1956) 41.—*Saussurea darwasica* Lipsky in Tr. Peterb. Bot. Sada, XXVI, 2 (1910) 437 p. p.—*Cirsium mirum* Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, III (1922) 61.

Perennial. Rhizome vertical, woody. Stem to 50–55 cm high, stocky, branched almost from base, sulcate, densely white-tomentose. Leaves lanceolate, 2–7 cm long (excluding decurrent part), 0.5–1.0 cm wide, entire, light green and weakly pubescent above, except white midrib, from pubescence, densely tomentose beneath with whitish or light gray midrib, strongly decurrent, such that internodes throughout narrowly-winged, wings considerably narrower than in preceding species, only in beginning 2–3 mm wide, becoming narrower downward, at end less than 1 mm wide. Capitula solitary, on peduncles, terminal distinctly smaller than in preceding species, 1.0–1.5 cm long, 0.5–0.8 cm in dia. Involucre in open capitula obconical, slightly rounded below, surrounded by small apical leaves; all bracts with distinct, deltoid, dark spot above; outer and middle bracts firmly appressed, whitish-tomentose; inner ones weakly pubescent, lighter in color, as long as pappus. Mature achenes unknown, immature reddish-brown. Flowering July. (Plate X, Fig. 3.)

Mountain slopes along river banks.—*Soviet Central Asia*: Pamiro-Alai (southern part). Described from Karategin. Type in Leningrad.

GENUS 1599. *Cynara* L.^{1, 2}

L. Sp. pl. (1753) 827.

Capitula large, on peduncles, homogamous, homochromous, with many setae. Involucre globose; involucre bracts imbricate, many-rowed, appressed at base, almost straight, coriaceous, narrowed into hard, conical spine, occasionally without spine, revolute. Receptacle flat, but fleshy, with long bristles. Corolla regular, 5-lobed; limb with unequal lobes, 1/2 as long as broad tube. Filaments glandular; basal appendages of anther short, more or less barbate, apical ones obtuse. Style branches convergent. Achenes obovate, thickish, somewhat bulged and weakly 4-angled, hard, glabrous and smooth, with almost straight or somewhat truncate hilum, upper scar lacking annulus; pappus of many rows of numerous, plumose, almost equal bristles, somewhat scariously broadened below, connate at base in ring and falling with it. Large perennial, prickly herbs, with basal rosette of leaves.

Type of genus *C. scolymus* L.

Of the 10–11 species in the Mediterranean Region and Canary Islands one is found in cultivation in the USSR.

1. *C. scolymus* L. Sp. pl. (1753) 827.

¹Treatment by S.G. Tamamschian.

²From the Greek word meaning dog.

Perennial. Plant 0.5–2 m high. Stem thick, straight, densely grayish- or whitish-arachnoid-hairy, weakly sulcate. Leaves larger, forming broad rosette at stem base, arachnoid-hairy beneath; lower leaves oblong or broadly lanceolate, about 1 m long and 50 cm wide, decurrent, twice pinnately incised, primary segments decurrent on winged axis and divided into irregularly lobate or toothed lobes, lobes and teeth unarmed, glabrous and green above, densely tomentose beneath; middle and upper cauline leaves reduced, sessile, weakly decurrent, upward reduced to linear and oblong apical leaves, 5–6 cm long. Capitula large, 7–10 cm long, solitary, terminal on short branches. Involucre ovate or subglobose; involucre bracts subglabrous, smooth, stiff, coriaceous, with more or less fleshy base, outer bracts slightly deflected, erect, or recurved, middle and innermost bracts straight, imbricate, appressed; middle bracts more or less narrowed above, acute, lacking spine, inner ones with short, roundish or obtuse appendage. Florets numerous; corolla bluish-purple. Achenes 6–7 mm long, oblong, reddish-brown with inconspicuous white and darker, sometimes black spots; pappus considerably longer than achenes, 2–3 cm long, more or less yellowish. Flowering June to October.

Cultivated in the south on fertile soils.

Note. It has been suggested that *C. scolymus* L. is a cultivar of the wild Mediterranean species *C. cardunculus* L., which is not found in the USSR in the wild.

Economic Importance. It is a culinary delicacy. Its fleshy receptacle and the fleshy base of the involucre bracts are eaten boiled. It also is grown as an ornamental plant for its attractive leaves and large red capitula.

Adans. Fam. II (1763) 116.

Capitula terminal, solitary, large, nodding, homogamous. Involucre broadly globose; involucre bracts imbricate, outer and middle bracts with foliaceous, prickly-toothed appendage, terminating in long, erect, lanceolate-subulate straight spine; inner bracts undivided, with or without small appendage. Receptacle flat, fleshy, scarious-ciliate. All florets alike, fertile, bisexual; corolla violet, purple, pink, occasionally white; corolla tube narrowly, cylindrical, long, limb campanulate, short, broadened; corolla lobes narrow, linear, undivided, with lateral veins

¹Treatment by S.G. Tamamschian.

²From a Greek name applied to a prickly plant used as food.

converging above. Filaments free above, connate above base because of dense short mucilaginous hairs covering them; basal anther appendages linear-cilia-like, as long as connective; apical appendages sagittately deltoid. Style thickened above, somewhat truncate, covered with long, branched hairs; style branches approximate, slightly divergent above, like style covered with short, branched hairs on outside. Achenes obovate, slightly truncate on sides, glabrous, with indistinct ribs, hilum straight, tubercle (nectary) on upper scar raised; pappus of many scaly, toothed bristles, connate at base in ring with crown of tiny, lustrous, approximate hairs. Annual or biennial herbs, with hard, leafy stem and spiny alternate leaves.

A monotypic genus, widely distributed throughout the Mediterranean Region, in central and southern Europe, and in Central Asia.

1. *S. marianum* (L.) Gaertn. De fruct. II (1791) 378; Grossh. Fl. Kavk. IV, 191.—*S. maculatum* (Scop.) Moench, Meth. (1794) 555.—*S. martiae* (Cranz) S.F. Gray, Nat. Arr. Brit. Pl. II (1821) 436.—*Carduus marianus* L. Sp. pl. (1753) 823.—*C. mariae* Crantz. Inst. I (1766) 248.—*Mariana mariana* (L.) Hill. Hort. Kew. (1768) 61.—*M. lactea* Hill. Herb. Brit. I (1769) 76.—*Cirsium maculatum* Scop. Fl. Carn. ed. 2, II (1772) 130.—*Carthamus maculatus* (Scop.) Lam. Encycl. meth. I (1783) 638.—**lc.**: Kozlovskaya in Fl. BSSR, V (1959) Plate LXIX.

Annual or biennial. Stem usually to 1.5 m high, sometimes quite low (30 cm), very rarely 10 cm, or very tall, taller specimens to 2–3 m, glabrous or weakly arachnoid-hairy, sulcate, straight, branched, occasionally simple, also farinose, cylindrical. Leaves green, lustrous, with large white spots, sometimes to 80 cm long and 30 cm wide; lower leaves rosulate, together with middle and upper ones oblanceolate or elliptical, spiny-toothed pinnately lobed or pinnately incised, lobes prickly or prickly-toothed, petiolate; upper leaves reduced, sessile, with broad, amplexicaul and short-decurrent base, deeply or shallowly pinnatifid, prickly-toothed, uppermost still reduced, with large spiny amplexicaul lobes and acute tip. Capitula medium- or large-sized, 3–6 cm long, oblong, often globose, solitary on slender peduncles. Involucral bracts weakly pubescent or glabrous, imbricate; outer and middle bracts appressed at base, with erect foliaceous, hard, spinescent appendage and 4–6 spines on margin, appendages as long as or longer than florets; innermost bracts straight, coriaceous, with small appendage or narrowed into nonspiny tip. Florets numerous, pink, violet, or white. Achenes elliptical or obovate, to 7.3 mm long, weakly transversely rugose, dark reddish-brown or black with longitudinal striations or more or less white-spotted, tubercle on somewhat angular

stalk, cylindrical, 3-lobed pappus hairs unequal, white or yellowish, outer hairs thin, setaceous, inner ones somewhat thickened, scarious, 1–2 cm long, 2–3 times as long as achenes, ring with thin, very short, delicate hairs, 2 mm long. Flowering July to August.

Uncultivated lands, roadsides, abandoned fields.—*European Part*: Ladoga-Ilmen, Baltic Region, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga, Upper Dniester, Black Sea Region, Bessarabia, Crimea; *Caucasus*: Ciscaucasia, Dagestan, Eastern and Southern Transcaucasia, Talysh; *Western Siberia*: Upper Tobol (south-western); *Soviet Central Asia*: Kara-Kum, Syr-Darya, Pamiro-Alai. *General distribution*: central and Atlantic Europe, Mediterranean, northern Africa. Described from western Europe. Type in London.

Note. It is highly variable in habit, color of corolla, and length of spines on the involucre bracts. In view of this, the described varieties and the species *S. leucanthum* Jord. and Fourr. can be considered only as forms of this species.

GENUS 1601. *Onopordum* L.^{1,2}

L. Sp. pl. (1753) 827.—*Acanos* Adans. Fam. II (1763) 116.

Capitula homogamous, homochromous, many-flowered, and unisexual, solitary or numerous, terminal, occasionally axillary. Involucre ovate, oblong-globose or globose; involucre bracts imbricate, lanceolate or cuneate, apically without or with long or short spines, appressed, 229 divergent or strongly deflected, sometimes more or less uncinat, narrow or broad, coriaceous or stiff, more or less thick, hollow or flat, subglabrous, pubescent or glandular-hairy. Receptacle fleshy, deeply alveolate, alveoli membranous along margin and sinuately irregularly toothed. Corolla 5-fid, slightly open, saccate, purple, violet, pink, yellowish, or white. Filaments glabrous or weakly glandular, lacking simple hairs; apical appendages of anthers linearly-cuneate or subulate, basal appendages shortly caudate, undivided, cuneate, truncate or straight and narrower, sometimes weakly lobed. Style long; style branches 1/5–1/3 as long as style, usually folded and entirely or partly exerted from corolla. Achenes oblong or obovate, sometimes more or less compressed, indistinctly or distinctly 3–4-quetrous, with distinct or indistinct ribs, on sides with oblique or parallel transverse-wrinkles or tubercles, with many or few, longitudinal, thin veins and furrows,

¹Treatment by S.G. Tamamschian.

²From the Greek words *onos*—ass, and *pordon*—flatulence.

4–7 mm long, dark brown or light- and dark-gray with darker, sometimes black spots, marbled; upper scar of attachment with thin edge, usually angular, with distinct or inconspicuous tubercle, hilum straight or slightly oblique, entirely or partly hidden under thick callose appendage; pappus fragile, falling off entirely, consisting of 2–3, occasionally many rows of equal bristles, of which, in many species, one row with longer and thicker bristles than others. All florets ciliolate, smooth, barbate or plumose above, connate in broader, angular, thick, waxy ring. Biennial, occasionally perennial, herbs, stemless or with erect, tall or short, solitary stem, simple or branched from middle or weakly branched only above, spiny-winged, with large, spinose, green or pubescent leaves.

Type of genus *O. acanthium* L.

A widely distributed Mediterranean genus, comprising about 50 species; in the USSR, it is represented by 10 quite polymorphic species.

Economic Importance. Good honey-producing plants. Their seeds contain oil which is similar in chemical composition to sunflower oil (Lazurevsky, 1934). In horticulture, the West European species *O. bracteatum* and *O. acanthium* are grown as ornamental plants.

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1. Plants not very spiny; capitula 3 cm long, 1.0–1.5 cm in dia, unopened ovoid, opened oblong, axillary and terminal; involucrel bracts small, all appressed. 6. **O. frickii** Tamamsch.
 - + Plants highly spiny; capitula 5–7 cm in dia, globose, somewhat depressed or oblong, often solitary at apices of branches, occasionally in clusters of 2–3; involucrel bracts erect, deflected or appressed. 2.
 2. Involucrel bracts coriaceous, broad, green, glabrous but with numerous small glands on midrib, inward and on margin..... 4. **O. tauricum** Wild.
 - + Involucrel bracts narrower, more or less strongly pubescent, eglandular or with few intermixed glands only on midrib.....3.
 3. Pappus bristles thin, scabrous-ciliate, often smooth at tips; involucrel bracts erect.....4.
 - + Pappus bristles barbate, weakly or distinctly plumose; involucrel bracts straight, appressed, or only middle ones recurved..... 6.
 4. Capitula depressed-globose, solitary or terminal on branches; involucrel bracts strongly divergent, erect, pubescent below, glabrous above, fleshy, thick, oval in cross-section, hollow; corolla almost white or light pink..... 3. **O. prjachinii** Tamamsch.
 - + Capitula globose; involucrel bracts glabrous or weakly or strongly pubescent, thinner than in preceding species, roundish in cross-

- section, not hollow; inner bracts straight, outer ones erect..... 5.
5. Whole plant tomentose-arachnoid-hairy, sometimes scarcely 1 m high; involucre bracts always covered with intertwined gray, long, arachnoid hairs..... 2. **O. cinereum** Grossh.
- + Pubescence of plant variable, sometimes completely glabrous; involucre bracts pubescent at beginning of flowering, later glabrous, if pubescent then never densely tomentose-arachnoid-hairy..... 1. **O. acanthium** L.
6. All involucre bracts appressed, more or less erect, similar; capitula oblong or globose..... 4.
- + Outer and innermost involucre bracts appressed, middle ones at beginning of flowering erect, later recurved; capitula very large, globose..... 10. **O. heteroacanthum** C.A.M.
7. Stem usually simple or with few branches from base..... 8.
- + Stem solitary with short racemose branches and oblong-globose capitula; involucre bracts unequal; pappus of barbate bristles..... 9. **O. seravschanicum** Tamamsch.
8. Plants snow-white and densely tomentose; capitula solitary, 2–2.5 cm in dia, on short solitary branches; involucre bracts appressed, spinose and densely pubescent, snow-white outside, ciliate-glandular on margin, abruptly acuminate, with yellowish erect spine. Corolla pinkish-violet..... 8. **O. candidum** Nabelek
- + Plants not snow-white, but more or less densely grayish- or sordid-white pubescent; stem simple, sometimes weakly branched from middle or above. Capitula 3–6 cm in dia..... 9.
- 231 9. Involucre bracts lacking spines or with inconspicuous spines, subglabrous. Pappus bristles ciliolate. Plants 30–65 cm high..... 5. **O. armenum** Grossh.
- + Involucre bracts with long, sharp spines, densely pubescent below. Pappus bristles plumose. Plants larger..... 7. **O. leptolepis** DC.

Section 1. Onopordum.—Sect. *Reflexa* Rouy in Bull. Soc. Bot. Fr. III (1896) 581; Arènes in Not. syst. Paris, IX (1942) 215.—Outer involucre bracts curved or upward-spreading, numerous, very narrow or broad, coriaceous, green or pubescent, roundish or oblong in cross section, hollow, finely glandular on both sides or only outside. Corolla broadened only at throat or including limb, violet or purple, occasionally light colored. Pappus bristles ciliolate, smooth above, not plumose.

Type of section: type of genus.

Series 1. Acanthia Tamamsch.—Involucre bracts narrow, more or less equal, glandular only on midrib and on margin outside, glabrous or arachnoid-hairy.

1. *O. acanthium* L. Sp. pl. (1753) 827; DC. Prodr. VI, 716; Ldb. Fl. Ross. II, 716; MB. Fl. taur.-cauc. II, 281, III, 561; Boiss. Fl. or III, 559; Grossh. Fl. Kavk. IV, 192; Takht. and Fed. Fl. Erevana, 323; Dumbadze in Fl. Gruzii, VIII, 522; Kozlovskaya in Fl. BSSR, V, 146; Gadjev in Fl. Azerb. VIII, 420 p. p.; Kryl. Fl. Zap. Sib. XI, 2902; Nikitin in Fl. Turkm. VII, 247, p. p.—*O. acanthium* ssp. *araneosotomentosum* Rech. f. in Anz. Ost. Acad. Wiss. 88 (1951) 263.—*O. acanthifolium* Gilib. Fl. Lithuan. III (1781) 190, non C. Koch—*Acanos spina* Scop. Fl. Carn. ed. 2, II (1772) 132.—**lc.**: Hegi, Ill. Fl. VI, 2, Taf. 272, fig. 1.

Biennial. Tall, mostly branched plant. Stem 0.3–2.0 m high, glabrous or arachnoid-hairy, winged to tip, wings 6–15 mm wide, sinuate, narrower on branches, with broadly deltoid spiny lobes, spines to 5 mm long, stiff, yellow. Leaves unequal, lower ones 10–30 (35) cm long, 4–15 cm wide, oblong- or broadly ovate, lowermost narrowed into petiole; middle and upper cauline leaves ovate or ovate-lanceolate; all pinnately lobed, toothed, terminating into sharp spine, subglabrous or softly arachnoid hairy on both sides, with distinct, especially beneath, reticulate venation of uniformly thick veins. Capitula usually in clusters of 2–3 on upper branches, occasionally solitary, globose, 3–5 cm in dia. Involucre of immature capitula usually arachnoid-hairy, later glabrous or subglabrous; involucre bracts almost equal, inner ones erect, middle and outer ones recurved or horizontal, in lower appressed part ovate-lanceolate, subulate above, strongly spinescent, with occasional lustrous glands on midrib, along margin short-ciliate, and sometimes with occasional glands. Corolla considerably longer than involucre bracts, purple or light violet, sometimes pink, very rarely white 2.0–2.3 cm long; corolla tube as long as limb including throat. Style branches almost entirely exerted from corolla. Achenes oblong or oblong-obovate, usually indistinctly triquetrous, slightly narrowed, 4–6 mm long, transversely rugose, with inconspicuous veins along margin, reddish-brown or brown with darker or grayish spots; pappus rubiginous, 1.5–2 times as long as achene; pappus bristles weakly ciliate. Flowering June to August. (Plate XI, Fig. 2).

Weedy places, old fields and in crops as weed.—*European Part*: Almost all regions but Far North; *Caucasus*: all regions except high mountains; *Western Siberia*: Upper Tobol, Irtysh, Altai; *Eastern Siberia*: Angara-Sayans (rarely); *Soviet Central Asia*: Kara Kum, Kyzyl-Kum, Tien Shbn, Pamiro-Alai, Aralo-Caspian Region, Lake Balkhash Region. *General distribution*: Central Europe, Atlantic Europe, Mediterranean, Balkans-Asia Minor, Armenia and Kurdistan, Iran-Afghanistan. Introduced in North America. Described from western Europe. Type in London.

Note. The hybrid *O. acanthium* L. × *O. tauricum* Willd., known from the vicinity of Yalta, is characterized by involucre bracts that are intermediate in form.

2. ***O. cinereum*** Grossh. in Tr. Tifl. Bot. Sada, II, 1 (1920) 38; Grossh. Fl. Kavk. IV, 192.

Biennial. Whole plant densely grayish-arachnoid-tomentose. Stem 20–90(100) cm high, white, sulcate, laterally winged; wings 3–4 rowed, 5–6 mm wide, weakly sinuate, with short deltoid lobes and hard, yellow or apically reddish-brown spine, equal to or 2 times as long as wing width; branches in upper part more or less spreading. Leaves, like stem, densely grayish-tomentose, 5–25 cm long, broadly oval, weakly pinnate-sinuate with deltoid lobes terminating into long, yellow spine, soft and thick from dense grayish pubescence. Capitula large, to 7 cm in dia when open. Involucre globose, sordid-white-tomentose; involucre bracts densely tomentose below, densely arachnoid-hairy in middle, and subulate above, glabrous and with or without occasional glands on midrib, ciliolate, tiny-ciliate on margin. Achenes narrowed, but distinctly 4-angled, obovate, sometimes strongly narrowed below, brown or reddish-brown, marbled with black spots, transversely rugose, upper scar of attachment quadrate, hilum narrowly, oval, almost entirely concealed under fleshy appendage; pappus 2–3 times as long as achene; pappus bristles barbate at base, weakly ciliate above. Flowering July to August.

Weedy places, roadsides, old fields in mountain zone.—*Caucasus*: Eastern Transcaucasia (south), Talysh; *Soviet Central Asia*: Kara-Kum, Amu-Darya (in extreme south). *General distribution*: Iran-Afghanistan. Described from Talysh. Type in Tbilisi.

233 3. ***O. prjachinii*** Tamamsch. in Addenda, XXVII, 605.

Biennial. Plants 60–100 cm high, light colored, greenish-gray from pubescence. Stems branched above, to tip spiny-winged; wings in lower part 1.5–2.0 cm wide, gradually narrowed above, with network of distinct thin veins, undulate-sinuate, with hard thickish spine, decurrent on midrib of deltoid lobes. Middle leaves 13–25 cm long, 2.5–4.0 cm wide, decurrent, spinescent, inequally pinnately lobed, lobes deltoid with long white or yellowish spine; upper leaves narrowly lanceolate, considerably reduced, sometimes entire, but always prickly at tip, like others on both sides uniformly grayish-arachnoid-hairy, beneath with more distinct reticulate venation. Capitula large, subglobose, to 5 cm across, solitary at tips of erect branches. Involucre imbricate, oblong or globose in immature capitula; middle and inner involucre bracts erect, terminating in long, straight, yellow spine; bracts more or

less tomentose below, all bracts erect in mature capitula, outer ones sometimes strongly curved; all bracts almost equal, flat, oblong-ovate below; subulate above, glabrous, hollow in cross section, narrowed into yellow spine, lustrous inside, glabrous, often with constriction at point of transition of flat lower part to subulate upper part, ciliate, scabrous. Corolla light pink or almost white, 2–5–2.9 cm long; corolla tube 1.5–1.6 cm long, style branches and style considerably longer than corolla. Immature achenes 5–6 mm long, tetraquetrous, transversely rugose on sides; pappus yellowish or light golden, its longest bristles more than 2 times as long as achenes, one bristle usually thicker and longer than rest. Flowering May to July.

In thickets of shrubs.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from banks of Vakhsh River from M.I. Pryakhin's collections. Type in Leningrad.

Series 2. Taurica Tamamsch.—Involucral bracts glabrous, densely fine glandular on both sides. Corolla limbs and throat uniformly expanded; filaments very finely glandular.

4. *O. tauricum* Willd. Sp. pl. III, 3 (1803) 1687; Boiss. Fl. or. III, 559; MB. Fl. taur.-cauc. II, 281, Ldb. Fl. Ross. II, 717.—*O. virens* DC. Fl. Fr. V (1815) 456.—*O. virens* β . *tauricum* DC. Prodr. VI (1837) 618.—*O. viscosum* Horn. apud Spreng. Syst. veg. 3 (1826) 386.—*O. elatum* Sibth. and Sm. Fl. Graeca, IX (1813) 23.

234 Biennial. Whole plant subglabrous, green, slightly viscid from tiny glands. Stem stiff, thinly sulcate, to 50–60 cm high, with narrow wings; wings 2–3-rowed, unevenly sinuate, with deltoid lobes and long, very thin spines. Leaves large, oblong-lanceolate, irregularly coarsely toothed, glabrescent, green, weakly coriaceous; leaf lobes spinose, more densely glandular beneath; lower leaves to 15–20 cm long, 5–7 cm wide, middle and upper ones gradually reduced, with deltoid prickly lobes, with distinct light-colored midrib like lower, basally considerably broader. Capitula solitary, large, at tips of branches winged almost to tip. Involucre 5–6 cm in dia, semi-globose; involucral bracts green, yellowish or reddish, large, elongate, to 5 cm long, almost equal, stiff, outer ones somewhat erect or deflected, like others with midrib slightly raised on outside, terminating in straight, subulate spine, with 3 distinct veins inside; corolla 3.0–3.2 cm long, its tube as long as limb including throat. Achenes gray, black-spotted, slightly compressed, 4-angled, with fine longitudinal veins on sides; pappus yellowish, sometimes rubiginous, 2 times as long as achene but 1/2 as long as corolla tube. Flowering May to July.

Stony river banks, around estuaries, roadsides.—*European Part: Crimea. General distribution: Balkans-Asia Minor; introduced in Central Europe. Described from Crimea. Type was in Berlin.*

Section 2. Erecta Rouy in Bull. Soc. Bot. Fr. III (1896) 581.—Involucral bracts appressed, flat, glabrous or pubescent, sometimes only middle bracts deflected. Pappus bristles ciliate, barbate, or plumose. Corolla light-colored, pinkish, creamish or whitish.

Type of section: *O. leptolepis* DC.

Series 1. Armenia Tamamsch.—Pappus bristles ciliate; involucral bracts appressed, lacking spine or with scarcely noticeable spine.

5. **O. armenum** Grossh. in Tr. Tifl. Bot. Sada, II, 1 (1920) 40; Grossh. Fl. Kavk. IV, 192; Takht. and Fed. Fl. Erevana, 323.

Biennial. Whole plant, except capitula, light grayish pubescent. Stems 30–65 cm high, simple or dichotomously branched from middle, deeply sulcate, 1 cm in dia, winged and spinose almost to capitula; wings 4–5-rowed, weakly sinuate, to 1 cm wide in lower part of stem, above gradually strongly reduced, weakly sinuate, with yellowish spines 4–8 mm long. Leaves large, on both sides tomentose, lower leaves with more or less winged petiole, middle cauline leaves decurrent, 6–15 cm long, 2–6 cm wide, ovate-lanceolate, shallowly pinnately lobed, with broadly deltoid, unequal lobes bearing yellow spines, midrib broad and tomentose at base on both sides; upper leaves like middle, gradually reduced, absent at tip. Capitula solitary, 3–5 cm in dia, oblong- or broadly-globose, slightly flattened. Involucral bracts imbricate, outermost tomentose, others glabrous, sometimes lustrous, strongly appressed, lacking spine or with short, scarcely noticeable apical spine; outer bracts about 1 cm long, middle and inner ones longer, ovate-lanceolate, often violet at tips, ciliolate scabrous, smooth inside, stramineous, lustrous, greenish inside along margin. Corolla light pinkish, sometimes almost white, 3.0–3.5 cm long; corolla tube 1.8–2.0 cm long. Style branches strongly exerted from corolla. Apical appendages of anthers violet. Achenes weakly tetraquetrous, 5–6 mm long, 1/2 as long as pappus; pappus bristles ciliate, unequal, as long as or shorter than corolla tube, basally connate in 4–5-angled ring. Flowering June to August.

Weedy places, stony slopes, roadsides.—*Caucasus: Eastern and Southern Transcaucasia. Endemic. Described from Dzervesh in vicinity of Erevan. Type in Tbilisi.*

236 6. **O. frickii** Tamamsch. in Addenda, XXVII, 605.

Annual or biennial. Plants more or less grayish-pubescent. Stem

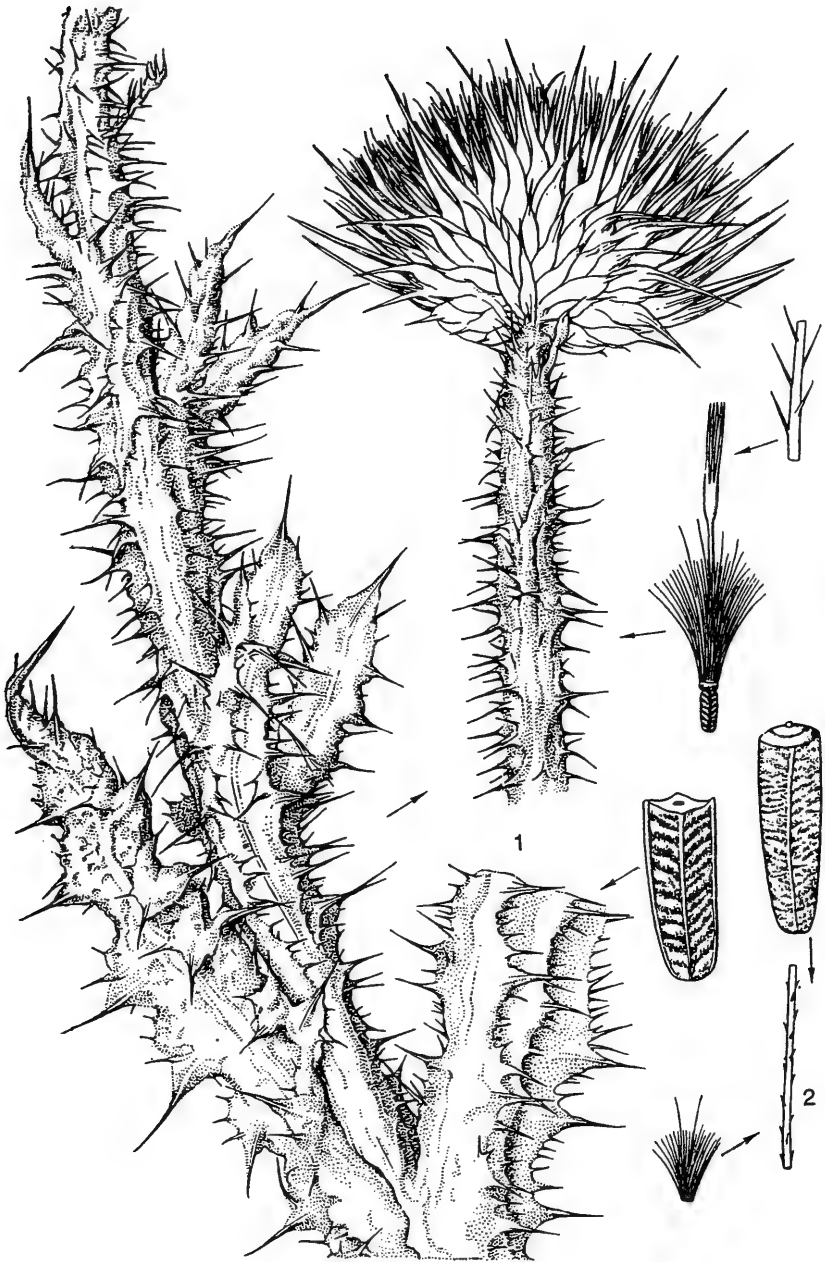


Plate XI.

1—*Onopordum heteracanthum* C.A.M., 2—*O. acanthium* L., achene, pappus, pappus bristles.

80–100 cm high, branched above or from middle; branches many, long, upward spreading, winged like stem; wings grayish-arachnoid-hairy, weakly sinuate, 0.5–0.8(1.0) cm wide, with tiny, yellow, short spines. Middle leaves broadly-lanceolate, 12 cm long, about 2 cm wide, sessile, short-decurrent, remotely coarsely toothed; teeth sometimes bidentate and with yellow spines of different length, gradually reduced in upper part, sessile, long-decurrent, narrowly-lanceolate with spine 1–2 mm long; upper leaves like lower soft from dense arachnoid pubescence on both sides, and with prominent midrib beneath. Capitula solitary, terminal and axillary, 3 cm long, 1 cm in diameter, oblong-cylindrical. Involucral bracts imbricate, flat, most diverse in size, outer ones 0.6–1.2 cm long, ovate-lanceolate and lanceolate, subsequent rows of bracts gradually longer, somewhat curved, linearly-lanceolate; innermost bracts from oblong, 0.6 cm long, 0.3 cm wide, glabrous base narrowly subulate, darker on midrib and along margin glandular ciliate; all inner bracts glabrous, light stramineous, lustrous. Corolla almost as long as inner involucral bracts, light colored. Achenes 5–6 mm long, 2–3 mm wide, ovate, slightly narrowed, 3–4-angled, with 3–4 thin longitudinal veins along sides, transversely rugose, gray, sometimes with black longitudinal spots along ribs, upper scar raised and hilum almost completely concealed under thick appendage; pappus setose, indistinctly two-rowed or one-rowed; pappus bristles ciliolate, almost smooth, unequal, of which longest (one of them thickest) $1/2$ as long as inner involucral bracts and 2 times as long as achene.

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Fields, rocky places.—*Caucasus*: Southern Transcaucasia. Endemic. Described from collections of Frick. Type in Leningrad.

Note. A very distinctive plant, distinguished by weak spines and relatively small capitula—both characters that in general are not characteristic of this genus.

Series 2. Leptolepidia Tamamsch.—Involucral bracts narrow or more or less broad at base, usually erect, with long spine, or middle involucral bracts deflexed; pappus bristles barbate or plumose.

7. *O. leptolepis* DC. Prodr. VI (1837) 619; Boiss. Fl. or. III, 564; O. and B. Fedtsch. Perech. Rast. Turk. IV, 276; Grossh. Fl. Kavk. IV, 191.—*O. lanigerum* Boiss. 1. c. (1875) pro syn.—*O. heteracanthum* var. *ortholepis* Bornm. in Beih. Bot. Zentralbl. LX (1939) 302 p. p. — *O. olgae* Rgl. and Schmalh. in Izv. Obsch. Lyubit. Estestv., Antrop. i. Etn. 34, 2 (1882) 51; O. and B. Fedtsch. op. cit.

Biennial. Tall, densely white-pubescent plants. Stem straight, solitary, more or less branched or simple, fistular, broadly-winged; wings

5–7-rowed, weakly sinuate, lobes toothed, with yellowish spines. Leaves oblong-lanceolate or elliptical, densely lanate on both sides; lower leaves pinnately parted with ovate or sinuate lobes, spiny-toothed, narrowed into straight, yellow, glabrous spine. Capitula 4–6 cm in dia, oblong-broadly ovate or globose, solitary on apical branches, sometimes in axils of upper leaves, sessile and then usually undeveloped. Involucral bracts appressed, straight, deflected even at blooming, gradually narrowed, lanceolate, dorsally floccose; spines erect, hairy, attenuate, triangularly acuminate; bracts more or less glabrous below, ciliate only along margin, narrowed above, along midrib on outside and often inside, ciliate on margin; innermost bracts 3.0–3.5 cm long, to 2 mm wide in broadest part in large capitula, gradually narrowed into tip 1.2–1.5 cm long, scabrous outside, glabrous inside, lustrous, almost as long as light-colored corolla. Achenes narrow, 6 mm long, 1.8–2 mm wide, distinctly tetraquetrous, brown or light brown, obliquely rugose on sides, longitudinally finely sulcate, with 2–3 distinct veins and sometimes with darker spots; ribs well developed, broader above; upper scar of achenes with scaly, more or less quadrate border, with distinct tubercle, hilum straight, to 1/2 or more concealed by callous appendage; pappus 2.0–2.5 cm long, 4 times as long as achene; bristles plumose, one of them thicker, to 3 cm long. Flowering May to June.

238 Mid-montane zone.—*Soviet Central Asia*: In all regions, except northern part of Aralo-Caspian. *General distribution*: Armenia and Kurdistan, Iran, Dzhungaria-Kashgaria. Described from Iran. Type in Paris.

Note. The hybrid *O. leptolepis* DC. × *O. acanthium* L. is known from Samarkand.

8. ***O. candidum*** Nabelek. It. turc.-pers. II (1925) 35.

Biennial. Plants arachnoid-hairy, snow-white. Root simple, dark brown at neck. Stem simple, occasionally weakly branched, solitary, with solitary capitulum, erect, 18–40 cm high, indistinctly angular below pubescence, with decurrent leaves, narrowly-spiny-winged, leafless above. Basal leaves large, falling before flowering; cauline leaves recurved, oblong, ovate, or narrowly-elliptical, 4–5 cm long, coarsely toothed, pinnate-undulate or pinnately parted, lobate with spine to 4 mm long, narrowed into petiole 5–7 cm long; upper and middle leaves sessile, 4–9 cm long, 2–3 cm wide, gradually reduced to simple spine, 1 cm long, 0.5 cm wide; all leaves soft, densely white-arachnoid-hairy above, more densely snow-white-tomentose beneath. Capitula solitary, ovoid-cylindrical, basally narrowed, lacking constriction, pedunculate, 3.5–4.5 cm long, 2–2.5 cm in dia. Involucral bracts appressed, spinose

or densely arachnoid-hairy snow-white, at tip sometimes colored, ciliate-glandular along midrib and margin, with yellowish upward-spreading spine, triangular or lanceolate below, 8–10 mm long, 2–3 mm wide. Corolla pinkish-violet, about 3 cm long; corolla tube 1.5 cm long; limb linear, uniformly broad; style branches to 3.4 cm long, exerted from corolla. Achenes tetraquetrous, dark brown, transversely rugose; pappus to 14 mm long; bristles barbate, thin, one of them erect, longer and thicker than rest. Flowering July to August.

Mountain slopes, dry stony places, uncultivated fields.—*Caucasus*: Southern Transcaucasia. *General distribution*: Asia Minor. Described from vicinity of Van. Type in Bratislava (Czechoslovakia).

Note. Nabelek cites fragrant florets as a distinctive feature of this species; however, fragrance is charactersitic of most species of this genus in general.

9. *O. seravschanicum* Tamamsch. in Addenda, XXVII, 605.

Biennial. Short light gray plant. Stem thick, almost uniformly thick from bottom to top, to 1 cm in dia, angular, weakly sulcate, densely white-tomentose, divaricately branched, with solitary terminal capitula at tips of branches, sometimes with 1–2 undeveloped capitula in axils of upper leaves; wings all over stem and branches 1.0–1.5 cm wide, undulate-sinuate, lobes of wings deltoid or plain, with thin spine, 0.5–0.7 mm long, yellow, densely grayish-pubescent like leaves. Basal leaves about 12 cm long and 2.5 cm wide with deltoid lobes; often bidentate, terminating into thin, yellow spine almost as long as width of lobes, lamina soft from dense indumentum above, denser beneath, rugose-cripsed, especially at base with light colored, thick veins, more prominent beneath, spinescent; upper leaves gradually reduced, below capitula 2 cm long, 0.5 cm wide, lanceolate, entire or denticulate, but always spinose and with thick midrib. Capitula oblong, 3.5–4.0 cm long, 1.5–2 cm wide. Involucre oblong-globose, basally somewhat constricted, more or less glabrous; outer involucre bracts very small, with cusp 0.5–0.6 cm long, ovate-lanceolate, middle-linearly-lanceolate, somewhat divergent, to 2–2.5 cm long, spinescent, like outer bracts glabrous at base, in middle weakly arachnoid-hairy, glandular above and on midrib, ciliate-glandular along margin; innermost bracts 2.5–2.8 cm long, 1.0–1.5 mm wide, at base narrowly-linear, subulate, glabrous below, glandular and ciliate-glandular above and along midrib and margin, pale violet. Corolla whitish, with occasional small glands, 2.8 cm long; corolla tube shorter than limb. Style branches exerted from corolla. Immature achenes 4–5 mm long, reddish-brown, unequally 4–5 angled; pappus white, barbate; pappus bristles unequal, one of them longest reaching throat. Flowering July to August.

Alpine zone.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from vicinity of Rarez from Zeravshan. Type in Leningrad.

Note. The species, possibly of hybrid origin, resembles *O. polycephalum* Boiss. in habit, which is distributed in the subalpine zone of the Sicilian Taurus. A highly ornamental plant.

10. ***O. heteracanthum*** C.A.M. Verzeichn. (1831) 68; DC. Prodr. VI, 618; Ldb. Fl. Ross. II, 717; Boiss. Fl. or. III, 563; Grossh. Fl. Kavk. IV, 192; Dumbadze in Fl. Gruzii, VIII, 522; Gadjiev in Fl. Azerb. VIII, 420.—*O. heteracanthum* β . *anisacanthum* Boiss. l. c. (1875).—*O. anisacanthum* Boiss. Diagn. ser. I, 10 (1849) 93.—*O. carmanicum* Bornm. in Beih. Bot. Zentralbl. LX (1939) 302 p. p.

Biennial. Light grayish and densely pubescent plant. Stem up to 50–60 cm high, occasionally shorter, branched, branches, like stem, to 1 cm in dia, ribbed-angular, densely white-pubescent, to top with many rows of spiny wings; wings in lower part of stem 1.5–1.8 cm wide, on both sides white-tomentose-arachnoid-hairy, weakly sinuate but with very long, light colored spine. Leaves greatly variable; lower leaves petiolate, 15–26 cm long, 4–8 cm wide, shallowly or deeply lobed almost to midrib into large deltoid spinescent lobes with long thick spine sometimes longer than lobe; middle and upper leaves gradually reduced, lanceolate, almost undivided, but with long spine, like lower leaves tomentose-arachnoid-hairy on both sides, with thick midrib and distinct lateral veins above. Capitula solitary, terminal on branches, large, unopened about 7 cm in dia, opened 10–11 cm, usually flattened-globose. Involucre surrounded by lanceolate apical leaves, somewhat appressed above, densely white-pubescent, glabrescent; involucre bracts dissimilar, 3–4-rowed, small, lanceolate, with short tip, imbricate, appressed; middle bracts cuneate, sub-glabrous above, often violet or purple, with thick bristles along margin, spinescent, deflected in upper half, inner bracts straight, shorter than florets, often colored, with whitish spine. Corolla large, bright pinkish, almost white, 3.5–3.8 cm long; corolla tube very narrow, considerably longer than limb. Achenes 5–6 mm long, oblong, somewhat narrowed below, distinctly tetraquetrous, ribbed, on sides grayish, with many longitudinal furrows and transverse dark brown striations, rugose, not maculate, hilum straight, somewhat concealed by thick appendage, upper scar almost quadrate; pappus long, longest bristles barbate, bristles longer than corolla tube and 3 times as long as achene, basally connate in angular, waxy ring, to 1 mm in dia. Flowering May to July. (Plate XI, Fig. 1.)

Up to mid-montane zone, roadsides, in weedy places, abandoned fields.—*Caucasus*: Eastern and Southern Transcaucasia. *General distribution*: Iran-Afghanistan. Described from Zuvant. Type in Leningrad.

Subtribe 3. Centaureinae O. Hoffm. in Pflanzenfam. IV, 5, (1893) 324.—Trib. Carduaceae Cass. in Dict. Sc. nat. VII (1817) 94 p. p.—Trib. Centaurieae Cass. In Dict. Sc. nat. VII (1817) 376, X (1818) 156, XX (1821) 358, L. (1827) 246, LX (1830) 370; Opusc. phyt. I (1826) 294, II (1826) 202.—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. Centaurieae Less. in Linnaea, VI (1831) 85 and Synops. Comp. (1832) 4 p. p.; DC. Prodr. VI (1837) 557; Benth. in Benth. and Hook. f. Gen. pl. II (1873) 214; Boiss. Fl. or. III (1875) 585.—Subtrib. Serratuleae DC. op. cit. 662 p. p.—Subtrib. Characopappeae Sch. Bip. Div. Centaurineae Sch. Bip. in Linnaea, XIX (1846) 325.—Subtrib. Characopappeae Sch. Bip. Div. Serratuleae Sch. Bip. *ibid.* 326 p. p.—Capitula heterogamous, with one row of sterile, often campanulate peripheral florets, mostly longer than bisexual central florets, or homogamous. Achenes with lateral, oblique, very rarely straight, areola or attachment (scar [or hilum]), glabrous, less often hairy, usually with pappus; pappus simple, comprising 2 or more rows of bristles or setaceous scales, or double, inner row comprising mostly considerably shorter scales, scale-like bristles or [simple] bristles.

KEY TO GENERA OF SUBTRIBE CENTAUREINAE

1. Capitula enclosed by spiny-toothed, toothed-ciliate, stiffly, setose, rarely almost entire, apical leaves..... 2.
- + Capitula not enclosed by apical leaves..... 5.
2. Capitula small, (4–7 mm in dia, excluding recurved spines and cusp); achenes compressed, not angular, lacking ribs, smooth..... 3.
- + Capitula larger (10–25 mm in dia, excluding squarrose outer involucre bracts); achenes angular or ribbed, large (4–8.5 cm long)..... 4.
3. Involucre bracts herbaceous, white-membranous along margin and at tip, terminating in stiff-membranous, nonprickly, subulate cusp; florets yellow; achenes rather large (3.5–4.5 mm long). Plants stemless or almost stemless; leaves on margin with white, thin, stiff, mostly palmately branched bristles.....
..... 1618. *Schischkinia* Iljin
- + Involucre bracts coriaceous, outer ones at tip with oblong appendage, on margin with toothed-ciliate, green, leaf-like appendage, not decurrent on bracts; middle bracts with long (10–22 mm), simple, strongly recurved, white spine; florets lilac-pink; achenes small

- (2–2.3 mm long). Plants with stem, stem dichotomously spreading-branched, mostly from base; leaves with stiff, simple, subulate cilia along margin (cf. also couplet 27)..... 1624. **Centaurea** L. (subgenus *Tetramorphaea* DC. Czer.)
4. Outer and middle involucre bracts more or less gradually narrowed into lanceolate, ovate-lanceolate, or ovate, pinnately, spiny-toothed, rarely almost entire, acuminate, or spiny-cuspidate, green, leaf-like, coriaceous, appendage. Achenes tetraquetrous, obovate, lacking, pappus or with pappus of numerous flat bristle-like scales..... 1626. **Carthamus** L.
- + Outer involucre bracts with long, filiform, stiff, appendage at tip, middle and inner bracts with narrowly lanceolate, coriaceous appendage; spiny-pinnate along margin; achenes many-ribbed, oblong-cylindrical, with pappus of few, narrow bristles 1627. **Cnicus** L.
5. Capitula homogamous; all florets bisexual, rarely unisexual (and then plants dioecious), fertile; sometimes capitula heterogamous, with peripheral pistillate florets, and large, central bisexual florets..... 6.
- + Capitula heterogamous; peripheral florets sterile, sometimes with staminodes, small, tubular, or large and then tubular-infundibuliform, central florets bisexual, fertile..... 16.
- 242 6. Receptacle with few, very readily deciduous, narrow-lamellate, long bristles; floret corolla with tube long pubescent in upper part; achenes appressed sericeous..... 1603. **Russowia** Winkl.
- + Receptacle densely covered with persistent, narrow bristles; floret corolla glabrous; achenes entirely glabrous or very rarely with scattered, readily deciduous, long hairs, and almost glabrous at maturity..... 7.
7. Outer and middle involucre bracts acuminate, cuspidate, awned or spinescent, rarely obtuse; achenes glabrous..... 8.
- + Outer and middle involucre bracts with scaly or membranous apical appendage, sometimes as very narrow border, weakly delimited from coriaceous part of bracts, but then involucre bracts roundish and achenes (especially immature) scatteredly pilose..... 11.
8. Florets yellow. Cauline leaves sessile, amplexicaul, short-decurrent (Kopetdag)..... 1610. **Schumeria** Iljin
- + Florets pink, violet, lilac-purple, purple, reddish, rarely white (albinos)..... 9.
9. Achenes small (2–2.5 mm long), with straight, punctate hilum; pappus double, outer one consisting of few, scabrous, hairlike bristles, inner of 1 (rarely 2) scabrous, stiff bristles, appreciably broadened below, longer than outer pappus bristles,

- and 3–5 small, smooth, unequal scales. Annual plants.....
 1617. **Oligochaeta** C. Koch
- + Achenes large (4–8 mm long); pappus simple, consisting of mostly numerous weakly scabrous, serrate, less often short-plumose bristles, gradually becoming longer from outer to inner. Perennial plants..... 10.
10. Stamen filaments densely, more or less long-pilose-hairy; involu-
 cral bracts very narrow (about 1 mm wide), outer bracts subulate,
 middle apically more or less abruptly attenuate into fine hairlike,
 8–12-mm-long awn. Semishrub with thick woody root and many-
 headed caudex; stems numerous (20–30) with virgate branches.
 Leaves rather fleshy, narrow, sessile; middle and upper cauline
 leaves linear and narrow-linear, entire or with 1–2 small teeth at
 base, erect (southern Darvaz Region)..... 1606. **Tricholepis** DC.
- + Stamen filaments glabrous or with very small, inconspicuous papil-
 lae; involu-
 cral bracts wider, lacking thin and hairlike, more or less
 long-awned tips. Plants of different habit..... 11.
11. Achenes with straight hilum. Basal appendages of anthers cleft into
 two hairlike bristles. Leaves entire or subentire; cauline leaves sessile
 1609. **Syreitschikovia** Pavl.
- 243 + Achenes with oblique hilum. Basal appendages of anthers undi-
 vided..... 12.
12. Anthers free, connate only by basal appendages, which are fused on
 inner side with filaments. Capitula drooping, large. Leaves broadly
 triangular-ovate, green above, glabrous, white tomentose beneath;
 basal and lower cauline leaves sinuate-lobate with cordate base.....
 1608. **Synurus** Iljin
- + Anthers connate in anther tube. Capitula not drooping, mostly
 medium-sized or rather small. Leaves of different shape, green,
 sometimes glaucous, glabrous or scabrous from scattered, usually
 somewhat stiff hairs, pinnately incised, pinnately parted, lyrate,
 lobate, less often undivided and entire..... 1607. **Serratula** L.
13. Achenes tetraquetrous, more or less ribbed or rugose-tuberculate,
 truncate at tip, with well-developed crown around margin; append-
 ages of outer and middle involu-
 cral bracts large, round, broadly
 ovate, or ovate, often divided into several lobes, convex, membra-
 nous, not decurrent on bract..... 14.
- + Achenes not angular, smooth, apically rounded, without crown
 around margin; appendages of involu-
 cral bracts of different struc-
 ture..... 15.
14. Annual plants, with slender roots, scabrous due to sharp spine-like
 hairs; leaves sessile, pinnately incised with narrowly linear, entire,
 decurved segments terminating in small bristle. Pappus bristles

- serrate, resilient..... 1615. **Callicephalus** C.A.M.
- + Perennial plants, with long or shortened rhizomes, weakly arachnoid-hairy tomentose, rarely glabrous. Leaves pinnately incised, pinnately parted or lyrate, with almost round, ovate, elliptical or lanceolate, toothed or lobed segments, less often undivided basal and lower cauline leaves petiolate. Pappus bristles short-plumose or barbate, softer..... 1611. **Rhaponticum** Adans
- 15. Plants entirely glabrous, with virgate, vertical root, not producing suckers. Outer and middle involuclral bracts with very narrow, semicoriaceous or stiff-membranous, glabrous upper margin, inner with small, wide, membranous appendage. Filaments papillose. Achenes sparsely pilose, mature achenes almost glabrous, with lateral hilum; pappus as long as achene, pappus bristles serrate (cf. also couplet 22)..... 1605. **Plagiobasis** Schrenk.
- + Plants arachnoid-pubescent, with very long root and with lateral, more or less horizontal or obliquely ascending suckers. Appendages of involuclral bracts scarious, in outer and middle bracts wide, semi-transparent, with short-hairy border, innermost bracts very narrow, linear-lanceolate, densely pilose. Filaments glabrous. Achenes glabrous, with very slightly oblique hilum; pappus usually 3 times as long as achene, pappus bristles serrate-ciliolate, innermost bristles short-plumose above..... 1616. **Acroptilon** Cass.
- 244 16. Achenes sericeous or rather profusely appressed-hairy. Exclusively annual or biennial plants..... 17.
- + Achenes glabrous or scatteredly hairy, subglabrous when mature..... 18.
- 17. Involuclral bracts herbaceous, from acute outer to long-acuminate inner ones, lacking appendages. Florets purple, few (only 1–6 achenes develop); peripheral florets not enlarged, tubular, with 5-parted corolla. Pappus double, outer one of serrate-scabrous, stiff bristles; inner of 5–10 smooth, small scales. Leaves sessile, pinnately divided, with narrowly-linear segments..... 1604. **Crupina** Cass.
- + Involuclral bracts coriaceous, outer and middle ones obtuse, lacking appendages, inner ones with small membranous appendages; florets pink or yellow, numerous, usually strongly enlarged, with infundibuliform, 4–20-lobed corolla; pappus simple, of serrate-toothed setaceous scales. Leaves toothed, pinnately lobed or pinnately parted; basal and lower cauline leaves with quite long petioles..... 1611. **Amberboa** (Pers.) Less.
- 18. Pappus bristles plumose. Perennial plants..... 19.
- + Pappus bristles scabrous, serrate or serrate-ciliolate or achenes lacking pappus..... 21.

19. Florets bright pink, peripheral ones quite enlarged, tubular-infundibuliform; pappus simple; outer involucre bracts membranous, more or less densely short-pubescent, fimbriate-ciliate; appendages of middle and inner involucre bracts like outer ones, large, ovate, entirely covering bracts. Rhizomatous plants; leaves undivided; lyrate-pinnately divided or incised, arachnoid-hairy or densely arachnoid-tomentose (mostly beneath), less often glabrous..... 1619. **Aetheopappus** Cass.
- + Florets yellow, peripheral ones not enlarged, tubular. Combination of other characters different..... 20.
20. Appendages of involucre bracts more or less large, membranous, almost round to ovate, mostly lacerated, erose-toothed. Achenes scatteredly hairy; pappus double. Leaves entire, scabrous from spine-like hairs; cauline leaves sessile, long-decurrent on stem as wings..... 1614. **Chartolepis** Cass.
- 245 + Appendages of involucre bracts small, coriaceous, with palmately divaricate, almost equal, small spines. Achenes glabrous; pappus simple. Leaves entire or sinuate-pinnately lobed, scabrous from stiff hairs; cauline leaves sessile, not decurrent 1620. **Cheirolepis** Boiss.
21. Achenes apically rounded; florets pink. Perennial plants with entire, toothed, or more or less pinnately lobed leaves..... 22.
- + Achenes apically truncate, with small-toothed, rarely almost obtuse crown..... 23.
22. Plants entirely glabrous; root unbranched, vertical. Outer and middle involucre bracts with very narrow, inconspicuous, semicoriaceous or stiff-membranous, entire border at tip. Peripheral florets with staminodes, not enlarged, tubular. Achenes with simple pappus of few very readily deciduous, serrate bristles (cf. also couplet 15.)..... 1605. **Plagiobasis** Schrenk
- + Plants pubescent, with long, more or less branched rhizome. Appendages of outer and middle involucre bracts like wide membranous margin, more or less decurrent on bracts acuminate or spinescent, pectinate-ciliate. Peripheral florets without staminodes, enlarged, tubular-infundibuliform; achenes lacking pappus 1623. **Phalacrachena** Iljin
23. Stamen filaments entirely glabrous. Outer and middle involucre bracts with thin-coriaceous or membranous, broadly triangular or lanceolate, pectinate-ciliate apical appendage, cuspidate or with long-awn; inner bracts at tip irregularly short-toothed, setose-fimbriate or setaceous-awned. Annual plants..... 24.
- + Stamen filaments covered with papilliform hairs or papillae. Involucre bracts at tip with diverse appendages, less often lacking

- appendages..... 25.
24. Florets saffron- or golden-brownish-yellow, flesh-colored or white; peripheral florets lacking staminodes, enlarged; all achenes with pappus, with 2–4 transverse furrows above, below crown; pappus 2 times as long as achenes..... 1602. **Zoegea** L.
- + Florets yellow; peripheral florets with staminodes far exerted from corolla tube, not enlarged. Achenes lacking transverse furrows, smooth, outer ones often lacking pappus; pappus almost as long as achene or slightly shorter..... 1622. **Stizolophus** Cass.
25. Achenes tetraquetrous, more or less transversely rugose, glabrous; pappus simple, bristly, long (12–16 mm), 2 times as long as achenes..... 1621. **Tomanthea** DC.
- 246 + Achenes not angular, smooth, scatteredly short-hairy (mature achenes more or less glabrous), very rarely glabrous (subgenus *Centaurea* of genus *Centaurea* L.); pappus double, sometimes simple, but then shorter (to 6 mm long), much shorter than or equal to achenes, less often achenes lacking pappus..... 26.
26. Scales of inner pappus much shorter than scale-like bristles of outer pappus, 8, broadly linear, more or less hairy on outer side, with tuft of rather long hairs at apex. Annual plants..... 1623. **Hyalea** (DC.) Jaub. and Spach.
- + Scales of inner pappus (often strongly reduced or not differing in size and shape from bristles of outer pappus), always glabrous on outer side, lacking tuft of hairs at apex..... 27.
27. Capitula very large, (20) 30–50 mm in dia; peduncles strongly thickened below capitula; appendages of involucre bracts membranous, irregularly fimbriately lacerate or deeply palmately divided into stiff cilia; florets yellow (Transcaucasia)..... 1613. **Grossheimia** Sosn. and Takht.
- + Capitula usually smaller; peduncles not thickened below capitula; appendages of involucre bracts of diverse shape and size (cf. also couplet 3)..... 1624. **Centaurea** L.

GENUS 1602. **Zoegea** L.^{1, 2}

L. Mant. pl. (1767) 15; DC. Prodr. VI (1837) 562; Boiss. Fl. or. III (1875) 697; Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX (1959) 443; in Fl. Turkm. VII (1960) 248.—*Cyanus* sect. *Zoegea* (L.) DC. in Ann. Mus. Paris, XVI (1810) 158.

¹Treatment by S.K. Czerepanov.

²Named after J. Zoega, a student of Linnaeus and investigator of the flora of Iceland.

Capitula heterogamous, medium- or quite small-sized, with many florets; at tips of stem and lateral branches, solitary, in lax paniculate or almost corymbose inflorescence. Involucres ovate, 6–12 mm in dia (excluding spreading cilia), weakly tomentose to glabrous; involucre bracts many-rowed, imbricate, almost herbaceous, with veins greenish (somewhat yellowing during drying), lanceolate, acute; appendages of outer and middle bracts not decurrent on bract, membranous, lanceolately triangular, pectinate-ciliate, setaceous cuspidate or long-awned at tip; cilia of appendages thin, hair-like, serrate-scabrous; inner involucre bracts white in upper part, irregularly short-toothed to long-awned at tip. Receptacle setose. Florets saffron- or golden-brownish-yellow, flesh-colored or white, heterogeneous; corolla glabrous, central florets (disk florets) bisexual, tubular, several-rowed, very slightly shorter than involucre, with deeply 5-parted corolla, peripheral florets (ray florets) sterile, lacking staminodes and rudiment of style, tubular infundibuliform or tubular, 1-rowed, broadened, longer than involucre, with more or less shallow 4-parted, sometimes 4-toothed corolla. Anthers with small basal appendages, their apical appendage obtuse; stamen filaments flattened, glabrous. Style woolly above, with collar of hairs, bifid, distinctly exerted from anther tube. All achenes similar, ellipsoid-obovate to oblong, 2–5 mm long, truncate above, with crown of short teeth, compressed, smooth, only above with 2–4 transverse furrows, weakly hairy or glabrous scar lateral; pappus longer than achene, persistent, double, outer one of several rows of serrately scabrous, white or very slightly reddish bristles, from very short outer to inner longer ones, inner 1/3 or 1/4 as long as outer, of 10 oblong-spatulate, fimbriate at tip, brownish-green, rarely brownish-purple, broad scales, or subulate, smooth, very narrow bristles. Annual herbs with erect, mostly well-built, branched stem, moderately leafy almost to tip and scabrous lower leaves mostly lyrate, pinnately incised or lyrate, short-petiolate; middle and upper cauline leaves entire, subsessile.

Type of genus: *Z. leptaurea* L.

Seven species belong to the genus *Zoega* L. They are distributed from the Sinai Peninsula to the southwestern Pamiro Alai.

1. Florets golden-brownish-yellow; achenes 3.5–4.0 mm long; inner pappus of achenes scaly..... 1. *Z. baldshuanica* Winkl.
- + Florets white or flesh-colored; achenes 2.0–2.2 mm long; inner pappus of achenes bristly..... 2. *Z. purpurea* Fresen.

Section 1. Zoega—Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX (1959) 446.—Capitula medium-sized; appendages of outer and middle involucre bracts bristly at tip, cuspidate; cusp shorter

than lateral cilia; inner involucre bracts irregularly short-toothed above, bristly-toothed or bristly-fimbriate with distinct bristle-like cusp, often lacking cusp; florets saffron- or golden-brownish-yellow, large (corollas of central florets 10–13 mm long, of peripheral florets 15–28 mm long, tubular-infundibuliform); achenes weakly undulate; inner pappus scaly, of 1 row of oblong spatulate, fimbriate at apex, brownish-green, rarely brownish-purple broad scales.

248 Type of section: type of genus.

Of the six species belonging to this section, only one is found in the USSR.

1. *Z. baldshuanica* Winkl. in Tr. Peterb. Bot. Sada, IX, 2 (1886) 426; O. and B. Fedtsch. Perech. Rast. Turk. IV, 273; Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX, 449; in Fl. Turkm. VII, 249.—*Z. crinita* auct. fl. As. Med. non Boiss.—**lc.**: Czer. Fl. Turkm. VII, Plate XXXIX, fig. 1.—**Exs.**: Sintenis, It. transcasp.-pers. 1900–1901, No. 180.

Annual. Whole plant weakly scabrous from short spiniform hairs. Stem 20–80(100) cm high, erect, finely ribbed, branched from middle or above, lateral branches spreadingly upcurved, well-shaped, more or less long, with fewer branches, sometimes simple, glabrous above. Leaves somewhat thick, acuminate or acuminate-cuspidate, with punctate sessile, glands; lower, often middle, cauline leaves also lyrate pinnately incised or lyrate, short-petiolate, their lateral segments mostly lanceolately linear, entire, 1–2 on each side, terminal segment 2–3 times as long as lateral, narrowly lanceolate or lanceolately linear, entire, sometimes remotely crenate; middle and upper cauline leaves lanceolately linear or linear, entire, subsessile, middle ones (3) 4–6 cm long, 0.3–0.6(0.8) cm wide. Capitula crowded in lax paniculate or almost corymbose inflorescence. Involucre elongately ovate, (15)18–20 mm long, (8)10–12 mm in dia (excluding spreading cilia), weakly tomentose; outer and middle bracts with membranous, pectinate-ciliate appendages; cilia of appendage slightly reddish, somewhat spreading, hairlike, 3–6 times as long as thickness of slightly tuberculate, lanceolate-triangular central part, (7)9–10 on each side; inner bracts 2 times as long as outer and middle ones, white in upper part, at tip, irregularly bristly toothed, lacking cusp. Florets golden-brownish-yellow; corollas of central florets 10–12 mm long, peripheral ones 15–17 mm long. Achenes ellipsoid-obovate or ellipsoid, 3.5–4 mm long, 2–2.5 mm wide, sparsely hairy in upper part, sparingly throughout (var. *dasycarpa* Nevski); pappus (6)7–9 mm long, inner ones 1/4 as long as outer. Flowering June. (Plate XII, Fig. 2).

Rubbly-stony, clayey slopes of foothills, loess mounds, rarely old fields; in low mountains up to 1,400 m.—*Soviet Central Asia*: mountainous Turkmenia, Pamiro-Alai (southwestern part). Endemic but possibly in Afghanistan and northeastern Iran. Described from Baldzhuan. Type and isotypes in Leningrad.

Note. A species very closely related to *Z. glabricaulis* Czer. (southeastern and probably central Iran) and *Z. crinita* Boiss. s. str. (southwestern and western Iran). The three species constitute the natural phylogenetic series *Crinitae* Czer. (*Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XIX (1959) 446.

Section 2. Subulatae Czer. in *Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XIX (1959) 454.—Capitula quite small; appendages of outer and middle involucre bracts long-awned, terminal awn much longer than lateral cilia; inner involucre bracts long-awned in upper part; florets white or flesh-colored, small (corollas of central florets 5 mm long, peripheral ones 7 mm, tubular); achenes glabrous; inner pappus setose, of single row of subulate, smooth, white, very narrow bristles.

A monotypic section.

2. ***Z. purpurea*** Fresen. in *Muz. Senckenberg I* (1834) 86; Boiss. *Fl. or. III*, 698; Hook. f. *Fl. Brit. Ind. III*, 384; Post, *Fl. Syr. Palest. a Sin.* 461, ed. 2, II (1938) 118; Parsa, *Fl. Iran. III*, 699; Czer. in *Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XIX, 455; in *Fl. Turkm. VII*, 250.—*Z. aristata* DC. *Prodr. VI* (1837) 562.—**lc.**: Fresen. loc. cit. *Taf. V*; Czer. in *Fl. Turkm. VII*, Plate XXXIX, fig. 2.—**Exs.**: Bornm. *It. Pers.-turc.* 1892–1893, No. 4052.

Annual. Stem 10–40 cm high, erect, finely ribbed, with few branches from middle or above, rather densely hairy below with more or less long, somewhat intertwined, whitish, articulate hairs, scabrous above from short, stiff, mostly numerous hairs, with few upward spreading, rather well-formed branches, usually simple. Leaves acuminate or acute, terminating into very short cartilaginous cusp, punctate, with sessile glands, scabrous from tiny, stiff hairs, sometimes mixed with arachnoid-hairy pubescence; lower ones rarely and middle cauline leaves lyrate or lyrate-pinnately incised, short-petiolate, their lateral segments linear, less often lanceolate or oblong-obovate, entire, 2–3(5) on each side, terminal segment 2–3 times as large as laterals; middle and upper cauline leaves (often also lower ones) narrowly lanceolate, entire, sub-sessile, middle ones 1.5–4 cm long, 0.15–0.3(0.4) cm wide. Capitula clustered in lax paniculate or almost corymbose inflorescence. Involucre ovate, almost 10 mm long (excluding slightly purple awns of

inner involucre bracts), 6–7(8) mm in dia, glabrous or farinose; outer and middle involucre bracts with membranous, pectinate appendages; cilia of appendages whitish, occasionally slightly purple, usually not spreading, stiff, hair-like, 3–4 times as long as diameter [width] of brownish or purple, lanceolately triangular central field, (5)7–10 on each side; inner involucre bracts longer, mostly purple in upper part, long-awned at tip. Florets white or flesh-colored; corolla of central
 250 florets 5 mm long, of peripheral ones 7 mm long. Achenes ellipsoid, 2.0–2.2 mm long, 0.9–1.0 mm wide, glabrous; pappus 5 mm long, inner 1/3–1/4 as long as outer. Flowering second half of March to April.

Rocks, in lower mountain areas.—*Soviet Central Asia*: Pamiro-Alai (Kugitang, vicinity of Khodzha-Karaul), mountainous Turkmenia (Firyuza). *General distribution*: Southwestern Asia (Sinai Peninsula, southern Palestine, Iran, and Afghanistan). Described from southwestern Asia (probably from Rocky Arabia [Arabia Petraea]). Type unknown.

GENUS 1603. *Russowia* Winkl.^{1, 2}

Winkl. in Tr. Peterb. Bot. Sada, XI, 2 (1892) 281; Czer. in Fl. Turkm. VII (1960) 252.—*Plagiobasis* auct. non Schrenk: Boiss. Fl. or. III (1875) 614.

Capitula homogamous, quite small, with few florets, clustered in lax paniculate or almost corymbose inflorescence. Involucre cylindrical, 3.5–5 mm wide, glabrous; involucre bracts 4–5-rowed, loosely imbricate, semi-coriaceous, with 3–4 dark reddish-brown veins, greenish (somewhat yellowing during drying), on margin thinner, white, from broadly ovate and roundish-elliptical obtuse outer ones to narrowly lanceolate, acute, innermost lacking appendage. Receptacle covered with scales, with few, very readily deciduous long bristles. All florets tubular, pale lilac-pink, slightly surpassing involucre, similar, bisexual; corolla tube pilose above. Anthers with small basal appendages, apical appendages obtuse, filament flattened, glabrous. Style branches very short-woolly, with collar of hairs at base, free up to collar, oblong, included in anther tube. All achenes similar, oblong, 3.5–4 mm long, truncate above, with finely toothed crown, slightly compressed, smooth, sericeous, hilum lateral; pappus longer than achene, white, persistent, simple, comprising more or less numerous serrate-scabrous bristles, gradually becoming longer from very short

¹Treatment by S.K. Czerepanov.

²Named for E. Russov, famous biologist and professor at the Yuriev University.



outer to inner ones. Annual herbs with erect, well-formed, branched stem and glabrous, pinnately incised, lyrate pinnate leaves, sometimes lower ones undivided.

A monotypic genus.

Winkler erroneously attributed to this genus characters not found in it, such as a glabrous receptacle and a double pappus on the achenes.

- 252 1. **R. sogdiana** (Bge.) B. Fedtsch. in O. and B. Fedtsch. Perech. Rast. Turk. IV (1911) 267; B. Fedtsch. Rast. Turk. 756; Czer. in Fl. Turkm. VII, 252.—*Plagiobasis sogdiana* Bge. in Mém. Acad. Sc. Pétersb. div. étr. VII (1854) 361; Boiss. Fl. or. III, 614.—*Russowia crupinoides* Winkl. in Tr. Peterb. Bot. Sada, XI, 2 (1892) 282.—**lc.**: Winkl. loc. cit. tab. I, II.

Annual. Whole plant glabrous. Stem 15–70 cm high, erect, finely ribbed, branched from middle or above, rarely almost from base, with slender, upward-spreading branches, leafless below capitula. Leaves pinnately incised or lyrate pinnate, sessile, not decurrent; lower leaves often with remote small teeth, or even entire, narrowly lanceolate to oblong-oblancheolate, subobtuse or roundish, petiolate, lateral segments of leaves narrowly linear, lanceolately linear, sometimes oblong-linear or oblong (var. *latifolia* Winkl.), roundish at tip, entire, terminal segment usually larger than laterals, mostly remotely small-toothed; segments of strongly reduced upper cauline leaves thickened at tips. Capitula clustered in lax paniculate or almost corymbose inflorescence. Involucre cylindrical, 9–13 mm long, 3.5–5 mm in dia; involucre bracts lacking appendages, outer and middle bracts obtuse, inner ones acute. Florets pale lilac-pink. Achenes 3.5–4 mm long, about 1 mm wide; pappus 6–7 mm long. Flowering April to May. (Plate XII, Fig. 1).

Stony Scree and limestones, pistachio plantations, loessic mounds.—*Soviet Central Asia*: Mountainous Turkmenia (Firyuza, Kushka, Kazachye Ravine), Amu-Darya (Charshanga), Pamiro-Alai (western part), Syr-Darya (south), Kyzyl-Kum (Zhana-Darya River), Tien Shan (former Dzharkent District, Kairylgan Road). Endemic. Described from Zhana-Darya River (Yana-Darya). Type in Leningrad.

GENUS 1604. **Crupina** Cass.^{1, 2}

Cass. in Dict. Sc. nat. XII (1818) 67, XLIV (1826) 35; L. (1827) 329, LX (1830) 571.

¹Treatment by S.K. Czerepanov.

²Name of unknown origin, presumably from the Low German word *krupen* (kreichēn)—to crawl; named, presumably, for the ability of the achenes to disperse with the help of their pappus.

Capitula heterogamous, medium-sized, with few florets clustered in corymbose or paniculate-corymbose, inflorescence. Involucre cylindrical, (4)5–8 mm in dia; involucre bracts few-rowed, loosely imbricate, herbaceous, membranous on margin and almost transparent, with distinct longitudinal striations and numerous, punctate, sessile glands on outer side, greenish, slightly violet at tip, from lanceolate-ovate and acute outer to oblong-lanceolate, long-acuminate innermost lacking appendages. Receptacle covered with long, relatively readily deciduous bristles. All florets tubular, purple, somewhat surpassing involucre, heterogeneous; central florets (disk florets) bisexual, with hairy corolla tube; peripheral florets (ray florets) sterile, lacking staminodes and rudiments of style, with subglabrous (corolla tube with occasional hairs) 5-parted corolla, not broadened. Anthers with short basal appendages, their apical appendages more or less acute; filaments flattened, papillose. Style very short-woolly above with collar of hairs, short, bifid, strongly exerted from anther tube. All achenes similar, 1–5(6) in each capitulum 4–5 mm long, truncate above with obtuse or indistinctly toothed crown, smooth, sericeous, hilum basal or lateral; pappus 1.5–2 times as long as achene, persistent, double, outer pappus comprising several rows of serrate-scabrous, stiff bristles, becoming longer from very short outer to inner ones; inner pappus much shorter than outer, comprising 5–10 triangularly lanceolate or oblong, entire, small scales in one row. Annual herbs, with erect stem and pinnately incised, sessile leaves, nondecurent.

Type of genus: *C. vulgaris* Cass.

The genus includes three or four species, of which two are with us.

1. Achenes obovate, compressed at base, with lateral linear hilum; pappus whitish-rusty-brown or pale rusty-brown.....
..... 1. ***C. crupinastrum*** (Moris) Vis.
- + Achenes short cylindrical, truncate, not compressed, with circular hilum at base; pappus blackish-brown..... 2. ***C. vulgaris*** Cass.

1. ***C. crupinastrum*** (Moris) Vis. Fl. Dalm. II (1847) 42; Boiss. Fl. or. III, 699; Grossh. Fl. Kavk. IV, 193 and Oped. Rast. Kavk. 488; Ter-Khachaturova in Fl. Gruzii, VIII, 524; Agadj. in Fl. Azerb. VIII, 421.—*C. vulgaris* auct. p. min. p. non Cass.: DC. Prodr. VI (1837) 565; Ldb. Fl. Ross. II, 2, 684.—*C. morisii* Bor. Fl. Cent. Fr. ed. 2 (1849) 292.—*C. zuccarinii* Bge. ex Nym. Consp. Fl. Eur. II (1879) 433, pro syn.—*Centaurea crupinastrum* Moris, Enum. sem. hort. Taur. (1842) 12.—**lc.**: Vis. loc. cit. tab. 51, fig. 3.—**Exs.**: Fl. cauc. exs. No. 75; Billot, Fl. Gall. et Germ. exs. No. 3424, Todaro, Fl. Sic. exs. No. 826; Pl. Herceg. exs. No. 93; Fl. Graeca exs. No. 468; Herb. Europ. sine numero.

Annual. Stem 20–80 cm high, erect, finely sulcate, branched, well-formed, whitish-pubescent below, with short-plumose, multicellular, intertwined, thin hairs, glabrous above, often with more or less sparse, dull, sessile glands. Leaves sessile, pinnately incised; leaf segments narrow, narrowly linear, toothed, with stiff, spines indistinctly stellate (visible under high magnification of stereoscopic microscope) at tip, 254 lower leaves pubescent like stem, usually on both sides on midrib, lowermost leaves 2, very small, oblong-obovate, obtuse, entire, withering early. Capitula solitary at tips of stem and its branches, in lax corymbose or paniculate-corymbose inflorescence. Involucre cylindrical, 16–20 (22) mm long, 5–8 mm in dia; involucre bracts on outer side with distinct greenish longitudinal lines and numerous, punctate sessile glands, from lanceolate-ovate, acute outer ones to oblong-lanceolate, long-acuminate innermost lacking appendages. Florets purple. Achenes obovate, 4–4.5 mm long, 2.3–2.5 mm wide, plump, sericeous, at base compressed, with lateral linear hilum; pappus whitish-rusty-brown or pale rusty-brown, 8–9 mm long. Flowering second half of May to July (August).

Dry clayey and rubbly slopes, among shrubs, on rocks from lowlands to mid-montane zone.—*Caucasus*: Dagestan, Eastern and Southern Transcaucasia, Talysh. *General distribution*: Mediterranean Region, Balkans-Asia Minor, Armenia and Kurdistan, Iran-Afghanistan. Described from Italy.

2. *C. vulgaris* Cass. in Dict. Sc. nat. XII (1818) 68; DC. Prodr. VI, 565, p. p.; Ldb. Fl. Ross. II, 2, 684 p. p.; Boiss. Fl. or. III, 699; Schmalh. Fl. II, 114; Fedtsch. and Fler. Fl. Evrop. Ross. 1014; O. and B. Fedtsch. Perech. Rast. Turk. IV, 267; Hegi, Ill. Fl. VI, 2, 930; Grossh. Fl. Kavk. IV, 192 and Opred. Rast. Kavk. 488; Dobrocz. in Vozn. Rosl. URSS, 571; Ter.-Khachaturova in Fl. Gruzii, VIII, 523; Geideman, Opred. Rast. Mold. SSR, 291; Dostal, Klič, 730; Nikitin in Fl. Turkm. VII, 253; Agadj. in Fl. Azerb. VIII, 422.—*C. pauciflora* Kar. and Kir. in Bull. Soc. Nat. Mosc. XV (1842) 392, non Hoffm. and Link (1820).—*Centaurea crupina* L. Sp. pl. (1753) 909.—*Serratula crupina* (L.) Vill. Hist. Pl. Dauph. III (1789) 38.—*lc.*: Hegi, op. cit. fig. 629; Javorka and Csapody, Iconogr. Fl. Hung. (1933) 544, fig. 3888; Dostal, op. cit. tab. 279, fig. 2493.—*Exs.*: Fl. exs. austro-hung. No. 3063; Fl. Gall. et Germ. exs. No. 685; Rchb. Fl. Germ. exs. No. 2524; Fl. exs. reip. Boh.-Slov. No. 881; Novopokr. Herb. Fl. Tanait. No. 67.

Annual. Stem 20–80 (120) cm high, erect, finely sulcate, branched, well-formed, whitish-pubescent below with distinctly plumose, short, thin hairs, usually glabrous above. Leaves sessile, pinnately incised, their segments narrowly linear, entire or small-toothed, on margin with

stiff spines indistinctly stellate (visible under high magnification of stereoscopic microscope!) at tip, lowermost leaves 2–4, very small, obovate to oblong-oblancheolate, obtuse, entire or toothed, withering early. Capitula solitary at tips of stem and branches, usually in clusters of 2–6 in corymbose or paniculate-corymbose inflorescence. Involucre cylindrical, (12)14–18(20) mm long and 4–6 (8) mm in dia; involucre bracts with distinctly dark green or green, longitudinal striations and
 255 numerous punctate, sessile glands on outer side, from ovate or lanceolately ovate, acute outer ones to oblong-lanceolate, long-acuminate innermost lacking appendages. Florets purple. Achenes short-cylindrical, truncate, 3.5–6 mm long, 2–3 mm wide, plump, dark-brown below, yellowish-sericeous above, with round basal hilum; pappus blackish-brown, 5–8 (9) mm long. Flowering second half of April to July (August).

Dry stony and rubbly slopes, on rocks and screes, among shrubs, on gravelly banks of rivers and streams, sometimes in gardens, vineyards, old fields and crop fields.—*European Part*: Bessarabia, Black Sea Region (south), Lower Don, Crimea (south); *Caucasus*: Almost all regions; *Soviet Central Asia*: mountainous Turkmenia, Pamiro-Alai, Tien Shan; Dzhungaria-Tarbagatai (Dzhungarian Alatau Range). *General distribution*: southern and Central Europe, Balkans-Asia Minor, Armenia and Kurdistan, Iran-Afghanistan. Described from southern Europe. Type in London.

Note. In Soviet Central Asia, there is a predominance of plants with more capitula on the average, in a more crowded inflorescence (in clusters of 2–6) at the tips of the stem and its branches, and on the average, larger involucre and achenes (1–5 per capitulum). However, in the Caucasus, in the south of the European part of the USSR and in Europe, specimens are found that do not differ from the Soviet Central Asian ones. The Soviet Central Asian plants were described as a separate species, *C. pauciflora* Kar. and Kir., which was found to be a later homonym (cf. synonymy). O.V. Tscherneva (*Fl. Uzbek.*, VI (1962) 387) proposed the new name—*C. oligantha* Tschern.

GENUS 1605. *Plagiobasis* Schrenk^{1, 2}

Schrenk in Bull. Acad. Sc. Petersb. III (1845) 108.

Capitula heterogamous, rarely homogamous, medium-sized, with many-florets in paniculate, less often almost corymbose inflorescence. Involucre globose-ovate or ovate, 10–20 mm in dia, glabrous; involu-

¹Treatment by S.K. Czerepanov.

²From the Greek words *plagios*—oblique, lateral, and *basis*—base; named probably for the lateral hilum of achenes.

cral bracts many-rowed, compactly imbricate, coriaceous, smooth, greenish (yellowing during drying), with small dark reddish-brown, triangular or almost crescent-shaped macula at apices, from roundish-elliptical outer ones to oblong innermost, outer and middle ones with very narrow, subcoriaceous or stiff, membranous border at tip, weakly delimited from coriaceous part; inner involucre bracts with membranous, entire, small appendages. Receptacle bristly. All florets tubular, pinkish-violet, much surpassing involucre, mostly heterogeneous; corolla glabrous; central florets (disk florets) bisexual, in several rows; peripheral florets (ray florets) sterile, mostly with staminodes far exerted from corolla tube, and long rudiments of style, in single row, less numerous not broadened, sometimes bisexual (and then all florets similar). Anthers with short basal appendages, their apical appendages subacute; filaments flattened, sparsely short-papillose laterally, glabrous below. Style branches short-woolly, at base with collar of hairs, free to $1/2$ – $2/3$ entirely or partly exerted from anther tube, oblong, divergent. All achenes similar, oblong-cylindrical, 5–6 mm long, rounded at tip, often very slightly curved, smooth, with occasional, long, readily deciduous hairs, mature achenes subglabrous or glabrous, hilum lateral; pappus almost as long as achene, whitish, simple, of few, very readily deciduous (at base not connate into ring), serrate bristles, gradually becoming longer from outer to inner ones. Perennial herbs with erect, branched stem and entire, thick, glabrous, leaves.

A monotypic genus.

1. *P. centauroides* Schrenk in Bull. Acad. Sc. Pétersb. III (1845) 109; B. Fedtsch. Rost. Turk. 756; Popov Fl. Almat. Zapovedn. 48.—*P. dshungaricus* Iljin in Izv. Bot. Sada, Akad. Nauk SSSR, XXX, 3–4 (1932) 357.—**Exs.**: GRF No. 4299.

Perennial. Whole plant glabrous, with cylindrical, vertical, simple or less branched root, thickened at collar. Stem solitary, occasionally several (2–3), 25–60 (80) cm high, erect, finely ribbed, branched from middle or above, with upward spreading branches, mostly leafy up to tip. Leaves thick, obovate to oblong, obtuse, subobtuse, less often subacute, usually irregularly toothed; basal and lower cauline leaves strongly approximate, petiolate, petioles 1.5–6.0 cm long; others sessile, sometimes very slightly amplexicaul; apical leaves greatly shortened. Capitula in panicle, less often almost corymbose inflorescence. Involucre globose-ovate or ovate, 15–20 mm long, 10–20 mm in dia; outer and middle involucre bracts with very narrow, semicoriaceous or stiff, membranous border at tip, weakly delimited from coriaceous part; inner bracts with small membranous appendages. Florets pinkish-purple. Achenes 5–6 mm long, 1.2–1.5 mm wide; pappus 5 mm long. Flowering July to September. (Plate XIII, Fig. 1).



Plate XIII.

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1—*Plagiobasis centauroides* Schrenk; 2—*Oligochaeta minima* (Boiss.) Briq.

Outcrops of gypsic clays, conglomerates, and red sand-stones, rubbly slopes; in desert, foothills and low-mountains—*Soviet Central Asia*: Dzhungaria-Tarbagatai (southern spurs of Dzhungarian Alatau; Dzhungarian Pass), Tien Shan (Ketmen Range, eastern spurs of Kungei Alatau and Trans-Ili Alatau ranges, Issyk-Kul Depression), Pamiro-
258 Alai (northeastern foothills of Alai Range). *General distribution*: Dzhungaria-Kashgarai (Kuldzha, Kash River. Turfan). Described from Chingilda in Dzhungarian Alatau. Type and isotypes in Leningrad.

Note. M.M. Iljin (op. cit.) described *P. dshungaricus* Iljin from the vicinity of Dzharkent (former Panfilov). I could not find characters reliably distinguishing it from *P. centauroides* Schrenk. It is represented only by the type specimen, collected in the range of the latter species.

GENUS 1606. *Tricholepis* DC.^{1, 2}

DC. in Guill. Arciv. bot. II (1833) 331, 515; DC. Prodr. VI (1837) 563; Benth. and Hook. f. Gen. pl. II (1873) 475.

Capitula with similar, regular, bisexual, fertile florets. Involucre, many-rowed, of imbricate, narrow, more or less long-awned bracts, gradually reduced from inner to outer ones. Receptacle flat, alveolate, densely bristly with long white bristles. Corolla regular, with narrow tube and narrow limb 5-fid. Filaments densely ciliate-hairy; anthers sagittate at base with rather long, lacerate, incised appendages. Style with thin long branches. Achenes attached laterally, along edge of slightly cartilaginous hilum, roundish-obpyramidal, somewhat angular, glabrous, weakly striped, truncate above, with broad (almost as wide as achene) areola at apex with projecting, small-toothed, upper margin; pappus many-rowed, much longer than achenes, consisting of numerous, sordid-white, very short-plumose unequal hairs, at base connate in ring and detaching together, innermost longer and at base somewhat thickened. Perennials (in Pamiro-Alai, Hindukush and Himalayas) or annuals (mostly in central and southern parts of the Indian Peninsula), with virgate, somewhat woody, more or less long branches, and pinnately incised or remotely-toothed lower leaves, and entire or subentire, middle and upper leaves greatly reduced in upper part; capitula lacking bracteal leaves, always solitary at apices of stems.

The genus comprises about 15 species; one species is known in the USSR.

¹Treatment by I.A. Linczevsky.

²From the Greek words *trix*—hairs, and *lepis*—scales.

1. **T. trichocephala** Lincz. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVI (1954) 479.—**lc.**: Linczevsky op. cit. Plate 1, Fig. a-c.

259 Perennial. Semishrubs with thick woody root and numerous caudices. Stems 40–60 cm high, numerous (20–30), weakly floccose-white tomentose below, entirely glabrous above, more or less strongly branched, only below with slender, virgate, somewhat woody, long (to 30–50 cm), quite densely leafy branches. Leaves sessile, lower ones linear-lobate, uniformly remotely toothed, rather fleshy, sparsely pubescent with short crisped hairs, 25–40 mm long, 3–4 mm wide; middle and upper leaves linear and narrowly-linear, erect, entire or basally with 1–2 small teeth, very fleshy, glabrous, with prominent white-cartilaginous cusp, (2)5–15(25) mm long, (0.5)1.0–1.5(2.0)mm wide, abruptly reduced upward. Capitula solitary at tips of branches, oblong-ovate or conical, or subconical, with fruits broadened above, and then cylindrical or obconical, 20–25 mm long (with florets), at base round or almost truncate, 7–10 mm in dia. Involucre stramineous, weakly floccose-white-tomentose; involucre bracts quite numerous; middle bracts stiff below, strongly appressed and firmly imbricate, linear or oblong-linear, obtusely carinate, 4–12 mm long, about 1 mm wide, almost abruptly attenuated above into thin, hair-like, strongly (sometimes horizontal) spreading, almost straight, light pink awn 8–12 mm long; outermost bracts much smaller, almost subulate, innermost linear, 18–20 mm long and about 1 mm wide, gradually narrowed above, hairy and ciliate at tip. Receptacular bristles almost 2 times as long as mature achenes. Florets slightly surpassing capitulum; corolla pink (?), 18–20 mm long, limb about 10 mm long, its lobes narrow, linear, about 5–6 mm long; anther appendages about 1.0–1.5 mm long, irregularly lacerate-incised with unequal lobes. Mature achenes about 5 mm long, 2 mm in wide; pappus almost 3 times as long as mature achenes. Flowering ?; fruiting September to October.

Stony slopes in lower mountain zone at about 1,200–1,400(1,800) m.—*Soviet Central Asia*: Pamiro-Alai (southern Darvaz Region). *General distribution*: Very possibly found in northeastern Afghanistan. Described from basin of Zarbuz River—a tributary of Pyandzh River. Type in Leningrad.

Note. The description of the lower and middle leaves (which are absent in the type specimens collected later) is given here on the basis of the material originating also from the southern Darvaz Region (south-western spurs of the Darvaz Range, southeast of the village of Sarygor, 1.VI. 1961, No. 286, Yu. Soskov and S. Yunusov), collected not far from the classic locality.

GENUS 1607. *Serratula* L.^{1, 2}

L. Sp. pl. (1753) 816.

Capitula homogamous, rarely heterogamous, with many-florets, medium-sized or small, in lax corymbs or solitary, large. Involucres
 260 semiglobose, globose, ovate or almost cylindrical, comprising several (4–9) rows of firmly imbricate, numerous, more or less coriaceous bracts; outer bracts mostly ovate, short, lacking appendages, subobtuse, acute, or cuspidate, more or less scarious on margin; inner bracts lanceolate and linear with membranous, obtuse or subacute apical appendage. Receptacle flat, bristly, densely pilose. Florets all tubular, pink, purple, lilac-purple or white, in upper part cup-shaped, almost regularly 5-parted, bisexual, less often mono- and dioecious or peripheral florets pistillate, surpassing bisexual central florets. Stamen filaments glabrous, smooth or with very fine papillae; anthers at base sagittate, with undivided, mostly linear appendages. Style usually bifid, less often undivided; lobes usually longer, divergent at maturity, arcuate. Achenes 4–6 mm long, oblong, terete, somewhat compressed laterally, glabrous, smooth or finely sulcate, with oblique hilum; pappus sordid-white or rusty-brown, many-rowed, simple, comprising serate, less often plumose, persistent or gradually detaching bristles, becoming longer from outer to inner. Perennial, unarmed, glabrous or scatteredly hispid herbs, with erect, sometimes ascending stems or almost stemless with alternate, mostly stiff, sometimes coriaceous, pinnately incised, less often undivided, toothed or entire leaves; leaves scabrous on both sides or only beneath, or glabrous, less often with weakly crisped hairs beneath.

Type of genus : *S. tinctoria* L.

The genus comprises about 50 species distributed in Asia, Europe and North America.

Economic Importance. Some species are used as dyeing agents to obtain yellow and green dyes (*S. tinctoria* and others); others are medicinal, vitamin-containing, meliferous and fodder plants (in the early stages of development). The stems of *S. coronata* contain traces of alkaloids.

1. Leaves compound, with 2-4 oblong or elliptical lateral leaflets and larger terminal leaflet (Caucasus) 28. ***S. quinquefolia*** MB.
- + Leaves simple, undivided, pinnately lobed or incised 2.
2. Stems divaricately branched from base, densely pubescent, basal

¹Treatment by A.G. Borissova.

²From the Latin word *serra* [saw]—projection of the saw-toothed leaf margin.

- leaves pinnately divided or incised. Capitula 0.4–1.5 cm in dia, mostly oblong, numerous, clustered in dense or lax corymbose or corymbose-paniculate inflorescence; pappus bristles few, deciduous 3.
- + Stems simple or branched in upper and middle part, sometimes plants stemless or almost stemless. Capitula large- or medium-sized, globose to ovate, few, solitary or in corymbose inflorescence 5.
- 261 3. Plant pubescent with articulate hairs; leaves pinnately divided with lobes lacking cusp. Involucres glabrous 3. *S. erucifolia* (L.) Boriss.
- + Plants pubescent with simple stiff hairs; leaves pinnately incised with toothed lobes, terminating into cartilaginous cusp. Involucres puberulent or subglabrous 4.
4. Involucral bracts puberulent, with curved, subulate cusp 2–3 mm long; involucres cylindrical. Stony places and alkaline steppes 4. *S. dissata* Ldb.
- + Involucral bracts subglabrous, with straight, hard, 3–5-mm-long apical spine; involucres cuneately narrowed toward base, narrowly cylindrical. On sands 5. *S. angulata* Kar. and Kir.
5. Stems reduced, 2–5 mm high, or plants stemless or almost stemless, leaves lyrate or runcinate. Capitula sessile or subsessile; involucral bracts 4–6-rowed 6.
- + Stems well developed, 20–190 cm high; if shorter, then leaves coriaceous, undivided or only at base pinnately lobed. Capitula pedunculate, sometimes subsessile; involucral bracts 5–8-rowed 7.
6. Leaves densely spinose-serrate, lyrate, with 2–3 pairs of lateral lobes; terminal lobe much larger than laterals. Involucres 5–6-rowed 29. *S. lyratifolia* Schrenk
- + Leaves with occasional inconspicuous teeth, runcinate, pinnately incised into 3–5 pairs of irregular lobes, terminal lobe differing little from laterals. Involucres 4-rowed 30. *S. tianschanica* Sap. and Nik.
7. Stems sometimes leafless, often woody at base; leaves coriaceous, crowded mainly in lower part of plant (Soviet Central Asia) 13.
- + Stem leafy throughout or almost throughout 8.
8. Peripheral florets pistillate with large corolla, others bisexual; capitula rather large, usually several in one cluster; involucre with rusty-brown tomentum, reddish-brown to reddish. Leaves large, deeply pinnately incised, coarsely serrately toothed; plants 80–150 cm high 2. *S. coronata* L.
- + Peripheral florets bisexual or unisexual (dioecious plants). Leaves

- entire, toothed, serrulate, or pinnately divided, sometimes pinnately incised 9.
9. Capitula mostly several in corymbose inflorescence, often constricted at base, 1.0–1.5 cm in dia. Plants dioecious, sometimes monoecious; leaves usually undivided or pinnately incised, serrulate (European part of USSR) 1. *S. inermis* Gilib.
- 262 + Capitula solitary, 1.5–4.0 cm in dia. Plants monoecious. Leaves undivided or pinnately lobed, sinuate-toothed or entire 10.
10. Capitula 2.5–4 cm in dia; involucre bracts with long, straight, recurved, hard spines. Plants low, stems simple, with single terminal capitulum (Caucasus). 11.
- + Capitula smaller. Stems simple, with single terminal capitulum, but then capitula 1–1.5 cm in dia, or branched and with several capitula 12.
11. Capitula semiglobose. Leaves lobate at base, crenate-toothed 32. *S. serratuloides* (Fisch. and Mey.) Takht.
- + Capitula subglobose. Leaves large, undivided, irregularly spinose-serrate 33. *S. caucasica* Boiss.
12. Leaves large, deeply pinnately incised or divided, sometimes only lower ones or only reduced upper cauline leaves undivided; plants scabrous or glabrous, (60) 75–150 cm high 17.
- + Leaves undivided, sometimes lower ones pinnately lobed or sinuate-toothed; plants subglabrous or pubescent but not scabrous, 10–50 (75) cm high 23.
13. Stems more than 25 cm high, more or less branched, angular, erect, uniformly leafy mainly in lower part; leaves coarsely spinose-toothed, sometimes lobed at base 14.
- + Stems mostly low, 5–20 cm high, simple, erect or ascending; leaves sharply-serrate or bluntly-toothed to crenate mostly in basal part of plant 15.
14. Capitula oblong, 0.7–1.2 cm in dia, at tips of lateral branches; involucre bracts greenish-stramineous, monochromatic. Stems branched above (Lake Balkhash Region, Dzhungarian Alatau, Tien Shan) 21. *S. suffruticosa* Schrenk
- + Capitula about 1.5 cm in dia, solitary on 15-cm-long peduncles; involucre bracts with dark brown spot at tip. Stems with few branches in lower part (Pamiro-Alai) 19. *S. chartacea* Winkl.
15. Peduncles much longer than leaves; leaves obovate, crenately toothed bluntly toothed or bluntly-lobed. Capitula about 1 cm in dia 22. *S. aphyllopoda* Iljin
- + Peduncles more or less leafy, as long as or slightly longer than leaves 16.
16. Capitula (2.5) 3.0–4.0 cm long and to 3 cm in dia, flat at base.

- Leaves large, ovate or oblong, undivided or with several lobes at base, long-petiolate (Dzhungarian Alatau) 31. **S. modesti** Boriss.
- 263 + Capitula 1.0–2.5 cm long, 1.0–1.5 cm in dia, roundish at base. Stems ascending, short, more or less leafy; leaves narrowly lanceolate, sharply serrate, short-petiolate 20. **S. procumbens** Rgl.
17. Basal and lower cauline leaves ovate or oval, undivided or incised at base itself, sinuate-coarsely toothed; cauline leaves pinnately incised or lobed. Capitula on long, straight peduncles, leafless above middle. 12. **S. heterophylla** (L.) Desf.
- + All leaves similar, pinnately incised with entire or pectinate segments 18.
18. Stems leafy to or almost to capitula; peduncles short; plants scabrous-pubescent or subglabrous. 19.
- + Stems tall, leafless in upper part; leaves large, basal leaves long-petiolate. Capitula large, on peduncles 20–50 cm long 21.
19. Plants scabrous-pubescent, grayish, densely leafy; all leaves similar, pectinate, pinnately incised into similar or almost similar, lanceolate or linearly-lanceolate, coarsely toothed lobes. Capitula to 2 cm in dia and to 3 cm long; outer involucre bracts with very short spines, inner with spiny-toothed appendages (Trans-Baikal) 6. **S. centauroides** L.
- + Plants almost glabrous or weakly pubescent; leaves lyrate or pinnately incised, [all] similar or lower undivided to pinnately lobed, uppermost leaves sometimes linear or linear-lanceolate; leaf lobes entire, less often with occasional teeth, sometimes terminal lobe longer than laterals. Involucre 0.7–1.5 cm in dia, 1.0–1.5 cm long; involucre bracts with conspicuous, very thin, filiform spines 20.
20. Involucre bracts with filiform cusp nearly 0.5 mm long. Upper leaves sometimes undivided, linear (south of European part of USSR) 8. **S. radiata** (Waldst. and Kit.) MB.
- + Involucre bracts with recurved and erect cusp 1.5–3.0 mm long. Capitula constricted in upper part. All leaves lyrate pinnatifid, sometimes terminal lobe longer than laterals (Armenia) 9. **S. biebersteiniana** (Iljin ex Grossh.) Takht.
21. Plant entirely glabrous, with slender stems; all leaves similar in shape; leaf lobes entire, linear to filiform in upper leaves, erect almost at right angle to rachis. Florets pale purple or whitish. On chalks 11. **S. tanaitica** P. Smirn.
- + Plants scabrous-pubescent, mainly in lower part, or subglabrous, 60–100 cm high, with thick, sulcate stems; leaves large, pinnately incised or divided; upper cauline leaves pinnately lobed or undivided, lanceolate, with broad lobes 22.

- 264 22. Involucral bracts yellowish-green, glabrous, 2.0–2.5 cm wide. Plants subglabrous, glaucous, 60–80 (100) cm high (Volga Region, Southern Urals, Western Siberia) 10. **S. gmelinii** Tausch.
- + Involucral bracts with dark tips, sometimes with arachnoid-hairy pubescence. Plants scabrous-pubescent, 80–150 cm high, with sturdy, often violet-colored stem (Trans-Baikal) 7. **S. komarovii** Iljin
23. Leaves coriaceous or almost coriaceous, glabrous, short-petiolate, entire, erose-toothed to lyrate with remote lobes in lower part of leaf, crowded mostly in lower part of plant; upper leaves sometimes pinnately incised with few linear lobes, sessile 24.
- + Leaves soft, not coriaceous, glabrous or short-ciliate, basal leaves long-petiolate, mostly undivided, entire, or upper leaves with large teeth or lobes 28.
24. Capitula oblong or ovate-oblong with cuneate base; involucral bracts yellowish, inner ones violet, lustrous, lacking cusp or with very short cusp often deciduous (Caucasus) 27. **S. coriacea** Fisch. and Mey.
- + Capitula ovate or oblong-ovate; involucral bracts with distinct cusp (Soviet Central Asia) 25.
25. Leaves undivided or entire, basal ones elliptical, gradually narrowed into petiole, obtuse or with short cusp; cauline leaves sessile, ovate-oblong to ovate, upper ones semiamplexicaul, auriculate. Capitula numerous; involucre cupuliform, 1.2–1.5 cm in dia, yellowish-green (Talass Alatau) 26. **S. hastifolia** Kult. and Korov.
- + Plants of other habit 26.
26. Basal and middle cauline leaves undivided, less often sinuate-toothed in lower part, lanceolate and linear-lanceolate, upper ones entire; involucre about 0.8 cm in dia, oblong-ovate 25. **S. lancifolia** Zak.
- + Basal and middle cauline leaves undivided, large-toothed or lyrate-lobate, with remote lobes or teeth 27.
27. Involucral bracts with straight spines 0.5–1.5 mm long. Plants 25–55 cm high (mostly in Pamiro-Alai) 23. **S. sogdiana** Bge.
- + Involucral bracts with divergent spines 3–5 mm long. Plants 30–80 cm high (mostly in Tien Shan) 24. **S. alatavica** C.A.M.
28. Stems branched above; leaves long-petiolate, mostly entire, sometimes with several small teeth; capitula usually in clusters of a few (1–5), 0.8–1.0 (1.5) cm in dia; involucral bracts green, with small brownish spot at tip 13. **S. cardunculus** (Pall.) Schischk.
- 265 + Stems simple; capitula usually solitary, 1.5–2.5 cm in dia; involucral bracts green or blackish, with blackish brownish border 29.
29. Involucral bracts blackish or brownish; capitula 1.5–2.5 cm in dia 30.

- + Involucral bracts green or with small brownish spot at very tip 31.
30. Involucral bracts usually black or with brownish-black border; leaves oblong, long-petiolate, usually entire or with remote, rare broad teeth 15. *S. algida* Iljin
- + Involucral bracts brown on margin and at tip. Leaves glaucous, cauline leaves usually toothed or pinnately lobed 14. *S. marginata* Tausch.
31. Stems and basal leaves on surface and on margin glabrous; basal leaves undivided or subentire, rarely large-toothed, with very short cartilaginous cusp; involucral bracts with hard cusp 16. *S. kirghisorum* Iljin
- + Stems pubescent; leaves ciliate on margin; basal leaves large-toothed or lobed; involucral bracts with thin soft cusp 32.
32. Involucral bracts densely tomentose, narrowly dark-bordered and with dark veins at apex; capitula 2–2.5 cm in dia, roundish at base; achenes oblong; pappus 10–15 mm long. All leaves large-toothed; cauline leaves narrowly lanceolate, appressed to stem 17. *S. dshungarica* Iljin
- + Involucral bracts glabrous or young bracts sparsely pubescent, green; capitula 1–2 cm in dia, concave at base; achenes oblong-ovate; pappus 9 mm long. Cauline leaves oblong-lanceolate, spreading 18. *S. transcaucasica* (Bormm.) Sosn. ex Grossh.

Section 1. Serratula.—Sect. *Sarreta* DC. Prodr. VI (1837) 667.—Plants dioecious or monoecious; capitula homogamous, oblong or oblong-ovate, small, several, usually clustered in corymbose or corymbose-paniculate inflorescence; florets unisexual or bisexual.

Type of section: type of genus.

1. *S. inermis* Gilib. Fl. Lithuan. III (1781) 183; Exerc. phytol. 1, 152; Iljin in Fl. Yugo-Vost. VI, 412; Dobrocz. in Vizn. Rosl. URSR, 570; Majeovski, Fl. ed. 8, 607.—*S. tinctoria* auct. fl. ross. non. L.—*S. tinctoria* ssp. *inermis* var. *angustiloba* M. Pop. Oчерk. Rast. i. Fl. 266 Karp. (1949) 252, nomen.—**lc.**: Fedtsch. and Fler. Fl. Evrop. Ross. Fig. 1018; Syreistsch. III. Fl. Mosk. Gub. III, 308, Kozlovskaja in Fl. BSSR, V, Plate L.—**Exs.**: GRF No. 925.

Perennial. Roots numerous, string-like; rhizome more or less oblique, short. Plant 30–120 cm high; stems erect, glabrous, hard, simple or branched above, with fibrous remnants of old leaves at base. Basal leaves long-petiolate, ovate or oblong-ovate, to 15 cm long and 8 cm wide, acute, at base more or less roundish, sharply serrulate, often undivided or with several lateral lobes, green, sometimes reddish, light

green beneath, stiff and scabrous from short papilliform hairs; middle cauline leaves short-petiolate to subsessile, elliptical to oblong-lanceolate, undivided or lyrate with large terminal lobe, acuminate; upper leaves reduced, often undivided. Capitula mostly several in clusters, at stem apices in corymbose-paniculate or corymbose inflorescence, small, 1.0–1.5 cm long, oblong or ovate, narrowed toward base and slightly constricted. Involucres oblong-cylindrical; involucre bracts dark purple entirely or only in upper part; outer and middle bracts broadly ovate to oblong-lanceolate, on margin and arachnoid-hairy or ciliate-arachnoid-hairy, in upper part, curved and acuminate; inner bracts longer than rest, lanceolately linear, acuminate. Florets lilac-purple, sometimes white, mostly unisexual and dioecious or bisexual. Corollas of pistillate florets about 13 mm long, narrow part of corolla [corolla tube] about 7 mm long, broad part [limb] about 5 mm long, with linear, acute lobes about 3 mm long and 0.5 mm wide; style as long as corolla or slightly exerted from it, about 13 mm long, brownish, with divergent, linear lobes about 1.5 mm long; staminate florets with well developed anther tube, as long as corolla or somewhat longer, ovary abortive, style short, with long linear branches [lobes]; bisexual florets with style sometimes piercing anther tube and surpassing it. Achenes oblong, 4–6 mm long, grayish or brownish; pappus about 7 mm long, comprising dense, weakly scabrous, short-toothed hairs, yellowish-brownish. Flowering June to September; fruiting August to September.

Open broad-leaved and mixed forests, mostly oak, pine, and birch, forest edges, among shrubs, in cut-over forests, moist, sometimes alkaline meadows, on sand ridges, limestones and chalk outcrops.—*European Part*: Baltic Region, Upper Volga, Volga-Kama, Upper Dnieper Middle Dnieper, Volga-Don, Trans-Volga, Upper Dniester, Bessarabia, Black Sea Region, Lower Don. *General distribution*: Central Europe (Poland). Described from vicinity of Grodno. Type in Kiev.

268 **Note.** This species is similar to the European *S. tinctoria* L. and possibly even identical to it; the character of absence of spines on the involucre bracts is variable. Additional observations in nature are necessary. Within the USSR, we often come across plants with undivided leaves—f. *integrifolia* Iljin (op. cit. 413). In Western Europe, the form *S. tinctoria* L. with incised leaves is predominant; however there are individuals with undivided leaves that are described as a separate species, for example, *S. germanica* Wiesb.

Section 2. Mastrucium (Cass.) DC. Prodr. VI (1837) 667.—*Mastrucium* Cass. in Dict. Sc. nat. XXXV (1825) 173, XLI (1826) 521.—*Pereuphora* Hoffm. Verz. Pfl. Nachr. II (1826) 173.—



Plate XIV.

1—*Serratula quinquefolia* MB.; 2—*S. procumbens* Rgl.; 3—*S. trancaucasica* (Bornm.) Sosn. ex Grossh.; 4—*S. biebersteiniana* (Iljin ex Grossh.) Takht.

Rhaponticum subgen. *Mastrucium* (Cass.) Less. Synops. Comp. (1832) 6.—Plants monoecious. Capitula heterogamous, quite large, ovate, several in clusters, forming corymbose inflorescence, sometimes solitary; peripheral florets pistillate, with larger corolla; disk florets bisexual, fertile, numerous.

Type of section: *S. coronata* L.

Note. Besides *S. coronata* L., this section includes *S. insularis* Iljin and *S. koreana* Iljin s. str.

2. ***S. coronata*** L. Sp. pl. ed. 2 (1763) 1144; DC. Prodr. VI, 667; Ldb. Fl. alt. IV, 38; Fl. Ross. II, 2, 756; O. Hoffm. in Pflanzenfam. IV, 5, 326; Schamllh. Fl. II, 112; Fedtsch. and Fler. Fl. Evrop. Ross. 1015; O. and B. Fedtsch. Perech. Rast. Turk. IV, 291; Grossh. Fl. Kavk. IV, 193; Iljin in Fl. Yugo.-Vost. VI, 413; Pavlov, Fl. Tsentr. Kazakhst. III, 315; Kitagawa, Lineam. Fl. Mansh. 470; Kryl. Fl. Zap. Sib. XI, 2935; Dobrocz. in Vozn. Rosl. URSR, 570; Majeovski, Fl. ed. 8, 607; Popov, Fl. Sredn. Sib. II, 767.—*S. coronaria* Pall. Reise. II (1773) 280, 528.—*S. altis-sima* Steph. ex Ldb. Fl. Ross. II, 2 (1846) 761, in nota.—*S. manshurica* Kitagawa in Tokyo Bot. Mag. XLIX (1935) 229.—*Mastrucium pinnatifidum* Cass. in Dict. Sc. nat. XXXV (1825) 173, XLI (1826) 523.—**lc.:** Gmel. Fl. sibirica, II (1749) tab. XX; Syreistsch. III. Fl. Mosk. Gub. III, 309; Kom. and Alis. Opred. Rast. Dalnevost. Kr. II, Plate 326; Lapin, Korm. Rast. III, Fig. 473.—**Exs.:** GRF No. 296.

Perennial. Rhizome woody, large, horizontal, with numerous string-like roots. Stems 35–150 cm high, sulcate, angular, in upper part more or less branched. Leaves green or reddish, sometimes glaucescent beneath, glabrous, less often sparsely hairy beneath on midrib, unpaired pinnate and pinnately divided, mostly with 3–8 pairs of lobes coalesced at base, oblong or elliptical, 10–40 cm long, to 12 cm wide, large-toothed, lobes serrate-toothed, spinulose-ciliate, sometimes with cartilaginous spines at tips of teeth, terminal lobe largest; lower leaves 269 petiolate, cauline leaves sessile and smaller, with ovate-oblong or lanceolate lobes. Capitula quite large, ovate, at tips of stems and lateral branches, on conspicuous peduncles, sometimes solitary, often several in clusters, forming corymbose inflorescence. Involucres 1.0–1.8 cm in dia, 1.5–2.5 cm long, ovate to oblong-ovate, pubescent with short-appressed hairs, often brown or rusty-brown, tomentose, sometimes subglabrous; involucre bracts imbricate, usually reddish-brown, 5–6 rowed, all acuminate, outer ones ovate with short subulate cusp, inner ones oblong-lanceolate, narrow and long-acuminate. Florets lilac-purple, sometimes peripheral larger, undeveloped, with abortive stamens, sterile anthers and narrower, sometimes 3–4-parted corolla; disk florets

bisexual; corollas 20–27 mm long, corolla tube narrow, 15 mm long, limb about 10 mm long, lobes linear, about 5 mm long; anther tube about 10 mm long; anthers with filiform basal appendages about 3 mm long; style exserted from corolla, with 2 linear, grooved lobes about 3 mm long. Achenes 4–5 mm long and about 1.5 mm wide, oblong, smooth, finely sulcate, brownish; pappus 8–10 mm long, shorter than corolla. Flowering June to September.

Forest and Steppe zones; forest and steppe meadows, on forest edges, shrubby thickets, insular forests, mountain slopes, in flooded and alkaline meadows, and sedge marshes.—*European Part*: Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga, Upper Dniester (?), Bessarabia, Black Sea Region, Crimea (?), Lower Don, Lower Volga; *Caucasus*: Cis-caucasia; *Western Siberia*: Upper Tobol, Irtysh, Altai; *Eastern Siberia*: Yenisei, Lena-Kolyma, Angara-Sayans, Dauria; *Far East*: Zeya-Bureya, Uda River area, Ussuri; *Soviet Central Asia*: Aralo-Caspian, Lake Balkhash Region, Dzhungaria-Tarbagatai, Tien Shan. *General distribution*: Central Europe, Mongolia (?), Japan, China. Described from Siberia and Italy. Type in London.

Note. A polymorphic, widely distributed plant. The size and number of capitula vary on the plant. In the Far East, the new var. *orientalis* Boriss. has been discovered. Its capitula are much smaller than in European and West Asian plants; the involucre are copiously brownish-villous; all the plants are smaller in size; and the leaves often have fewer pairs of sparsely toothed lobes.

Economic Importance. A melliferous, medicinal, and vitamin-containing plant; traces of alkaloids have been found in its stem.

Section 3. Piptochaete Boiss. Fl. or. III (1875) 590.—Capitula 0.4–1.5 cm in dia, oblong or oblong-ovate, numerous, clustered in corymbose-paniculate inflorescence; all florets similar, bisexual; pappus bristles few, deciduous. Plants scabrously pubescent, branched from base; leaves pinnately incised or divided.

Type of section: *S. erucifolia* (L.) Boriss.

270 *Series 1. Xeranthemoides* Boriss.—Leaf lobes not cuspidate; outer involucre bracts with recurved cusp.

3. *S. erucifolia* (L.) Boriss. comb. nova.—*S. xeranthemoides* MB. Fl. taur.-Cauc. II (1808) 265, III, 545; DC. Prodr. VI, 669; Ldb. Fl. Ross. II, 760; Boiss. Fl. or. III, 590; O. Hoffm. in Pflanzenfam. IV, 5, 326; Schmalh. Fl. II, 112; Fedtsch. and Fler. Fl. Evrop. Ross. 1016; O. and B. Fedtsch. Perech. Rast. Turk. IV, 292; Grossh. Fl. Kavk. IV,

193; Iljin in Fl. Yugo-Vost. VI, 415; Pavlov, Fl. Tsentr. Kazakhst. III, 317; Ter-Khachaturova in Fl. Gruzii, VIII, 525; Majeovski, Fl. ed. 8, 609; Agadj. in Fl. Azerb. VIII, 426.—*Xeranthemum erucifolium* L. Sp. pl. (1753) 858.—**lc.**: Gmel. Fl. sibirica, II (1749) tab. XLVII; Larin. Korm. Rast. III, Fig. 475.

Perennial. Whole plant bristly from long, papilliform, flexuous moniliform-articulate hairs. Stems 20–60 cm high, with fibrous remnants of old leaves at base, divaricate, strongly dichotomously branched throughout, with woody, spreading branches, forming globose bush. Basal and lower cauline leaves petiolate, oblong-lanceolate, oblong-oval or oval, pinnately divided or incised only at base, less frequently pinnately incised or lobed with lanceolate, acute, toothed lobes; cauline leaves sessile, middle leaves pinnately incised into narrow, entire or sparsely-toothed lobes, gradually transitional to undivided and entire, linear, smaller upper leaves. Capitula oblong-ovate to cylindrical, more or less small 0.4–1.5 cm in dia, numerous, at tips of branches, clustered in broad, compound corymbose-paniculate inflorescence. Involucres dull greenish-yellow, glabrous or sparsely arachnoid-hairy; involucre bracts coriaceous, imbricate, outer and middle bracts ovate, broad, scarious on margin, with short or more or less long cusp at tip, usually recurved. Receptacle densely covered with long, smooth bristles, as long as involucre. Corollas light purple, almost pink, sometimes white (albinos), about 10 mm long; corolla tubes narrow, 4–5 mm long, limb about 6 mm long with linear teeth about 4 mm long. Anthers connate in tube, as long as corolla, free above and obtuse, with filiform basal appendages 0.5 mm long; filaments glabrous. Style short-hairy, exserted from corolla. Achenes oblong 4–5 mm long, weakly compressed, only at base slightly narrowed, weakly sulcate, with slightly raised longitudinal ribs, brownish or almost black; pappus deciduous, reddish, consisting of several rows of deciduous, toothed, scabrous hairs 4–5 mm long. Flowering May to August.

Alkaline soils, “solonetztes” [alkali soils], dry slopes, weedy places, fields, to mid-montane zone.—*European Part*: Volga-Kama, Middle Dnieper, Volga-Don, Trans-Volga, Bessarabia, Black Sea Region, Crimea, Lower Don, Lower Volga; *Caucasus*: Ciscaucasia, Dagestan, Eastern and Southern Transcaucasia; *Western Siberia*: Upper Tobol (southwestern part); *Soviet Central Asia*: Aralo-Caspian. Endemic. Described from Don River. Gmelin’s illustration is the type.

Series 2. Dissectae Boriss. —Leaf lobes with cartilaginous cusp; outer involucre bracts finely floccose, with long spiniform cusp more or less deflected.

4. *S. dissecta* Ldb. Fl. alt. IV (1833) 40; Ldb. Fl. Ross. II, 2, 759 p. p.; DC. Prodr. VI, 669; O. and B. Fedtsch. Perech. Rast. Turk. IV, 292; Pavlov, Fl. Tsentr. Kazakhst. III, 316; Kryl. Fl. Zap. Sib. XI, 2940.—*S. trichocephala* Pall. in herb.—**lc.**: Ldb. Ic. pl. Fl. Ross. V (1834) tab. 489.

Perennial. Roots long, string-like. Rhizome oblique, short, thick. whole plant grayish, with stiff hairs. Stems solitary or 2, 15–40 cm high, branched only in upper part, straight, angular, leafy, covered with flexuous, articulate, scattered hairs, with fibrous remnants of old leaves at base. All leaves, except bracteal, pinnately divided, stiff; basal leaves often withering before flowering, oblong, 10–15 cm long, 1.5–3.5 cm wide; lower cauline leaves like basal with basally broadened, grooved petioles, middle and upper leaves remote, sparse sessile, 2–10 cm long, 1.0–3.5 cm wide, gradually reduced upward and less, incised; all leaves covered on both sides with scattered, long, articulate and shorter bristly hairs; leaf lobes lanceolate or linear, 1–3(5) mm wide, pinnately lobed or toothed, sometimes undivided, tips of teeth with cartilaginous cusp. Capitula almost in corymbose-paniculate inflorescence. Involucre cylindrical, about 0.7–1.5 cm long, 0.5–1.0 cm in dia, round at base; involucre bracts mostly green, sometimes with brownish spot below cusp, puberulent; outer bracts broadly ovate, like shorter, oblong-lanceolate, gradually elongating, and narrower middle bracts with curved, more or less deflected, finely subulate cusp, 2–3 mm long; innermost bracts elongate-lanceolate, acuminate, light-colored. Corollas lilac-purple or pink, 14–16 mm long; corolla tubes about 7 mm long; limb lobed to half with linear lobes about 4 mm long, with very sparse small appressed hairs on outer side. Anther tubes often surpassing corolla; filaments with small papillae; anther
272 appendages linear, 0.5–0.75 mm long. Achenes 5–6 mm long, elongate, yellowish or yellowish-reddish-brown, longitudinally finely sulcate; pappus whitish, about 12 mm long, with short-toothed hairs. Flowering May to July. (Plate XV, Fig. 2).

Stony and rubbly slopes of high steppes, low rounded, isolated hills, desert-steppe regions, clayey, sandy and alkaline steppes.—*Soviet Central Asia*: Aralo-Caspian, Lake Balkhash Region, Dzhungaria-Tarbagatai. *General distribution*: possibly in Dzhungaria-Kashgaria. Described from Arkaul Mountains and Dolon Kar (between Zaisan and Kurchum River. Type in Leningrad.

Note. It is similar to *S. angulata* Kar. and Kir., from which it is distinguished by the pubescence and shape of the involucre and involucre bracts.

5. *S. angulata* Kar. and Kir. in Bull. Soc. Nat. Mosc. XIV (1841) 453; Ldb. Fl. Ross. II, 2, 759; Pavlov, Fl. Tsentr. Kazakhst. III, 316.—*S. dissecta* var. *angulata* (Kar. and Kir.) Trautv. Enum. pl. Songor. (1866) No. 684; Sergievskaja in Kryl. Fl. Zap. Sib. XI (1949) 2941.

Perennial. Root long, string-like. Rhizome oblique, short. Stem 15–40 cm high, angular scabrous, almost arachnoid-hairy. Leaves pinnately incised with linear, undivided cuspidate lobes. Capitula numerous, in corymbose inflorescence, somewhat small. Involucres subglabrous, narrowly cylindrical, almost cuneately narrowed at base; involucral bracts imbricate, 4-rowed, outer ones with spine 3–5 mm long, usually erect and straight; inner bracts with elongate, acuminate appendage. Corollas pink or purple, about 15 mm long; corolla tube about 6 mm long, filiform; limb about 8 mm long, less than 1 mm wide, with linear lobes about 4 mm long. Anther tube somewhat shorter than corolla; style somewhat surpassing corolla. Achenes ovate oblong, about 4 mm long and 2 mm wide, weakly scabrous-hairy. Flowering June to July.

Sands.—*Soviet Central Asia*: Lake Balkhash Region. Endemic. Described from desert along Tonsyk River, near Ayaguz. Type in Leningrad.

Note. This species is similar to *S. dissecta* Ldb., from which it is distinguished by a narrower cylindrical involucre that is cuneately narrowed to the base (and not rounded at the base), involucral bracts that are subglabrous, and longer, straight, hard spines.

Section 4. Klasea (Cass.) DC. Prodr. VI (1837) 668.—*Klasea* Cass. in Dict. Sc. nat. XXXV (1825) 173, XLI (1826) 521.—Capitula medium-to large-sized, on more or less leafy peduncles; all florets similar, bisexual; achenes with pappus.

Type of section: *S. centauroides* L.

²⁷³ *Series 1. Centauroides* Boriss.—Stems well-developed, mostly strong; leaves pinnately incised, divided, or lobed, usually scabrous on margin, often on veins, often also on surface sometimes glabrous; capitula large- and medium-sized, mostly solitary, on leafless or leafy peduncles.

This series combines similar, sometimes difficult-to-distinguish, geographically separated species.

6. *S. centauroides* L. Sp. pl. (1753) 820, ed. 2 (1763) 1148; DC. Prodr. VI, 668; Ldb. Fl. Ross. II, 2, 757; Popov, Fl. Sredn. Sib. II, 767.—*S. pectinata* Turcz. ex Herd. in Bull. Soc. Nat. Mosc. XLIII, 1 (1870) 94; Trautv. in Tr. Peterb. Bot. Sada, VIII, 509.—*Klasea*

Centauroides (L.) Cass. in Dict. Sc. nat. XXXV (1825) 173.—**lc.**: Gmel. Fl. sibirica, II (1749) tab. XVII.

Perennial. Roots string-like, numerous, brown. Rhizome oblique, quite robust. Plants (10)30–80 cm high. Stems covered at base with fibrous remnants of petioles of old leaves, mostly angular, sulcate, more or less pubescent, simple, often branched, leafy to tip. Leaves pinnately incised or divided; leaf lobes oblong to linear, large-toothed, alternate and remote, at acute angle to rachis; lower leaves petiolate, pinnately incised, less often pinnately lobed, spiny-toothed in upper part, scabrous on margin and veins from short, curved hairs, less scabrous on surface, with pubescent petioles; upper leaves short-petiolate. Capitula several, ovate, 2–3 cm in dia, narrowed at base, on peduncles, leafy to capitula. Involucres in upper part slightly constricted; involucral bracts imbricate, 5-rowed, yellowish, glabrous or subglabrous, greenish at tip, acute and with short cusp, about 0.5 mm long, with 5 dark veins, arachnoid-hairy; lower involucral bracts ovate, middle ones to oblong, inner ones lanceolate, longer than others, with scarious, spinescent appendage, innermost linear, with spiny-toothed, membranous appendage, tip and margin of appendage narrowly crisped-scarious. Corolla pink, narrowly tubular, tube about 8 mm long, limb 13 mm long, with linear lobes to 7 mm long; anthers almost as long as corolla, with obtuse, apical appendage about 1 mm long, and linear basal appendage; filaments papilliform, pubescent with hairs. Style 4–5 mm, exerted from corolla, short-bilobate. Achenes oblong, about 5 mm long, constricted at tip and expanded crown-like below pappus, brownish, sulcate; pappus short, about 5 mm long, dense, of unequal shortly plumose bristles. Flowering June to August.

Dry stony slopes, rocks, in mixed herb steppes, sandy steppes, and sands, limestones, sometimes in abandoned fields and crops.—*Eastern Siberia*: Angara-Sayans, Dauria. *General distribution*: Mongolia (northern Mongolia). Described from Siberia. Type in London.

7. **S. komarovii** Iljin in Izv. Glavn. Bot. Sada, XXVII, 1 (1928) 89.—*S. centauroides* auct. non L.: Kom. Fl. Manchzh. III (1907) 757;
 274 Kom. and Alis. Opred. Rast. Dalnevost. Kr. II, 1086.—**lc.**: Kitagawa in Tokyo Bot. Mag. XLVIII (1934) 913.

Perennial. Root string-like, numerous. Rhizome oblique, less often horizontal. Plants 80–150 cm high. Stems solitary or few, with fibrous remnants of old leaves at base, erect, simple, sometimes with few branches, purple in lower part and covered with crisped short hairs, subglabrous and leafless in upper part. Leaves all similar, oblong; basal and lower cauline leaves petiolate, usually pinnately divided,

with alternate lobes, often terminal lobe largest, less often lyrate; middle and upper cauline leaves sessile, pinnately divided, mostly with largest terminal lobe and oblong or lanceolate, toothed or, in upper part, entire lateral lobes with cartilaginous cusp; uppermost leaves reduced, bracteal, entire; all leaves glabrous, subglabrous or mostly lower scatteredly hairy, ciliolate-hairy on margin. Capitula 2–3 cm in dia, solitary, less often 2, on peduncles 20–50 cm long. Involucres subglobose, constricted in upper part; outer and middle involucre bracts ovate or ovate-oblong, sulcate, often blackish in upper part, with narrow scarious margin, violet, with short, straight or slightly curved cusp and usually almost woolly, glabrous on remaining surface; innermost involucre bracts lanceolate, longer than others, with elongate, yellowish appendage, often reddish, very short-hairy on outer side, crisped-scarious at apex and margin. Receptacle covered with long smooth bristles. Florets reddish or violet; corolla 20–25 mm long; corolla tube narrow, 11–12 mm long, almost as long as limb of narrow linear, thin lobes 7–9 mm long. Anther tube shorter than or as long as corolla; basal appendages of anther about 1 mm long, almost undivided; filaments short-pubescent; style quite exerted from corolla, with short inconspicuous branches. Achenes obconical, about 6 mm long and 2.5 mm wide, slightly constricted, scarcely toothed at tip, sulcate; pappus sordid white with unequal, sulcate, deciduous bristles, 6–7 mm long. Flowering June.

Dry stony slopes.—*Eastern Siberia*: Dauria; *Far East*: Zeya-Bureya, Ussuri. *General distribution*: China (north-eastern China). Described from Far East. Type (lectotype) in Leningrad.

8. *S. radiata* (Waldst. and Kit.) MB. Fl. taur.-cauc. III (1819) 545; DC. Prodr. VI, 668; Ldb. Fl. Ross. II, 2, 757; Boiss. Fl. or. III, 588; O. Hoffm. in Pflanzenfam. IV, 5, 326; Grossh. Fl. Kavk. IV, 194.—*S. centauroides* auct. non L.: MB. op. cit. II (1808) 264.—*S. radiata* ssp. *bractefolia* Iljin ex Grossh. loc. cit.; Iljin in Fl. Yugo-Vost. VI, 414.—*S. bractefolia* (Iljin ex Grossh.) Stank. in Stank. and Tal. Opred. Vyssh. Rast. (1949) 670; Dobroc. in Vizn. Rosl. URSR, 275 571.—*Carduus radiatus* Waldst. and Kit. Descr. et icon. pl. rar. Hung. I (1802) 9.— *Ic.*: Gmel. Fl. Sibir. II (1749) tab. XVIII; Waldst. and Kit. op. cit. tab. 11; Rchb. Icon. Fl. Germ. XV, tab. 803; Fiori and Paol. Iconogr. Fl. Ital. I, fig. 3708; Javorka and Csapody, Iconogr. Fl. Hung. 544; fig. 3893.— *Exs.*: Herb. norm. No. 5122.

Perennial. Roots numerous, string-like, brown. Plants 30–100 cm high, scabrous, pubescent, or subglabrous. Stem with remnants of petioles of old leaves at base, virgate, angular-sulcate, erect, simple or weakly branched, with long branches, scabrous in lower part, setose.

Basal and lower cauline leaves long-petiolate, oblong-ovate, pinnately lobed, divided or incised, with linearly lanceolate or lanceolate, acute, entire or sparsely toothed lobes; leaves on branches smaller, undivided or pinnately divided; upper leaves sessile. Capitula on long peduncles, solitary, 1.0–1.5 cm in dia and about 1 cm long, subglobose. Involucral bracts glabrous, lustrous, coriaceous, yellowish-green, imbricate, 5–6-rowed, quite small; outer and middle ones ovate-triangular or oblong-ovate, with cartilaginous thin cusp, 1–2 mm long, more or less bent or almost curved; innermost involucral bracts elongate, lanceolate to linear, with long, membranous appendage, obtuse, and toothed-erose. Corolla pink, about 18 mm long; corolla tube very narrow, about 10 mm long, limb campanulate, about 9 mm long with linear, acuminate lobes about 5 mm long. Anther tube almost as long as corolla or shorter, anther appendages filiform, about 1 mm long; filaments with papillate hairs. Style exerted from corolla or as long, short-bilobate, its lobes about 0.5 mm long. Achenes 4–5 mm long, 1.5–2.0 mm wide, sometimes almost tetraquetrous, glabrous, finely sulcate, slightly curved, yellowish- or reddish-brown to brown, acute at base; pappus 5–7 mm long, yellowish, scabrous from very short, toothed hairs of equal length. Flowering July to August. (Plate XVII, Fig. 2).

Dry montane forests, forest edges, shrub thickets, on limestones.—*European Part*: Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga, Black Sea Region, Lower Don; *Caucasus*: Ciscaucasia, Dagestan, Eastern and Southern Transcaucasia. *General distribution*: Central Europe. Described from Hungary. Type in Budapest.

Note. It is distinguished from the similar species *S. centauroides* L. by the longer cusps of the involucral bracts, the form and degree of incision of the leaves, and the pubescence.

9. *S. biebersteiniana* (Iljin ex Grossh.) Takht. in Takht. and Fed. Fl. Yerevana (1945) 323; Grossh. Opred. Rast. Kavk. 489; Ter-Khachaturova in Fl. Gruzii, VIII, 526.—*S. radiata* ssp. *biebersteiniana* Iljin ex Grossh. Fl. Kavk. IV (1934) 194; Iljin in Fl. Yugo-Vost. VI, 414; Agadj. in Fl. Azerb. VIII, 425.

276 Perennial. Roots string-like, numerous. Rhizome oblique, thick; stems 30–60 cm high, densely, finely woolly, sulcate, with fibrous remnants of older leaves at base. Leaves very dense to capitula, appressed to stem, all pinnately divided mostly with larger terminal lobe, coarsely toothed, teeth recurved, cuspidate, acute and with spinous cusp, hispid-scabrous, on veins and particularly on margin, pinnately incised in lower part, with decurrent lobes, rachis winged; lower cauline leaves sometimes undivided. Capitula globose or globose-ovoid, 1.0–1.2 cm in dia, elongated in upper part, broader at base. Involucral

bracts pale green, firmly imbricate, with 3, green, short stripes above, at tip with long, erect, often recurved, stiff, yellow, straight and cartilaginous spines 2–5 mm long; outer involucre bracts ovate, arachnoid-hairy brown, scarious on margin; middle bracts oblong-ovate, inner oblong-lanceolate to linear, longer than others, pale green in lower part with 3 dark green streaks, with membranous, light yellow, apically toothed and acute appendage. Corollas pink or pale pink, 20–25 mm long; corolla tube narrow, about 8 mm long; limb narrow, about 13 mm long with thin, linear lobes 5–6 mm long. Anthers as long as or slightly shorter than corolla, about 8 mm long, subacute, with short-linear, basal appendage about 0.5 mm long; filaments about 4 mm long. Style exerted from corolla by 2 mm, or as long; style branches very short, inconspicuous, subacute. Achenes oblong, about 5 mm long, 1.5–2.0 mm wide, weakly sulcate or smooth, glabrous, brown; pappus shorter than corolla lobes, 6–8 mm long, not dense, comprising weakly scabrous hairs. Flowering June to August. (Plate XIV, Fig. 4).

Stony dry steppe slopes, among shrubs, in mid- and high-montane zones.—*Caucasus*: Dagestan, Eastern and Southern Transcaucasia, Talysh. *General distribution*: Armenia and Kurdistan. Described from Caucasus. Type (lectotype) in Leningrad.

10. *S. gmelinii* Tausch in Flora, XI, 31 (1828) 485; Kryl. Fl. Zap. Sib. XI, 2937, non DC. (1837).—*S. isophylla* Claus in Beitr. Pflanzenk. Russ. Reichs, VIII (1851) 118, 301; Fedtsch. and Fler. Fl. Evrop. Ross. 1016; Iljin in Fl. Yugo-Vost. VI, 4141; Majeviski, Fl. ed. 8, 608.—*S. centauroides* var. *isophylla* (Claus) Schmalh. Fl. II (1897) 113.—**Ic.**: Gmel. Fl. sibirica II (1749) tab. XVIII; Iljin, op. cit. Fig. 704.

278 Perennial. Roots string-like, brown. Stems 60–100 cm high, solitary, erect or slightly assurgent at base, simple, leafy, sulcate, subglabrous or flexuous-hairy all over or only in upper part. Leaves similar, pectinate-pinnately incised, with lanceolate or linearly lanceolate, acuminate, serrate, less often entire, sometimes with crescent-shaped lobes, coalescent in upper part of leaf with their bases; terminal lobe often larger and broader than laterals; basal and lower cauline leaves with long, thin petioles, obovate or ovate-oblong, 8–10 cm long, about 3.5 cm wide; middle cauline leaves sessile, not amplexicaul and not decurrent; upper leaves reduced, like lower. Capitula solitary, on long, mostly leafless peduncles, subglobose, (1.5)2–2.5 cm in dia, with broad base. Involucre yellowish-green, subglabrous, lustrous or with sparse appressed tomentum; involucre bracts herbaceous, sometimes on margin indistinctly scarious, imbricate, 5–6-rowed; outer involucre bracts triangularly ovate or oblong-ovate, with very short, soft, readily fragile curved cusp, blackish at tip; innermost bracts elongate, lanceolate to



Plate XV.

1—*Serratula chartacea* Winkl.; 2—*S. dissecta* Ldb. 3—*S. lyratifolia* Schrenk;
 4—*S. algida* Iljin.

linear, colored, with lanceolate, yellow membranous appendage. Corolla purple, 15–20 mm long, almost 2 times as long as pappus; corolla tube narrow, 8–10 mm long; limb about 10 mm long, with narrow lobes about 5 mm long. Anther tube longer or almost as long as corolla. Style far surpassing corolla, distinctly bilobate. Achenes 5–6 mm long, 1.5–2.0 mm wide, oblong, 3–4-angled, subacute at base, slightly curved, glabrous and finely sulcate, brownish; pappus about 7 mm long, 1/2 as long as corolla tube, whitish or yellowish, comprising stiff, thick, scabrous, toothed, unequal bristles. Flowering June to July.

Meadow steppes, among thickets of steppe shrubs, along edges in open forests, in flooding meadows, on limestones, sometimes in old fields and salt-marsh meadows, in forest-steppe and steppe zones.—*European Part*: Upper Volga, Volga-Kama, Volga-Don, Trans-Volga, Lower Volga; *Western Siberia*: Upper Tobol, Irtysh. Endemic. Described from Western Siberia. Gmelin's illustration is considered as the type.

Note. It is distinguished from *S. centauroides* L. by an always simple, mostly straight stem, with a single large capitulum and highly leafless peduncle; coalescent upper lobes of the leaves; a much larger terminal lobe; the shape of the leaves; and the finely serrate-scabrous pappus bristles.

11. *S. tanaitica* P. Smirn. in Byull. Mosk. Obshch. Isp. Prior. Otd. Biol. XLIX (1940) 92; Majeovski, Fl. ed. 8, 609.

279 Perennial. Roots numerous, almost horizontal, string-like, about 1 mm thick, brownish. Rhizome thin, vertical or oblique, 1–2 cm long. Stem 40–70 cm high, about 3 mm thick, with fibrous remnants of petioles of old leaves at base, glabrous, cylindrical, sulcate, with many leaves or almost leafless. Basal leaves petiolate, petioles almost as long as oblong lamina. Leaves pinnately divided, with 8–12 remote lobes; leaf lobes almost similar, linear, 2–4 cm long, 2.5–4.0 mm wide, almost at right angle to rachis, almost falcate, shorter and narrower in basal leaves, entire like upper leaves, sometimes with occasional or several teeth, finely scabrous-ciliate along margin, raised beneath along midrib, with short subulate cusp; rachis in upper part narrowly winged, more broadly winged above, at base unwinged; uppermost leaves entire, linear to subulate, 0.5–2 cm long, about 2 mm wide, sometimes absent. Capitula solitary on leafless peduncles. Involucre globose, 1.5–1.7 cm in dia, attenuate in upper part, rounded at base; outer involucre bracts ovate, acute, middle ones oblong-ovate, inner ones oblong, longer than others, yellowish, with 3–5 green veins and narrow scarious border, at tip sparsely woolly to subglabrous, with

scarious, curved, flat cusp 1.5–2.0 mm long; innermost bracts oblong to linear, with glabrous apical appendage about 7 mm long. Corolla pale, dry, violet, or pale, violet, about 18 mm long; corolla tube about 8 mm long; corolla limb about 10 mm long, with linear lobes about 4 mm long. Anther tubes as long as corolla or slightly longer. Style scarcely exerted from corolla, short-bilobate; ovary oblong, glabrous, finely sulcate. Achenes unknown. Flowering May.

Chalky, more or less turfy, slopes.—*European Part*: Lower Don. Endemic. Described from mouth of Golubaya River in Volgograd Region. Type in Moscow; isotype in Leningrad.

Note. This species is similar to *S. radiata* (Waldst. and Kit.) MB. and *S. gmelinii* Tausch. It differs from the first by having involucre bracts with a straight cusp, about 5 mm long, and from the second by having a glabrous stem, almost uniform, markedly narrower and entire leaf lobes, smaller capitula, and a pale corolla.

Series 2. Heterophyllae Boriss.—Stem straight, simple, with relatively few leaves. Basal leaves petiolate, undivided, large-toothed or pinnately lobed; cauline leaves mostly in lower part of stem, pinnately lobed to incised. Capitula large, solitary, on long leafless peduncles.

S. caput-nejæ Zahariadi, described from Romania and very close to *S. heterophylla* (L.) Desf., belongs to this series.

12. ***S. heterophylla*** (L.) Desf. Tabl. ecol. bot. Mus. hist. nat. Paris (1804) 93; DC. Fl. Fr. IV, 86; Prodr. VI, 669; Ldb. Fl. Ross. II, 2, 758; O. Hoffm. in Pflanzen fam. IV, 5, 326; Schmalh. Fl. II, 113; Fedtsch. and Fler. Fl. Evrop. Ross. 1016; Dobrocz. in Vizn. Rosl. URSR, 570.—*S. nitida* (Waldst. and Kit.) Bess. Enum. pl. Volhyn. (1822) 32.—*Carduus heterophyllus* L. Sp. pl. (1753) 824, ed. 2 (1763) 1154.—*C. nitidus* Waldst. and Kit. Descr. et icon. pl. rar. Hung. I (1802) 52.—*Klasea heterophylla* (L.) Cass. in Dict. Sc. nat. XXXV (1825) 173.—**lc.**: Waldst. and Kit. loc. cit. tab. 52; Rchb. Icon. Fl. Germ. XV, tab. 804; Fiori and Paol. Iconogr. Fl. Ital. I, fig. 3709; Javorka and Csapody, Iconogr. Fl. Hung. 544, fig. 3891.—**Exs.**: Herb. norm. No. 5123; Fl. Cechosl. exs. No. 96.

Perennial. Roots string-like, numerous. Whole plant sparsely papillate-scabrous. Stem virgate, simple, straight, 50–80 cm high. Leaves relatively few, mostly in lower part of stem, pinnately incised to lobed, reduced above to narrowly linear; basal leaves petiolate, ovate, lobed or undivided, broad and large-toothed, cuspidate, sometimes pinnately divided in lower part, lyrate. Capitula solitary, on long leafless peduncles, medium- or large-sized, 1.5–2.0 cm in dia, subglobose, broader

toward base. Involucral bracts glabrous, coriaceous, imbricate, 6-rowed, outer ones ovate-triangular with five greenish-brown, narrow stripes, at tip narrowed into short cusp, with narrow membranous reddish-brown border; innermost bracts oblong, linearly lanceolate, acuminate and apically undulate, membranous. Corolla pink, about 20 mm long; corolla tube about 10 mm long, limb 10 mm long, 1 mm wide, with linear, acute lobes about 5 mm long. Anther tubes almost as long as corolla. Style considerably surpassing corolla. Achenes oblong; pappus about 6 mm long, comprising straight, scabrous bristles. Flowering June to July.

Meadows and steppes, moist herb slopes, in scrubs, on limestones, in mountains at 900–1,000 m.—*European Part*: Upper Volga, Volga-Kama, Upper Dnieper, Middle Dnieper, Volga-Don, Trans-Volga, Bessarabia, Black Sea Region. *General distribution*: Atlantic, northern and Central Europe, Mediterranean. Described from northern Europe. Type in London.

Series 3. Nitidae Boriss.—Leaves undivided, entire, or upper leaves with few large teeth or lobes, mostly glabrous or short-ciliate on margin, basal leaves long-petiolate; capitula solitary or 2–7 on lateral branches of stem, large, about 3 cm in dia, or smaller, 0.8–1.5 cm in dia.

13. *S. cardunculus* (Pall.) Schischk. in Kryl. Fl. Zap. Sib. XI (1949) 2938; Grubov, Konsp. Fl. Mong. (1955) 279.—*S. centauroides* Spreng. Syst. veg. 3 (1826) 389, non L. nec MB.—*S. nitida* Fisch. ex Spreng. *ibid.*, 390; DC. Prodr. VI, 668; Ldb. Fl. Ross. II, 2, 759; 281 Schmalh. Fl. II, 114; Fedtsch. and Fler. Fl. Evrop. Ross. 1016; O. and B. Fedtsch. Perech. Rast. Turk. IV, 292; Iljin in Fl. Yugo-Vost. VI, 416; Pavlov, Fl. Tsentr. Kazakhst. III, 316, non Bess.—*S. nitida* α . *typica* Trautv. in Bull. Soc. Nat. Mosc. XXXIX, 2 (1886) 73; Kryl. Fl. Alt. III, 715.—*Centaurea cardunculus* Pall. Reise, I (1771) 500.— *Ic.*: Gmel. Fl. sibirica, II (1749) tab. XL; Zachariadi in Bull. Sect. Scient. XXVIII, 5 (1946) pl. IV, B. f. g. h.

Perennial. Rhizome short, thick, with numerous string-like roots. Stem straight, 20–50 cm high, simple, less often branched in upper part, with brown remnants of old leaves at base, glabrous or sparsely hairy, sulcate. Basal leaves long-petiolate, elliptical or oblong-elliptical to ovate, 5–20 cm long, 1–5 cm wide, obtuse or short-acuminate, glabrous, finely ciliate on borders, glaucescent beneath, entire, with remote teeth or small-toothed, decurrent, sometimes broadly sinuate; cauline leaves sessile, smaller, fewer, lanceolate, entire, toothed to pinnately lobed; upper cauline leaves reduced, undivided, linearly

lanceolate or linear. Capitula on long peduncles, 2–7 on lateral branches of stem, less often solitary. Involucres 0.8–1.5 cm in dia, subglabrous, very sparsely hairy; involucre bracts greenish, sometimes with dull brownish spot at tip, imbricate, 5–6 rowed; outer bracts ovate, acuminate; inner ones linearly lanceolate, scarious at tip, middle ones ovate-lanceolate, with short, somewhat attenuate, cusp 0.5–1.0 mm long. Corolla pale, lilac-pink, about 15 mm long, with narrow tube, 4–5 mm long, gradually merging with deeply lobed limb about 9 mm long; limb lobes linear, about 5 mm long. Anthers with linear basal appendage, at tip obtusely short-lobate. Style somewhat surpassing corolla, short-bifid with divergent lobes. Achenes about 9 mm long, oblong, brown, finely sulcate, narrowed toward base, apically attenuate and crowned or small-toothed; pappus 8–9 mm long, whitish-yellowish, of unequal, short-plumose hairs. Flowering May to June. (Plate XVI, Fig. 2).

Forest-steppe and steppe zone, steppe, often alkaline meadows, shores of salt lakes, in desert-steppes, now and then in old fields, shallow sands and sandy steppes.—*European Part*: Volga-Kama, Trans-Volga, Lower Don, Lower Volga; *Western Siberia*: Upper Tobol, Irtysh, Altai; *Soviet Central Asia*: Aralo-Caspian, Lake Balkhash Region, Dzhungaria-Tarbagatai. *General distribution*: Mongolia (northwestern part of Mongolia). Described from Volga. Type in London.

14. *S. marginata* Tausch in Flora, XI, 31 (1828) 484; Kryl. Fl. Zap. Sib. XI, 2939; Grubov, Kosp. Fl. Mong. 279.—*S. glauca* Ldb. in Mém. Acad. Sc. Pétersb. V (1812) 560; Fl. alt. IV, 38 and Fl. Ross. II, 2, 758 p. p.; DC. Prodr. VI, 668; Zahariadi in Bull. Sect. Scient. XXVIII, 5 (1946) 18, non L. (1753).—*S. centauroides* Ldb. Fl. alt. IV (1833) 39, non L.—*S. gmelini* Ldb. ex DC. Prodr. VI (1837) 668 p. p. non Tausch (1828).—*S. laxmanni* Fisch. ex DC. ibid., 669, pro syn.—*S. nitida* β. *glauca* (Ldb.) Trautv. in Bull. Soc. Nat. Mosc. XXXIX, 2 (1866) 379; Kryl. Fl. Alt. II, 715; Schmalh. Fl. II, 114 p. p.—*Centaurea uniflora* Pall. Reise. III (1776) 252, 321, non L. (1767).—*Carduus altaicus* Patrin ex DC. op. cit. 669, pro syn.—*C. uniflorus* Turcz. ex DC. op. cit. 669, pro syn.— *Ic.*: Gmel. Fl. sibirica, II (1749), tab. XXXIX, fig. 2; Ldb. Ic. pl. Fl. Ross. I, tab. 32.

Perennial. Roots cord-like, numerous. Rhizome short, nodulose, oblique, ascending. Stems 15–70 cm high, solitary, simple, subglabrous, ribbed, glaucous, usually leafless above. Leaves glabrous, glaucous; basal and lower cauline leaves mostly long-petiolate; petioles almost as long as oblong or ovate lamina (1) 2–4 cm wide, undivided or some with few large teeth or lobes or pinnatifid, obtuse or short-acuminate, short-ciliate along margin; upper cauline leaves sessile, lanceolate, 4–9 cm long and 0.4–1.5 cm wide, coarsely and sharply toothed or

pinnatifid, sometimes with few teeth or undivided; uppermost leaves small, linear. Capitula solitary, quite large. Involucre semiglobose or ovate-semiglobose, 1.5–2.0 cm in dia, slightly arachnoid-hairy; outer involucre bracts ovate or ovate-oblong, gradually narrowed above and with spine 1–2 mm long, brownish or blackish along margin in upper part; inner bracts oblong, with scarious, obtuse or acute, fimbriate-ciliate, lacerate or toothed, dorsally appressed, short-hairy appendage. Corolla pinkish-violet, greatly exserted from involucre, about 20 mm long; corolla tube filiform-tubular, 10 mm long; limb about 10 mm long, with linear lobes, 5 mm long. Anther tube almost as long as corolla, in upper part with obtuse, free lobes, with filiform basal appendage about 1 mm long; filaments free, papillately hairy. Style surpassing corolla, very short-pubescent, bilobed, lobes about 1 mm long. Achenes oblong, 4 mm long, 2 mm wide, somewhat attenuated in upper part, narrowed toward base, finely sulcate; pappus about 15 mm long, yellowish with scabrous, very short-plumose hairs of varying length. Flowering June to July.

Mountain steppes, dry stony slopes and rocks, in forest and sub-alpine mountain zones, in larch forests, along forest edges, in forest meadows and on meadow slopes, coastal gravels.—*Western Siberia*: Irtysh, Altai; *Eastern Siberia*: Lena-Kolyma, Angara-Sayans, Dauria; *Soviet Central Asia*: Dzhungaria-Tarbagatai. *General distribution*: Dzhungaria-Kashgaria, Mongolia, China. Described from Siberia. Gmelin's illustration is the type.

Note. De Candolle (DC. op. cit. 670) recognizes *S. glandulifera* Turcz., described from the Khor steppe in Selenga Dauria from the collections of Turczaninow, and characterized by the unlobed, runcinate leaves, and also a glandular stem. However, M.G. Popov (*Fl. Sredn. Sib.*, II, 768) considers this species an abnormal form of *S. glauca* Ldb. (= *S. marginata* Tausch) or *S. centauroides* L.

15. *S. algida* Iljin in Fedde, Repert. XXXV (1934) 357; Kryl. Fl. Zap. Sib. XI, 2940; Czerneva in Fl. Uzbek. VI, 389.

Perennial. Rhizome obliquely ascending or horizontal, with copious, thin, string-like, fibrous roots. Plants 25–80 cm high, glaucescent or light green. Stems solitary, covered at base with fibrous remnants of old leaves, straight, simple, sulcate, glabrous or scatteredly pubescent, sometimes reddish at base, leafy. Leaves dull green on both sides, glabrous or scatteredly hairy on midrib, finely short-ciliate on margin or subglabrous; basal and lower cauline leaves 5.5–20.0 cm long, 0.7–2.5 cm wide, oblong-ovate to oblong-lanceolate, long-petiolate, obtuse or with short, thin cusp, often withering at fruiting; cauline leaves sessile, small, oblong to lanceolate, uppermost narrowly linear; all leaves

entire, occasionally, almost toothed. Capitula solitary, 1.5–3.5 cm in dia, semi-globose, on long peduncles. Involucres 1.5–2.0 cm long and 1.5–3.0 cm in dia; involucral bracts imbricate, 6-rowed, almost coriaceous, initially sparsely arachnoid-hairy, later subglabrous or with inconspicuous pubescence, outer ovate or oblong-ovate, often black, middle ones broadly lanceolate all bracts acuminate or with 0.5–2.0 mm long cusp, gradually attenuate, with wide black stripe on margin and at tip; inner and innermost bracts oblong to lanceolate with elongated, stiff, almost scarios, acuminate or acute, undulate, irregularly, toothed and short-ciliate appendage. Corolla pinkish-reddish, 20–23 mm long; corolla tube 6–10 mm long, limb 9–13 mm long, with linear lobes 4.5–6.0 mm long; anther with short basal appendage 0.5–0.75 mm long; filaments papillose; style surpassing or as long as corolla, bifid, with long lobes. Achenes about 6 mm long, oblong, brownish, finely sulcate; pappus about 10 mm long, yellowish, finely barbate. Flowering June to August. Fruiting July to August. (Plate XV, Fig. 4).

Rocks, stony and rubbly slopes, moraines, on herb slopes and passes, in cedar-larch and larch forests from alpine to forest zones, 1,500–3,600 m.—*Western Siberia*: Altai; *Soviet Central Asia*: Dzhungaria-Tarbagatai, Tien Shan. Pamiro-Alai. Endemic. Described from region of Kafarag Pass, descent from Anzob Pass. Type in Leningrad.

16. *S. kirghisorum* Iljin in Fedde, Repert. XXXV (1934) 338; Kryl. Fl. Zap. Sib. XI, 2939.—*S. nidida* var. *sublyrata* Kryl. ex Schischk. in Kryl. *ibid.*, pro syn.

284 Perennial. Roots numerous, fibrous, string-like. Rhizomes thick and short, almost horizontal. Plants 10–40 cm high, glaucescent. Stems almost always solitary, simple, straight, angular, glabrous or subglabrous. Leaves on both sides glabrous, scabrous and ciliate along margin with short dense cilia; basal leaves more or less numerous, like lower cauline leaves petiolate, ovate or oblong-ovate, almost lyrate or sinuate-toothed usually only in lower part, less often pinnately divided or undivided, obtuse, with very short cartilaginous cusp on teeth; middle cauline leaves sessile, mostly pinnately divided or lyrate, with oblong lobes or toothed; upper leaves reduced, linearly lanceolate, appressed to stem and mostly undivided. Capitula solitary, on more or less long peduncles. Involucres 1.2–1.5 cm long, 1.2–2.0 cm in dia, yellowish-green, lax arachnoid-tomentose at tip; outer involucral bracts ovate or oblong-ovate, middle ones broadly lanceolate, their cusp (1)2–3 mm long, blackish-brown at tip and with few dark veins; inner bracts often reddish, lanceolate, narrowed into scarios, linear appendage. Receptacle densely setose, bristles $\frac{3}{4}$ as long as involucre. Corolla 15–19

mm long, pinkish-purple; corolla tube 7–9 mm long; limb with linear lobes 5–6 mm long. Anthers appendages 0.5–0.8 mm long filaments papillose. Style as long as or slightly surpassing corolla, short-bilobate. Achenes oblong, 5.0–5.5 mm long, 1.5–2.0 mm wide, finely sulcate, glabrous, lustrous, grayish or brownish-blackish, whitish at base, with small tooth at tip; pappus almost 1/2 as long as corolla, 7–9 mm long, yellowish, short-barbate. Flowering May to June.

Desert-steppe zone, occasionally alkaline rubbly, clayey-stony and loamy slopes.—*Western Siberia*: Upper Tobol, Irtysh, Altai; *Soviet Central Asia*: Aralo-Caspian, Baltic Region, Dzhungaria-Tarbagatai. Endemic. Described from Chinghiz Mountains in region of Namas River in former Semipalatinsk Region. Type in Leningrad.

17. *S. dshungarica* Iljin in Fedde, Repert. XXXV (1934) 357.

Perennial. Roots thin, string-like; rhizome woody, oblique, thick. Plants 30–75 cm high, glaucescent. Stems at base with remnants of old leaves, solitary or few, simple or weakly branched, angular, covered with long, beaded hairs. Leaves glabrous on both sides, less often scatteredly hairy beneath, ciliate on margin; basal leaves relatively few, like lower cauline leaves gradually narrowed into petiole, oblong, or oblong-ovate, pinnately divided, less often lyrate or undivided, with
285 oblong-oval or oblong, obtuse lobes, cuspidate or sometimes acute; upper cauline leaves sessile, pinnately divided or toothed, with acuminate or acute lobes or teeth; apical leaves linear, almost entire. Capitula 1–4 mostly solitary, on quite long peduncles, 2.5 cm in dia. Involucres 2.2–2.5 cm long, 1.5–2.2 cm in dia, arachnoid-hairy or tomentose; outer involucre bracts ovate or oblong-ovate, cuspidate, middle ones oblong-lanceolate, scarcely short-ciliate on-margin, at tip brownish-blackish, pubescent, gradually narrowed into brownish cusp 2–4 mm long; inner bracts lanceolate or linearly lanceolate short-hairy, at tip with membranous, oblong or linear, acuminate appendage, usually hairy on margin and purple. Receptacle densely setose, bristles 1/3–3/4 as long as involucre. Corolla pinkish-purple, 19–25 (often 21–22) mm long, corolla tube filiform, 8–11 mm long, limb 11–14 mm long, with linear lobes 5–8 mm long. Anther tube almost as long as corolla; anther appendages 0.5–1.0 mm long; filaments papillose. Style surpassing corolla, with 2 short lobes. Achenes 5–6 mm long and 2.0–2.5 mm wide, oblong-ovoid, somewhat flat, sulcate, brownish or grayish, glabrous and lustrous, with small teeth at tip, somewhat narrowed at base; pappus 10–15 mm long, 1/2 as long as corolla, pale yellow, short-barbate. Flowering May to August.

Common cattail—sheep's fescue, often stony, steppe slopes, on tertiary clays, 1,100–1,800 m.—*Soviet Central Asia*: Dzhungaria-

Tarbagatai, Tien Shan. Endemic. Described from Dzhungaria Alatau, from vicinity of Sary-Dzhas. Type in Leningrad.

18. *S. transcaucasica* (Bornm.) Sosn. ex Grossh. Fl. Kavk. IV (1934) 194; Ter-Khachaturova in Fl. Gruzii, VIII, 526; AgadJ. in Fl. Azerb. VIII, 425.—*S. glauca* Ldb. Fl. Ross. II, 2 (1846) 758 p. p.—*S. haussknechtii* Boiss. Fl. or. III (1875) 589 p. p.—*S. nudicaulis* ssp. *haussknechtii* var. *transcaucasica* Bornm. in Vestn. Tifl. Bot. Sada, 32 (1914) 2.—*S. haussknechtii* var. *transcaucasica* (Bornm.) Grossh. and Schischk. Sched. ad Pl. or. exs. (1928) No. 224.—**Exs.**: Pl. or. exs. No. 224.

Perennial. Roots numerous, string-like. Rhizome oblique. Stems 12–30 cm high, simple, sulcate, covered at base with fibrous remnants of old leaves. Leaves mostly at stem base, not coriaceous; basal leaves subglabrous, ciliate along margin, oblong, on short or more or less long, winged petiole; with thin, short spines at tip and on teeth, gradually narrowed toward base, entire or in lower part with sparse, remote teeth; cauline leaves remote, few, linear, gradually reduced upward. Capitula small, 1.0–1.2 cm in dia, ovate-globose, solitary at tips of almost leafless stems. Involucral bracts subglabrous or pubescent in upper part, coriaceous, imbricate, 4–5-rowed; outer bracts triangularly ovate, with quite long, thin spines at tip; inner bracts much longer than outer, lanceolate, gradually narrowed into scarious appendage with short spine. Corolla pink, about 15 mm long; corolla tube 6–7 mm long; limb about 9 mm long with linear lobes 5–6 mm long. Anther tubes shorter than corolla; anthers with short, linear basal appendage about 0.5 mm long, obtuse, free; filaments short-papillose. Style surpassing corolla, short-bilobate. Achenes oblong-ovate, about 6 mm long, 2 mm wide, finely sulcate, brownish, somewhat narrowed toward base; pappus about 9 mm long, dense, of short unequal hairs. Flowering May to August. (Plate XIV, Fig. 3).

Dry slopes, in middle and lower montane zones.—*Caucasus*: Dagestan, Eastern and Southern Transcaucasia, Talysh. *General distribution*: Asia Minor, Iran. Described from Caucasus. Type in Weimer.

Note. *S. haussknechtii* Boiss. is a species extremely close to *S. transcaucasica* and possibly even identical to it. It differs in the shape of the more attenuate leaves, involucral bracts, plant height, range, and adaptation to the alpine zone of northern Iran.

Series 4. Chartaceae Boriss.—Stems woody at base, branched or simple, sometimes reduced; leaves coriaceous or papery, undivided or pinnatifid, upper leaves oblong to lanceolate and linear.

19. *S. chartacea* Winkl. in Tr. Peterb. Bot. Sada, IX, 2 (1886) 524; O. and B. Fedtsch. Perech. Rast. Turk. IV, 293.

Perennial. Root strong, brown, string-like. Rhizome woody, branched. Stem 30–40 cm high, almost woody at base, branched or simple, with cylindrical branches, sparsely pubescent, leafy almost to middle. Leaves thick, coriaceous, or papery, oblong, lyrate, 3–12 cm long, 1.5–5.5 cm wide, densely reticulate; lower ones narrowed into petiole, irregularly coarsely spiny-toothed and sinuate-toothed, along margin short-ciliate, glabrous above, sparsely pubescent beneath on veins, cuspidate; upper leaves gradually reduced, uppermost solitary, about 0.5 cm long, sessile, oblong-lanceolate, entire, cuspidate, subglabrous. Capitula solitary on glabrous peduncle, about 15 cm long, medium-sized 1.5–2.0 cm in dia, subglobose. Involucral bracts imbricate, densely below, sparsely pubescent above, outer ones coriaceous, triangular-ovate, elongate to lanceolate, almost spinescent at apex and brownish-blackish; inner ones linear, about 2 cm long, with scarious reddish cusp about 8 mm long, with undulate apical appendage. Receptacle setose, bristles 8–9 mm long. Corolla red, about 22 mm long; corolla tube 8–9 mm long; limb campanulate, about 10 mm long, with linear, acute lobes 5 mm long. Anthers connate in middle, slightly shorter than corolla, free at tips, subobtusate, with basal linear appendage 1 mm long; filaments papillose. Style slightly exerted from corolla, shortly bilobate. Achenes oblong, 6 mm long, 2.0–2.5 mm wide, weakly attenuate, toward tip, weakly undulate on edges, densely sulcate, glabrous; pappus dense, about 11 mm long, white, with short and thin plumose hairs. Flowering August to September (Plate XV, Fig. 1).

Mountain slopes.—*Soviet Central Asia*: Pamiro-Alai. Endemic. Described from Pamiro-Alai. Type in Leningrad.

Note. The form with entire leaves—*f. integrifolia* Iljin—has been reported from eastern Tadzhikistan.

20. *S. procumbens* Rgl. in Bull. Soc. Nat. Mosc. XL, 3 (1867) 165; O. and B. Fedtsch. Perech. Rast. Turk. IV, 294.—*S. flexicaulis* Rupr. in Mém. Acad. Sc. Pétersb. ser. VII, XIV, 4 (1869) 57; Trautv. in Tr. Peterb. Bot. Sada, VIII, 508.—*S. depressa* Rgl. and Schmalh. in Izv. Obshch. Lyubit. Estestv., Antrop. i. Etn. 34, 2 (1882) 52; Trautv. op. cit. non Stev.—*Jurinea paulseni* O. Hoffm. ex Pauls. in Kjoeb. Vidensk. Meddle. (1903) 155, (1909) 159.

Perennial. Roots string-like, brown, numerous. Rhizome long, thick, creeping, with brown remnants of old leaves in upper part. Plants subglabrous or very short-pubescent, many-stemmed, many-headed, and woody at base. Stem reduced, 4–25 cm high, often procumbent, simple or with 2/4 branches; flowering stems as surgent, flexuous. Leaves

coriaceous, undivided, oblong-ovate to lanceolate, 5–8 cm long and to 2 cm wide; basal leaves narrowed toward base into short-winged petioles, apically attenuated, with widest part in upper third, irregularly sinuate and sharply serrate-toothed with straight or curved, short, cartilaginous cusp; cauline leaves semiamplexicaul, upper ones gradually reduced, sessile, elliptical or oblong, in lower part sharply toothed, above almost undivided; uppermost leaves small, oblong to linear, entire. Capitula 1/3, solitary at tips of stems, large, 2–3 cm in dia, nodding, on straight, short peduncles, often with bracteiform apical leaves. Involucre 1.0–2.5 cm long, 1–2 cm in dia, light green, almost monochromatic, under lens short-woolly on margin, ovate-cylindrical, rounded at base, somewhat attenuated at tip, with many rows of imbricate bracts; outer involucre bracts triangular-ovate, sometimes with black cusp about 2.5 mm long, later oblong, green, with thin stripes, hairy on margin, tiny deciduous fluff, inner ones lighter in color, scarious, attenuate to linear, acuminate point, with scarious appendage; innermost violet in upper part, acute or subobtuse, lacking spine, longer than others, 2.0–2.5 cm long, linear, very finely pubescent on outside. Receptacle flat, long- and densely-setose, bristles white, almost as long as ovary. Florets red, pink, or pinkish-violet, violet when dry. Corolla about 23 mm long, narrowed over 9–10 mm; broader part of corolla tube about 12 mm long, with narrow, filiform, more intensely colored lobes 7–8 mm long. Anthers connate in middle, free above, obtuse, with linear basal appendage about 5 mm long. Style thin, long, far exerted from corolla or shorter, bilobed, with lobes 0.5–2.0 mm long. Achenes oblong, 5 mm long, and 1.5–2.0 mm wide, brown, indistinctly tetraquetrous, smooth or weakly sulcate; pappus about 12 mm long, many-rowed, short-barbate, stramineous, some bristles slightly shorter than corolla and shorter outer hairs longer than or as long as narrow part of corolla. Flowering June to September. (Plate XIV, Fig. 2).

Dry stony and rubbly slopes of foothills and mountains, on steppe slopes, 1,700–4,000 m.—*Soviet Central Asia*: Tien Shan, Pamiro-Alai. Endemic. Possibly found in parts of China adjoining Pamir. Described from Tien Shan, Tekes. Type in Leningrad.

21. *S. suffruticosa* Schrenk. in Bull. phys.-math. Acad. Sc. Pétersb. III (1845) 110; Trautv. in Bull. Soc. Nat. Mosc. XXXIX, 2 (1866) 380; O. and B. Fedtsch. Perech. Rast. Turk. IV, 295.

Perennial. Roots woody, strong, brown. Rhizome woody, often with numerous woody branches. Plants glabrous, at base woody, with brown remnants of petioles of old leaves. Stem branched above, with few long branches and solitary capitula. Leaves coriaceous, lower ones

oblong-lanceolate to linearly lanceolate, sometimes runcinate or pinnately incised into linear lobes, with winged petioles, sharply or spiny-serrate or sinuate-toothed; upper leaves linearly lanceolate to linear, entire. Capitula oblong or ovate, (1.5) 2.0–3.0 cm long, and 0.7–1.2 cm in dia, subglabrous. Involucral bracts greenish-stramineous, monochromatic, with very short deflected cusp; outer bracts ovate, cuspidate; inner bracts elongate to linear, almost scarious, acute, cuspidate. Receptacle covered with scarious bristles shorter than achenes. Corolla pink, exserted from involucre, about 15 mm long; corolla tube about 5 mm long, bulged at base; limb campanulate, about 5 mm long, 1 mm wide, with narrow, filiform, acuminate, about 4 mm long lobes, somewhat attenuate at tip. Anthers somewhat shorter than corolla, fused over entire length of corolla, free at apex, with short basal appendage. Style not exserted from anther tube, linear, bifid, its lobes about 1 mm
 289 long. Achenes 5 mm long, and about 1.8 mm wide, oblong, glabrous, somewhat curved, with occasional furrows; pappus short, about 7 mm long, slightly longer than corolla tube; yellowish, with almost equal and almost smooth hairs. Flowering June.

Stony slopes, on red gypsiferous sandstones and granites.—*Soviet Central Asia*: Lake Balkhash Region, Tien Shan, Dzhungaria-Tarbagatai. Endemic. Described from Tien Shan, Bektautu Mountains, Type in Leningrad.

22. **S. aphyllopoda** Iljin in Fedde, Repert. XXXV (1934) 359; Czerneva in Fl. Uzbek. VI, 390.—**Ic.**: Czerneva, *ibid.*, Plate XL, Fig. 1.

Perennial. Plants 20–30 cm high. Stems erect, almost leafless, sulcate, subglabrous, pubescent below capitulum, with one capitulum. Leaves oval or oblong-oval, obtuse, short-petiolate, sinuate-toothed, almost coriaceous, glabrous on both sides or noticeably scatteredly pubescent, mostly with prominent reticulate veins beneath; basal leaves numerous, 8–15 cm long and 3–7 cm wide; cauline leaves 2–3, reduced, at base of stem. Capitulum medium-sized, about 1.5 cm in dia. Involucres glabrous, yellowish-green; outer involucral bracts ovate or ovate-oblong, middle ones oblong, with very short cusp, 0.5–1 mm long, blackish at tip, with 3 veins, inner ones linear with oblong, scarious, pale-purple appendage, attenuate and noticeably short-stiff-hairy basally on outer side. Corolla pale-purple, 20–24 mm long, narrowed over 10–12 mm, limb lobes 5.5–7.0 mm long. Basal appendages of anthers very short, about 0.25–0.5 mm long, flatish; filaments glabrous. Immature achenes glabrous, mature achenes unknown; pappus whitish, densely barbate, with hairs almost as long as diameter of bristles. Flowering June to July.

Outcrops of gypsiferous rocks, in foothills.—*Soviet Central Asia*: Tien Shan. Endemic. Described from Chatkal Range in area between Maili and Poneu. Type in Leningrad.

Note. *S. aphyllopoda* Iljin is close to *S. chartacea* Winkl. and possibly even identical to it; additional material and observations in nature are needed. According to Iljin, *S. aphyllopoda* is close to *S. alata* C.A.M. and *S. sogdiana* Bge. but differs from them by the absence of the stem.

Series 5. Sogdianae Boiss.—Leaves entire, incised-toothed to lyrate, with remote lobes; upper leaves sometimes deeply pinnately incised with few linear lobes, coriaceous or almost coriaceous, glabrous, lower ones short-petiolate, cauline leaves sessile. Capitula medium-sized, ovoid or oblong-ovate, with round base; involucre bracts with distinct cusp.

23. *S. sogdiana* Bge. Beitr. Kenntniss Russl. Stepp. Centr.-As. (1851) 191; Boiss. Fl. or. III, 588; O. and B. Fedtsch. Perech. Rast. Turk. IV, 293 p. p.; Czerneva in Fl. Uzbek. VI, 389.

290 Perennial. Roots string-like. Rhizome thick, woody, branched. Stems 25–55 cm high, with adpressed, straight, thin and long branches, ribbed, glabrous, only on ribs scabrous, leafy. Basal and lower cauline leaves thin, coriaceous, oblong, mostly about 8 cm long, about 2.5 cm wide in middle, narrowed into short petiole, from base to middle incised-toothed, entire in upper part, with stipule-like, linear, deflected, straight, or curved auricles at base; middle cauline leaves and those on branches linearly lanceolate, about 3 cm long, gradually reduced, upper ones almost linear, sessile, undivided or lyrate, with lanceolate terminal lobe and linear, short, lateral lobes, coriaceous, cartilaginous-spinescent, with acute, cartilaginous cusp. Capitula mostly solitary, 2.5 cm long, 1.5 cm in dia, obovate or ovate cylindrical, on more or less long peduncle, with several spinose, appressed scaly leaves. Involucre bracts coriaceous, yellowish-green, glabrous, imbricate, outermost ovate, 4–5 mm long, gradually narrowed, with short, yellow, appressed cusp, on outside short-hairy; middle bracts oblong-lanceolate and lanceolate with deflected cusp 0.5–1.5 mm long, lower margin of cusp sparsely hairy, above base ciliate; innermost bracts linear, 20–22 mm long, scarious at tip and strong narrowed, ciliate almost to base, setose in middle on outside. Receptacle setose with smooth bristles about 1 cm long. Corolla purple or pink, about 16 mm long; corolla tube narrow, about 6 mm long; limb about 10 cm long, with linear lobes 5 mm long. Stamen filaments papillose; anther tube as long as corolla; anthers with obtuse, basal appendage not tailed. Style long,

longer than corolla, bilobed. Achenes reddish-brown, oblong-conical, about 5 mm long, narrowed at base, somewhat curved, almost smooth; pappus longer than corolla, about 10 mm long, with dense, gradually deciduous, very short and appressed plumose bristles. Flowering July to September; fruiting August to September (Plate XVI, Fig. 1).

Mountain-steppe meadows, in juniper stands, on stony and rubbly slopes, scree, dry riverbeds and ravines, 2,500–3,000 m.—*Soviet Central Asia*: Tien Shan (Kirghizian Alatau), Pamiro-Alai (Gissar, Turkestan, Zeravshan and Alai ranges). Endemic. Described from Zeravshan. Type in Paris.

24. *S. alatavica* C.A.M. in Mém. Acad. Sc. Pétersb. sér. VII, XIV, 4 (1869) 56; Trautv. in Tr. Peterb. Bot. Sada, VIII, 508; Grubov, Konsp. Fl. Mong. 278.—*S. dissecta* var. *asperula* Rgl. and Herd. in Bull. Soc. Nat. Mosc. XL, 2 (1867) 116.—*S. trautvetteriana* Rgl. and Schmalh. in Tr. Peterb. Bot. Sada, VI, 2 (1880) 321.—*S. sogdiana* auct. p. p. non Bge.: O. and B. Fedtsch. Perech. Rast. Turk. IV (1911) 293.—**Exs.**: H.F.A.M. No. 498.

Perennial. Rhizome thick, long, woody, with string-like roots. Stems 30–80 cm high, straight, angular and sulcate, branched, with long, cylindrical branches. Leaves glabrous, scabrous and spinous-toothed along margin; basal leaves oblong, undivided, triangular-toothed with short thin cusps; lower cauline leaves lyrate, with many, often almost linear, remote, lateral lobes, sometimes undivided, terminal lobe large, ovate; middle cauline leaves deeply pinnately incised, with few, almost linear, deflected lobes; uppermost leaves elongated to linear, base of some lobes widened, sometimes subentire. Capitula solitary, sometimes 2–3, about 2 cm long and 1.5 cm in dia, on leafless or more or less leafy peduncle. Involucral bracts with long, setaceous, deflected, cusp 3–5 mm long; outer bracts more or less pubescent mostly in young capitula; inner bracts greatly elongated, acuminate like bristle. Corolla pink, about 20 mm long; corolla tube about 6 mm long, almost as long as limb, 12 mm long and 1 mm wide; limb almost 1/2 as long as tube, with linear lobes about 5 mm long. Anther tube somewhat shorter than or almost as long as corolla. Style somewhat exerted from corolla. Achenes oblong-ovate, 4 mm long and 1.75 mm wide, sulcate, narrowed at base, slightly attenuate and undulate at apex, with black spots, brown; pappus almost as long as corolla tube, about 10 mm long, yellowish, of numerous unequal, very short-plumose (visible under lens!) hairs. Flowering June to September.

Clayey, rubbly and stony steppe slopes, wormwood steppes and mountain meadows, among woody-scrub vegetation, 1,000–3,000 m.—*Soviet Central Asia*: Tien Shan, Pamiro-Alai. Endemic. Described from Alatau Mountains. Type in Leningrad.

Note. *S. altavica* C.A.M. was described from plants grown from seeds collected by Schrenk in the Alatau Mountains. *S. trautvetteriana* Rgl. and Herd. was described from the former Kokand Khanate (Shakhimardan). *S. alatavica* is a species similar to *S. sogdiana* Bge., but is distinguished from it by the large size of the plant as a whole, longer than 0.5–1.5 mm, recurved, not erect, spines of the involucrel bracts. *S. alatavica* C.A.M. occurs in the more northern regions of the Kirgiz Alatau, Trans-Ili Alatau, and southern Kirghizia. *S. sogdiana* Bge. is confined mostly to Pamiro-Alai and to the Hissar, Turkestan, Zeravshan, and Alai ranges.

25. ***S. lancifolia*** Zak. in Fl. Uzbek. VI (1962) 515, 388.

Perennial. Stems numerous, erect, 20–30 cm high, with thin, glabrous, weakly pubescent below capitula, leafy, simple or branched in upper part, subramose, one-headed. Leaves thin-coriaceous, green on both sides, glabrous, entire, less often sinuate-toothed; basal and lower cauline leaves petiolate, lanceolate, subobtusate; middle cauline leaves gradually reduced, narrowly lanceolate, sessile, narrowed at both ends. Capitula about 2 cm long (with corolla) and 0.8 cm in dia, oblong-ovate, at base rounded. Involucrel bracts numerous, 6-rowed, imbricate, coriaceous, obtuse, with very short cusp and 2–3 dark colored veins, arachnoid-hairy on margin; outer bracts ovate, inner ones lanceolate, erect, 15–16 mm long, puberulent on outside. Receptacular bristles smooth. Corolla pink, 15 mm long, corolla tube narrow, about 6 mm long; limb about 10 mm long and 1 mm wide, with linear lobes 4 mm long. Anther tube somewhat shorter than corolla. Style not exerted from corolla. Achenes 3 mm long and 1 mm wide, glabrous, with several furrows, brown, oblong-ovate, narrowed toward base, slightly attenuate at tip; pappus 7 mm long, slightly longer than corolla tube, of few, short-plumose hairs. Flowering July to August, fruiting August.

Mid-montane zone.—*Soviet Central Asia*: Pamiro-Alai (Surkhandaarya Region). Endemic. Described from Katarbulak on Kashka-Darya River. Type in Tashkent.

Note. *S. sogdiana* Bge. is characterized by leaves that are undivided and entire in the upper part, very short cusps on the involucrel bracts, and smaller capitula.

26. ***S. hastifolia*** Kult. and Korov. apud Iljin in Fedde, Repert. XXXV (1934) 360.

Perennial. Rhizome short. Stem densely hairy at base, 30–50 cm high, solitary or less numerous angular-sulcate, glabrous and smooth, pale, often sordid-reddish, branched almost from base, branches long.

Leaves coriaceous, glabrous, smooth, undivided and entire, with prominent, mostly violet veins; basal leaves elliptical, gradually narrowed into petiole, obtuse or short-cuspidate; lower cauline leaves ovate-oblong, middle and upper ones ovate, all leaves sessile, auriculate, semiamplexicaul, obtuse, short-cuspidate; reduced toward stem tip. Capitula more or less numerous, on long peduncles, solitary terminal on branches. Involucres goblet-shaped, slightly constricted at tip, 1.2–2.0 cm long and 1.2–1.5 cm in dia, yellowish-green, pubescent; involucre bracts coriaceous, outer and middle ones ovate or ovate-oblong, short-cuspidate, inner ones lanceolate, erect, gradually narrowed, recurved on fruiting, sometimes with few teeth in upper part. Receptacle densely setose, bristles almost as long as involucre. Corolla pale-red-dish, 15–17 mm long, tube 5–7 mm, limb lobes 5–6 mm long. Basal appendage of anthers about 0.25 mm long, slightly broadened at tip and rounded; filaments papillose. Style exerted from corolla, more or less incised, with flat and recurved lobes. Achenes 5–6 mm long and about 2 mm wide, compressed, glabrous, smooth, dark, with some longitudinal streaks, broadened at tip and rounded; pappus scabrous with distant cilia. Flowering June to July.

Soviet Central Asia: Tien Shan (western part). Endemic. Described from Talass Alatau (Karagoin). Type in Tashkent.

Note. Described from the original diagnosis because of the absence of herbarium material.

Series 6. Coriaceae Boriss.—Leaves undivided or in lower part lyrate-pinnately lobed, coriaceous; capitula oblong or ovate-oblong, cuneately narrowed toward base; involucre bracts lacking distinct cusp or with very short deciduous cusp, yellow, or inner bracts violet.

27. *S. coriacea* Fisch. and Mey. in DC. Prodr. VI (1837) 668; Ldb. Fl. Ross. II, 2, 757; Boiss. Fl. or. III, 587; Grossh. Fl. Kavk. IV, 194; Agadj. in Fl. Azerb. VIII, 424.—*Centaurea strictissima* Boiss. and Buhse in Nuov. Mém. Soc. Nat. Mosc. XII (1860) 130.—**Exs.**: Pl. or. exs. No. 374.

Perennial. Root thick, woody. Stems 50–150 cm high, straight, sulcate, glabrous, in upper part paniculately branched, with long, cylindrical branches having few leaves. Leaves long- or short-petiolate, obovate or ovate-oblong, 9–25 cm long and (1.5) 4–9 cm wide, lower ones undivided, or lyrate pinnately lobed or pinnately divided in lower part, serrate or toothed, glabrous, lustrous, gradually cuneately narrowed toward base, winged; leaves on branches reduced, entire, upper ones pinnately lobed; lanceolate or oblanceolate, narrowed toward base. Capitula solitary, 5–7 on plant, ovate, often oblong-ovate,

1.0–1.5 cm in dia, to 2.5 cm long, on subglabrous peduncle. Involucral bracts densely and firmly appressed, imbricate, 7–8 rowed, lacking spines, coriaceous, yellowish, almost woolly, later glabrous; outer bracts ovate, very short, obtuse, middle ones larger, oblong or oblong-lanceolate, with very short, straight, often deciduous cusp, innermost elongate, lanceolate-linear, pappery or scarious, undivided or entire, scabrous along margin. Receptacle setose. Corolla purple, about 22 mm long; corolla tube narrow, about 9 mm long, limb about 12 mm long with linear lobes 5 mm long. Anther tube slightly shorter than corolla, free in upper part, with inconspicuous basal appendage. Style almost as long as corolla, short-bilobate. Achenes 5–6 mm long and 1.5 mm wide, almost triquetrous, narrowed toward base, slightly sulcate and with dark streaks, smooth; pappus about 10 mm long, yellowish, 1.5 times as long as achenes. Flowering July to October. (Plate XVI, Fig. 3).

Dry rubbly and stony slopes, in low- and mid-montane zones, to 1,800 m.—*Caucasus*: Southern Transcaucasia (Nakhichevan ASSR). *General distribution*: Iran. Described from Nakhichevan. Type in Leningrad.

Series 7. Quinquifoliae Boriss.—Leaves compound, with 1–2 pairs, ovate or oblong, serrate, acuminate, wide lobes, and larger terminal lobe.

28. *S. quinquefolia* MB. Fl. taur.-cauc. II (1808) 264, III, 544; DC. Prodr. VI, 668; Ldb. Fl. Ross. II, 2, 756; Boiss. Fl. or. III, 587; Schmalh. Fl. II, 112; Grossh. Fl. Kavk. IV, 193; Ter-Khachaturova in Fl. Gruzii, VIII, 525; Agadj. in Fl. Azerb. VIII, 423.—*Klasea quinquefolia* (MB.) Cass. in Dict. Sc. nat. XXXV (1825) 173.— *Ic.*: Bot. Mag. tab. 1871.— *Exs.*: GRF No. 465; Fl. cauc. exs. No. 146.

Perennial. Plant branched, 50–120 cm, sometimes to 2 m high, subglabrous or weakly pubescent. Leaves compound, unpaired-pinnate, 1–2 paired, with 3–5 lobes often simple in upper part; leaf lobes ovate-oblong or oblong-lanceolate; lower leaves petiolate, with ovate or oblong, serrate, acuminate, broad lobes, narrowed toward base; lateral lobes often decurrent, terminal lobe larger; leaves on branches reduced, fewer, petiolate, elliptical to oblong-lanceolate. Capitula on more or less leafy peduncles, numerous, medium-sized, 1.0–1.5 cm in dia, ovate. Involucral bracts numerous, firmly imbricate, membranous, cuspidate, pubescent and finely ciliate on margin, with dark stripes on outside; outer bracts ovate, middle ones lanceolate, inner ones linear, pubescent at tip, scarious, elongated, almost toothed. Corolla pink, about 17 mm long; corolla tube narrow, 9 mm long; limb campanulate,



8–10 mm long, with linear lobes 5 mm long. Anther tube almost as long as corolla; filaments papillose. Basal appendage of anthers less than 1 mm long, anthers free at tips. Style longer than corolla, bilobed, with short lobes. Achenes oblong, about 5 mm long, compressed, slightly narrowed toward base, slightly constricted at apex, sulcate; 296 pappus reddish, deciduous, slightly longer than achenes, about 8 mm long, shorter than corolla tube, with somewhat scabrous hairs. Flowering June to October. (Plate XIV, Fig. 1).

Mountain forests edges, scrubs, 300–1,000 m to mid-montane zone.—*Caucasus*: Ciscaucasia, Eastern, Western, and Southern Transcaucasia. *General distribution*: Iran, Balkans-Asia Minor. Described from Caucasus. Type in Leningrad.

Section 5. Iljinia Boriss. in Addenda XXVII, 606.—Low stemless plants or stems low, 2–20 cm high, but then leaves undivided; leaves in rosettes, basal and cauline leaves lyrate, more or less long-petiolate, with 2–5 pairs of lobes. Capitula 1.5–3.5 cm in dia, sessile or on more or less attenuate peduncles; involucre bracts 7–9 rowed.

Type of section: *S. lyratifolia* Schrenk.

Series 1. Lyratifoliae Boriss.—Plants stemless or with very low stem to 2–8 cm high; basal and cauline leaves lyrate, pinnatifid or pinnately incised, 5–6 cm long and 1–2 cm wide, with 2–5 pairs of lobes, scabrous from short pubescence; capitula 1.5–2 cm in dia.

29. *S. lyratifolia* Schrenk. in Fisch. and Mey. Enum. pl. nov. I (1841) 45; Ldb. Fl. Ross. II, 2, 756; O. and B. Fedtsch. Perech. Rast. Turk. IV, 291; Czerneva in Fl. Uzbek. VI, 390.

Perennial. Roots strong, string-like, brown. Rhizome oblique, in upper part covered with fibrous remnants of old leaves, petioles. Plants stemless or stem prostrate on debris in underground part, solitary, very short, 2–8 cm high, simple, considerably shorter than leaves, one-headed. Basal and cauline leaves 5–6 cm long and 1.5–2 cm wide, long-petiolate, lyrate, pinnatifid or pinnately incised with 2–5 pairs of lobes, scabrous from scattered short bristle-like hairs; terminal lobe of leaf rounded or ovate, 3–4 cm long and 2.5–3 cm wide, occasionally narrower, lateral lobes considerably smaller than terminal one, coalescent at base, broadly triangular, ovate, obovate, or oblong, all sharply serrate-toothed, teeth with white cartilaginous cusp; uppermost leaf at base of capitulum lanceolate, toothed. Capitula medium-sized, 1.5–2 cm in dia. Outer involucre bracts broadly ovate-triangular, obtuse, green; inner bracts elongate to lanceolate, almost woolly, at tip with herbaceous, nonspinous, thin, almost filiform, often contorted, straight,

often deflected and bent apical appendage. Receptacle setose. Corolla purple, 20–25 cm long; corolla tube narrow, 10 mm long; limb 10–12 mm long, with narrow, almost filiform, acute, purple-violet lobes 5 mm long. Anthers shorter than corolla, connate in tube, free above, with linear, short, basal appendage; filaments papillose. Style slightly exserted from corolla or as long, with 2 very short branches. Achenes 5–6 mm long and about 2 mm wide, oblong, slightly narrowed toward tip but more toward base, grayish-brownish or almost black, smooth; pappus somewhat shorter than corolla, long, many-rowed, with hairs 17–20 mm long, yellowish. Flowering June to August (September). (Plate XV, Fig. 3).

Dry rubble slopes, debris, and stony and rubbly peaks, to 3,500 m, to alpine zone of mountains.—*Soviet Central Asia*: Lake Balkhash Region (Chu-Ili Mountains), Dzhungaria-Tarbagatai, Tien Shan (Trans-Ili Alatau, Kirghiz Range), Pamiro-Alai (Turkestan and Hissar ranges). *General distribution*: Dzhungaria-Kashgaria (Kitakh-Sairam Mountains). Described from Trans-Ili Alatau Range in Kaktau region. Type in Leningrad.

30. *S. tianschanica* Sap. and Nik. in Bot. Mat. Gerb. Glavn. Bot. Sada, VI, 2 (1926) 31.

Perennial. Roots string-like, thickened. Plants stemless, 4–6 cm high, with fibrous remnants of old leaves at base. Leaves in rosettes, thickish, oblong-lanceolate, 16 cm long, 1–1.5 cm wide, pinnately divided into irregular lobes, finely hairy on veins or all over on both sides, on wide petiole winged like rachis; leaf lobes almost opposite or alternate, ovate-triangular or roundish, obtuse, sometimes with very short, cartilaginous cusp, with sparse, unequal, irregular, short, acute teeth; terminal lobe similar to lateral or slightly larger, obtuse or sub-acute. Capitula solitary, in leaf rosette. Involucres ovate-cylindrical, 1.5–2 cm in dia; involucral bracts imbricate, 4–5-rowed, greenish, narrowly brownish-blackish on margin at a tip; outer bracts ovate, broad, acute or short-cuspidate, inner bracts oblong to lanceolate and linearly lanceolate, with scarious brownish-yellowish appendage, largest on innermost bracts. Receptacle alveolar, bristly on edges of alveoles. Corolla pinkish-violet, about 22 mm long; corolla tube 10–13 mm long; limb about 10 mm long, parted up to half into 5 narrow, linear, acute, violet lobes about 5 mm long. Anthers connate in middle, free above, with short basal appendage. Style exserted from corolla to 4–5 mm, with lobes 1.5–2.0 mm long. Achenes oblong or oval, almost tetraquetrous, slightly compressed, 4.5 mm long and about 2 mm wide, glabrous; pappus slightly shorter than corolla tube, yellowish with scabrous, longer inner bristles. Flowering July to August.

298 Steep slopes, mountain meadows, and large bouldery, turfey moraines.—*Soviet Central Asia*: Tien Shan (eastern part), Dzhungaria-Tarbagatai (?). *General distribution*: Dzhungaria-Kashgaria. Described from Inylchek in Tien Shan. Type in Leningrad.

Series 2. Turkestanicae Boriss.—Stems 10–20 cm high; leaves oblong, undivided, sometimes with 1–2 lobes in lower part, glabrous, 8–15 cm long and 2.5–4 cm wide; capitula (1.5)2–3 cm in dia, sessile or on more or less distinct peduncles.

31. *S. modesti* Boriss. in Addenda XXVII, 606.

Perennial. Root string-like, brown. Rhizome strong, long; stem 10–20 cm high, simple, with remnants of old leaves at base. Basal leaves glabrous, 8–15 cm long and 2.5–4.0 cm wide, on (1)5–10 cm long petiole, sharply serrate, sometimes with 1–2 pairs of basal lobes, thick and coriaceous, subacute, with short, soft and thin cusp. Capitula 2.5–3.5 cm in dia, pedunculate, peduncles as long as leaves. Involucres 2–3 cm in dia, basally flatish, not narrowed, uniformly broad in upper part; involucral bracts 7–9-rowed, outer and middle ones ovate, gradually becoming longer, with narrow black border, green, with deciduous cusps; inner bracts lanceolate, with membranous appendage. Receptacle densely setose, bristles smooth, 5 mm long. Corolla purple, 25 mm long; corolla tube very narrow, about 13 mm long; limb narrow, campanulate, 13 mm long with linear lobes 7 mm long. Anther tube slightly shorter than corolla, free obtuse lobes in upper part, with linear, very short basal appendage; filaments free, sparsely papillose. Style slightly exserted from corolla, with 2 short branches. Achenes ovate, 5 mm long and 3 mm wide, almost smooth, very finely sulcate; pappus about 16 mm long, dense, yellowish, pappus hairs very short, appressedly plumose. Flowering June to July.

Dry stony slopes and hills.—*Soviet Central Asia*: Dzhungaria-Tarbagatai. Endemic. Described from Dzhungarian Alatau. Type in Leningrad.

Note. It is distinguished from *S. lyratifolia* Schrenk by the presence of a developed stem, undivided leaves, and larger capitula and florets.

Section 6. Leuzeopsis Boriss. in Addenda XXVII, 607.—Plants monoecious; leaves coriaceous, large, undivided or pinnately lobed and with prominent veins mostly in lower part, obtuse, and coarsely crenate-toothed. Capitula large, 3–4 cm in dia, subglobose, with bisexual florets; involucral bracts coriaceous, glabrous, with deflected, spinous appendage 5–6 mm long; achenes ovate, abruptly narrowed toward base; pappus 11–15 mm long, 2 times as long as achenes.



Plate XVII.

Type of section: *S. serratuloides* (Fisch. and Mey.) Takht.
A monotypic section.

32. *S. serratuloides* (Fisch. and Mey.) Takht. in Takht. and Fed. Fl. Yerevana (1945) 323; Grossh. Oprod. Rast. Kavk. 488; Agadzh. in Fl. Azerb. VIII, 428.—*Leuzea serratuloides* Fisch. and Mey. in DC. Prodr. VI (1837) 666; Grossh. Fl. Kavk. IV, 197—*Phaeopappus freynii* Hausskn. and Sint. in herb.—**lc.**: Agadj. loc. cit. Plate XLII.

Perennial. Root strong, woody. Stems angular or more or less straight, 10–30 cm high, usually short, less often somewhat surpassing lower leaves, strong, sulcate, weakly woolly pubescent. Leaves large, undivided or pinnately lobed, oblong, to 20 cm long and 4–10 cm wide, petiolate, thick, coriaceous, with prominent veins, subglabrous above, thinly hairy beneath mostly along veins, terminal lobe ovate or ovate-oblong, lateral lobes 2–3 pairs, smaller, decurrent on petioles, oblong, like terminal lobe irregularly crenate-toothed. Capitula solitary, terminal, almost globose or subglobose, large, 3–4 cm in dia. Involucral bracts 5–6-rowed; glabrous, coriaceous, narrowly membranous along margin, with dark green, longitudinal veins, subulate, often deflected spinous, apical appendage 5–6 mm long, 1/3–1/2 as long as involucral bracts; outer bracts ovate, middle ones oblong, inner ones lanceolately-linear, acuminate. Receptacle setose. Corolla pink or light-pink, 30–33 mm long; corolla tube narrow, 16 mm long, clavately bulged at base; limb broad, campanulate, about 16 mm long, with linear lobes 7 mm long. Anther tube as long as or slightly shorter than corolla, about 11 mm long, with free obtuse lobes at tip, basal appendage about 0.5 mm long; filaments glabrous. Style about 36 mm long, exserted from corolla, usually short-bilobate. Achenes greatly compressed, ovate or oblong-ovate, 6–7 mm long and 3–5 mm wide, narrowed above, at base subacute, brown, weakly sulcate or smooth; pappus longer than achenes, 11–15 mm long, dense, white, of flat, plumose bristles at base connate in ring. Flowering May to July; fruiting July to August.

Dry rubbly and rocky slopes, talus, in mid-montane zone, 1,500–1,800 m.—*Caucasus*: Southern Transcaucasia (Nakhichevan ASSR, Armenia). Endemic. May be present in the neighboring parts of Iran. Described from southern Transcaucasia (Koshadar River Valley). Type in Leningrad.

Section 7. Demetria Boriss. in Addenda XXVII, 607.—Plants monoecious; stems broad-winged; leaves large, decurrent, shallow sinuate-toothed and spinose. Capitula large, 2.5–3.5 cm in dia, globose or ovate; involucral bracts coriaceous, subglabrous, spines 7–10 mm long, straight; limb 1.5 times as long as corolla tube.

Type of section: *S. caucasica* Boiss.

33. *S. caucasica* Boiss. Fl. or. III (1875) 590; Grossh. Fl. Kavk. IV, 194; Agadj. in Fl. Azerb. VIII, 426.—*S. cichoracea* (L.) DC. Prodr. VI (1837) 670 p. p.; Ldb. Fl. Ross. II, 2, 760.—*Centaurea cichoracea* Stev. in Mém. Soc. Nat. Mosc. IV (1813) 66; MB. Fl. taur.-cauc. III, 595, non L.

Perennial. Plant glabrous or subglabrous, 20–50 cm high. Stem robust, 4–5 mm thick, angular, simple, deeply sulcate, uniformly densely leafy and broad-winged, one-headed. Leaves 5–15 cm long and 2–7 cm wide, lanceolate or oblong, decurrent, irregularly finely, spinous-sinuate-toothed. Capitula 2.5–3.5 cm in dia, globose or ovate. Involucral bracts imbricate, 6-rowed; coriaceous, subglabrous, lanceolate or oblong, gradually attenuate above into almost straight, deflected spine 7–10 mm long; inner involucral bracts elongate, 2.5–3.0 cm long, softer and acuminate. Corolla purple or pinkish-purple, about 25 mm long; corolla tube narrow, about 10 mm long; limb narrowly campanulate, about 15 mm long, with linear lobes 9 mm long. Anther tube shorter than corolla, with free, subacute apical lobes, anthers with filiform, basal appendage about 1 mm long; filaments densely papillose. Style slightly exerted from corolla, short-pubescent (visible under lens!) with subacute lobes about 0.5 mm long. Achenes oblong, 9 mm long and 3 mm wide, finely sulcate above, brownish; pappus of yellowish, lax and short-plumose hairs. Flowering July to August.

Dry slopes in subalpine mountain zone.—*Caucasus*: Dagestan, Eastern Transcaucasia (Azerbaijan). Endemic. Described from Caucasus. Type in Geneva.

Note. It is distinguished from *S. cichoracea* (L.) DC. s. str. (Italy) by a shorter, broadly (and not narrowly) winged stem and thinner, almost straight (and not recurved) spines on the involucral bracts. With its large capitula and involucre, *S. caucasica* is closer to *S. mucronata* Desf. and *S. flavescens* Poir., differing from the latter by having decurrent leaves.

GENUS 1608. *Synurus* Iljin^{1, 2}

Iljin in Bot. Mag. Gerb. Glavn. Bot. Sada, VI, 2 (1926) 35.

Capitula homogamous, large, few at tips of long branches. Involucral bracts arachnoid-hairy, stiff, triangular-lanceolate to linear, cuspi-

¹Treatment by A.G. Borissova.

²From the Greek words *syn*—together, and *ura*—tail; so named for the shape of the anther appendages.

302 date and acuminate, often with recurved, nodding long spine. Receptacle covered with smooth, more or less long bristles. Florets all tubular, bisexual; corolla regular, 5-lobed. Anthers like filaments free, joined only by appendages, fused on inner side with filaments, leaving gap, or forming tube around filaments, sometimes fused with tube of neighboring anther. Style bifid, with short, more or less coalesced, obtuse, flat and glabrous lobes on inner side. Achenes slightly compressed, glabrous, with crown of apical teeth, surrounding base of pappus; pappus of scabrous unequal bristles, connate in ring. Large perennials with nodding, long, thin arachnoid-hairy branches; leaves large, long-petiolate, deltoid-ovate with cordate base.

Type of genus: *S. deltoides* (Ait.) Nakai.

A monotypic genus occurring in China, Japan, Korean Peninsula, Mongolia, and the Far East.

1. *S. deltoides* (Ait.) Nakai, Kôryô Sikenrin no Ippan (1927) 64; Kitagawa in Rep. first Sc. exp. Manch. IV, 2, 41, in nota; Lineam. Fl. Mansh. 470; Kitam. in Mem. Coll. Sc. Kyoto Imp. Univ. ser. B, XIII 25 (Comp. Jap. I); Grubov, Konsp. Fl. Mong. 279.—*S. atriplicifolius* (Trev.) Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, VI, 2 (1926) 35; Popov, Fl. Sredn. Sib. II, 766.—*S. hondae* Kitagawa in Rep. first Sc. exp. Manch. IV, 2 (1935) 40.—*S. atriplicifolius* var. *hondae* (Kitagawa) Kitagawa in Rep. Inst. Sc. Res. Manch. 1, 8 (1937) 324.—*Onopordon deltoides* Ait. Hot. Kew. III (1789) 146.—*Cirsium ficifolium* Fisch. in Mem. Soc. Nat. Mosc. II (1812) 69.—*Carduus atriplicifolius* Trev. Ind. Sem. hort. Vratisl. (1820); in Nova Acta phys.-med. Acad. Leopold.-Carol. Nat. Curios. XIII, 1 (1826) 198.—*Silybum atriplicifolium* (Trev.) Fisch. Ind. pl. Hort. Petrop. (1824) 64.—*Rhaponticum atriplicifolium* (Trev.) DC. Prodr. VI (1837) 663; Turcz. Fl. baic.-dahur. II, 1, 132; Regel, Tent. Fl. Ussur. 96; Fr. Schmidt, Fl. Amur. et Sachal. 52; Maxim. Prim. Fl. Amur. 175; Korsh. in Tr. Peterb. Bot. Sada, XII, 2, 361.—*Stemmacantha ficifolia* (Fisch.) Turcz. in DC. 1. c. pro syn.—*Stephanocoma atriplicifolia* (Trev.) Turcz. ex Ldb. Fl. Ross. II, 2 (1846) 751, pro syn.—*Serratula atriplicifolia* (Trev.) Benth. in Benth. and Hook. f. Gen. pl. II (1873) 475; Kom. Fl. Manchzh. III, 758; Kom. and Alis. Opred. Rast. Dalnevost. Kr. II, 1086; Miyabe and Miyake, Fl. Saghal, 281.—*S. pungens* Franch. and Sav. Enum. pl. Jap. II (1879) 416.—*S. deltoides* (Ait.) Makino in Tokyo Bot. Mag. XXIV (1910) 247.—*S. atriplicifolia* var. *inciso-lobata* Miyabe and Miyake, 1. c.—*Centaurea atriplicifolia* (Trev.) Matsum. Ind. pl. Jap. II (1912) 667.—**Ic.:** Iljin, op. cit. 35 (details of flower); Makino in Jap. Bot. Illustr. Album. (1933) 1368; Kitagawa in Rep. first Sc. exp. Manch. IV, 2 (1935) tab. XI.

303 Perennial. Rhizome thick, short. Plants to 1 m high, branched with rather strong stem and nodding, long, finely arachnoid-hairy branches. Basal and lower cauline leaves long-petiolate, deltoid-ovate, to 20 cm long, cordate, acute, toothed-lobed or sinuate-lobed, glabrous and green above, white-tomentose beneath; upper cauline leaves oblong-ovate, short-petiolate, almost entire. Capitula large, 3–4 cm in dia, nodding at tips of long lateral branches. Involucral bracts lanceolate to linear, weakly or densely arachnoid-hairy, gray, with dark brown, long, appressed or recurved spines. Florets dark violet, numerous, bisexual, all tubular; corolla 27–30 mm long, almost regular, with narrow tubular part about 8 mm long, gradually broadened part about 15 mm long, with 5 linear lobes about 3 mm long, exerted from corolla; anthers about 7 mm long, free, joined only by appendages about 3.5 mm long. Style exerted from corolla, with short branches or almost equal to stamens. Achenes 7 mm long, and about 2.5 mm wide, ovate-oblong, tetraquetrous, slightly compressed, finely sulcate and dark-spotted, obliquely truncate at both ends, tip small-toothed; pappus of unequal, scabrous bristles 8–9 mm long. Flowering July to August. (Plate XVII, Fig. 1).

Open forests, birch groves, forest edges, scrubs and herb meadows.—*Eastern Siberia*: Dauria; *Far East*: Zeya-Bureya, Ussuri, Sakhalin. *General distribution*: Mongolia, Japan, China, Korean Peninsula. Described from cultivated plants. Type in London.

GENUS 1609. *Syreitschikovia* PAVL.^{1,2}

Pavl. in Fedde, Repert. XXXI (1933) 192.

All florets in capitulum tubular, bisexual; corolla lilac with very narrow tube and 5-parted limb. Anther tube with oblong, slightly acuminate, apical appendages and bifid, bristle-like, basal appendages; filaments glabrous. Style thickened at base of branches, with tuft of short bristles, with numerous papillae from basal thickening to branches; style branches appressed, slightly divergent only above. Pappus deciduous, with unequal toothed bristles, connate in ring, outer ones hair-like, inner ones thickened, acuminate; achenes oblong, compressed, glabrous, hilum basal, with toothed crown above enclosing pappophorus with nectary.

Type of genus: *S. tenuifolia* (Bong.) Pavl.

The genus includes two species, both found in the USSR.

¹Treatment by M.M. Iljin and G.A. Semidel.

²Named in honor of D.P. Syreitschikov, author of "Ill. Fl. Mosk. Gub." [Illustrated Flora of Moscow Province].

- 304 1. Leaves narrow, linear, spinose on margin and in lower part. Involucral bracts appressed, cuspidate, sometimes somewhat spreading..... 1. *S. tenuifolia* (Bong.) Pavl.
 + Leaves oblong-ovate or oblong; cauline leaves sessile, semiamplexicaul, auriculate, with numerous spinules along margin. Involucral bracts with long arcuate apical prickles 2. *S. spinulosa* (Franch.) Pavl.

1. *S. tenuifolia* (Bong.) Pavl. in Fedde, Repert. XXXI (1933) 192; Kryl. Fl. Zap. Sib. XI, 2934.—*S. tenuis* Botsch. in herb.—*Serratula tenuifolia* Bong. in Bull. Acad. Sc. Pétersb. VIII (1841) 340; Ldb. Fl. Ross. II, 760; O. and B. Fedtsch. Perech. Rast. Turk. IV, 293.—*Jurinea tenuis* Bge. in Flora, XXIV (1841) 158.—*lc.*: Bong. and Mey. in Mém. Acad. Sc. Pétersb. ser. VI, VI, 2, tab. 10 (1845).

Perennial. Plants 5–40 cm high, densely caespitose with branched rhizome, densely covered with dark brown, scarios scales and large number of adventitious roots. Stems mostly several, straight, simple, weakly ribbed, spinose-arachnoid-hairy, with readily rubbed-off pubescence. Leaves linear, narrowly oblong, entire, acuminate, slightly narrowed toward base, at base along margin with tiny spine-like cilia, bright green above, somewhat lustrous, sometimes weakly arachnoid-hairy, white-tomentose beneath, 1.5–10.0 (13.0) cm long, 1–3 mm wide, with single longitudinal vein. Capitula solitary, with many florets. Involucres cylindrical or goblet-shaped, 8–15 mm long, green, glabrous, weakly arachnoid-hairy at base; involucral bracts appressed, but with recurved spine-like tips; outer and middle bracts carinate, lanceolate, inner ones lanceolately acuminate, straight. Corolla 9–15 mm long; corolla tube very narrow, 5–7 mm long; limb with 5 linear lobes 3–4 mm long. Anthers purple, with acuminate apical appendage, basal appendages bifid into filiform bristles 2 mm long; filaments glabrous. Style with divergent branches. Pappus slightly shorter than corolla, 8–12 mm long, its bristles toothed, unequal, innermost thickened, broadened upward, and long apical, bristles weakly connate in ring, deciduous on maturation; achenes glabrous, narrowly-oblong, dull, longitudinally striped, with dark purple spots, hilum basal, scarios-toothed crown at apex, enclosing cylindrical pappophorus with nectary in its center; mature achenes 6–7 mm long. Flowering June to July; fruiting July to September.

High-mountain stony, steppe slopes.—*Soviet Central Asia*: Tien Shan, Dzhungaria-Tarbagatai. *General distribution*: western China. Described from Dashildag Mountains. Type in Leningrad.

- 305 2. *S. spinulosa* (Franch.) Pavl. in Fedde, Repert. XXXI (1933) 193.—*Serratula spinulosa* Franch. Pl. du Turkest. Mission Capus (1883) 107; O. and B. Fedtsch. Perech. Rast. Turk. IV (1911) 295.

Perennial. Plants 15–35 cm high. Stems angular-sulcate, straight, with spiny, arachnoid, deciduous hairs, usually few, occasionally branched from base, covered with brown scales, leafy to capitula. Leaves oblong-ovate or oblong, basal leaves gradually narrowed into petiole; cauline leaves sessile, semiamplexicaul, auriculate; all leaves undivided, subentire, margin slightly undulate with frequent spines, acuminate, gradually attenuate into spine, green and slightly lustrous above, at places with thin arachnoid pubescence, later glabrous, white-tomentose beneath with prominent ochreous midrib. Capitula solitary, urn shaped, with many florets, 25–40 mm in dia. Involucres about 20 mm long, thinly arachnoid-hairy; involucre bracts linear, with very prominent vein, gradually attenuate into thin spine, arcuately recurved. Corolla dark lilac when dry, with scattered glands, 15–18 mm long, gradually narrowed below over 7–8 mm; limb lobes 3–4 mm long. Anthers lilac-purple, their basal appendages bifid into filiform bristles; filaments glabrous. Style with short, slightly divergent branches; stigma entirely covered with numerous papillae. Pappus deciduous, 14–16 mm long, smoky; pappus bristles unequal, all connate in ring, small-toothed, outer ones filiform, inner ones thick, broadened above and terminating in long cusp; achenes glabrous, 6–8 mm long, and hilum basal, narrow-oblong, compressed, 4-angled, longitudinally striate, gray, with longitudinal violet spots, with irregularly toothed crown enclosing raised annular pappophorus with nectary in its center. Flowering July; fruiting August to September.

High-mountain arboreal-shrub and subalpine zones.—*Soviet Central Asia*: Tien Shan (western). Endemic. Described from Ona Ulgan River Valley, near Chirchik, at 1,800 m. Type in Paris.

GENUS 1610. *Schumeria* Iljin^{1, 2}

Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 363.—*Microlophopsis* Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 483.

306 Capitula homogamous, few, medium-sized, with many florets, solitary, at tips of stems and their lateral branches. Involucres oblong, about 1.5 cm wide; involucre bracts compactly imbricate, coriaceous,

¹Treatment by A.G. Borissova.

²Named after the ancient Sumeria lying between the Tigris and Euphrates rivers.

lacking appendage, with short, appressed, pointed tip, scabrous in upper part, glabrous in lower, oblong-triangular. Receptacle densely covered with long, lustrous, and smooth bristles. Florets all bisexual, similar, tubular, with long tube, yellow, many-rowed; corolla limb with 5 equal, linear lobes. Anthers with subobtusate, rounded, apical appendage; basal appendages of anthers short, cuneate, almost undivided and scarious; filaments flattened, sparsely covered with papillae. Style glabrous, exerted from corolla, with long lobes, on outer side covered with very short hairs. Achenes oblong, 8–10 mm long compressed, slightly sulcate or smooth, glabrous, hilum oblique; pappus large, 2 times as long as achenes, with several rows of deciduous bristles; pappus bristles barbate-toothed or plumose-barbate, gradually longer from outer to inner. Perennial or biennial glabrous herbs; leaves sessile, amplexicaul, short-decurrent, undivided and entire, sometimes lower and basal leaves pinnately incised.

Type of genus: *S. cerinthifolia* (Sibth. and Sm.) Iljin.

About 6 species, distributed in West Asia and Soviet Central Asia.

Note. The genus *Schumeria* Iljin is subdivided into two sections: *Schumeria* (= sect. *Oroboidea* Iljin loc. cit.) and *Serratulopsis* Iljin (op. cit., 364).

The genus *Schumeria* is similar to the genus *Serratula* L., from which it is distinguished by yellow florets, coriaceous short-acuminate involucre bracts, larger achenes, amplexicaul, undivided and entire cauline leaves, the lower sometimes pinnately incised, and by the habit of the plant. It approaches *Serratula* by the presence of an oblique lateral hilum and a pappus of bristles and not scales. The species of the genus *Schumeria* are close to those of the genus *Microlophus* Cass., particularly to *M. behen* (L.) Takht. (= *M. alatus* (Lam.) Cass. = *Centaurea behen* L. = *C. alata* Lam. = *Piptoceras behen* (L.) Cass.). De Candolle (*Prodr.* VI [1837] 567) referred the genera *Microlophus* Cass. and *Piptoceras* Cass. to section *Microlophus* (Cass.) DC. of the genus *Centaurea* L., where *Centaurea cerinthifolia* Sibth. and Sm. (= *C. behen* Lam. non L.) appears, which was referred by M.M. Iljin to the genus *Schumeria*. Additional material and further studies are needed to reach any definite conclusions. Possibly, the species of the genus *Schumeria* Iljin should be referred to the genus *Microlophus* Cass.

1. Plants glabrous; involucre bracts glabrous, only young plants sparsely hairy 1. *S. latifolia* (Boiss.) Iljin
- + Plants scabrous from short barbate hairs; leaves with long, soft white hairs on veins mostly beneath, later becoming glabrous
..... 2. *S. litwinowii* (Iljin) Iljin

307 Section 1. *Serratulopsis* Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 364.—All leaves undivided and entire; pappus plumose-barbate.

Type of section: *S. latifolia* (Boiss.) Iljin.

1. *S. latifolia* (Boiss.) Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 364; Iljin in Fl. Turkm. VII, 254.—*Serratula latifolia* Boiss. Diagn. pl. or. ser. I, 10 (1849) 96; Fl. or. III, 586; O. and B. Fedtsch. Perech. Rast. Turk. IV, 211; B. Fedtsch. Rast. Turk. 756.—*Centaurea plumosa* Aitch. and Hemsl. in Trans. Linn. Soc. ser. 2, III (1888) 81; Parsa, Fl. Iran, III, 686, non Kern. (1872).—*Microlophopsis plumosa* (Aitch. and Hemsl.) Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 488.

Perennial. Plants glabrous, 25–90 cm high. Root long, strong, woody. Stems elongate, cylindrical, simple or weakly branched, with long, straight branches, whitish, with fibrous remnants of old leaves at base. Leaves coriaceous, lustrous, pale green, with thick, whitish midrib and reticulate venation, undivided; basal leaves 7–10 cm wide, 10–13 cm long, ovate, on thick, short, grooved petioles, scarious at base along margin, amplexicaul; middle leaves sessile, oblong, subacute, with acute, cordate auricles at base, short-decurrent; leaves in lower part of stem and on branches reduced, erect, linear. Capitula solitary, about 3.5 cm long, on long peduncles. Involucres about 2.5 cm long, oblong-cylindrical, almost constricted at apex, lustrous, entirely glabrous; involucre bracts firmly appressed, 6-rowed, lacking spines, almost lacking distinct veins, weakly sulcate, coriaceous, yellowish; outermost bracts ovate, with small cusp, innermost elliptical to linear, acuminate, gradually broadened. Receptacle densely covered with long, smooth bristles, almost as long as pappus. Florets lemon-yellow, all equal, bisexual, 1/3 longer than involucre; corolla about 33 mm long; corolla tube very narrow, about 18 mm long; limb narrowly campanulate, about 14 mm long, with linear lobes about 6 mm long. Anthers connate in tube, slightly exerted from corolla with free, obtuse, apical appendage and very short, linear basal appendage about 0.5 mm long; filaments subglabrous. Style slightly exerted from corolla, 2-fid, with obtuse, oblong, grooved branches. Achenes somewhat compressed, about 6 mm long, sulcate; pappus about 15 mm long, with white, sordid-red, or yellowish, short-plumose hairs, basally connate in deciduous ring. Flowering May to August.

Rubby and loamy mountain slopes and foothills, mountain meadows.—*Soviet Central Asia*: mountainous Turkmenia (primarily Central Kopetdag). *General distribution*: Iran (Khorasan). Described from Iran. Type in Geneva.

2. *S. litwinowii* (Iljin) Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 364; Iljin in Fl. Turkm. VII, 254.—*Serratula litwinowii* Iljin in Bot. Mat. Gerb. Glavn. Bot. Sada, V, 7 (1924) 112.

Perennial. Root robust, woody. Stems with few branches, 25–70 cm high, sulcate, scatteredly short-hairy. Leaves oblong, undivided and entire, scatteredly hairy on both sides, mostly woolly beneath, along veins; with deciduous, quite long hairs; basal leaves petiolate, oblong, narrowed toward base; cauline leaves decurrent, upper ones reduced, with short-decurrent auricles. Capitula mostly large, 4.0–4.5 cm long, about 3 cm in dia at flowering. Involucral bracts yellowish-greenish; outer ones deltoid-ovate, glabrous or subglabrous, cuspidate; middle ones ovate-oblong; inner ones oblong-linear, acuminate, appressed above, usually with short stiff hairs at tip. Receptacle setose, with long, smooth bristles. Corolla yellow, 30–38 mm long, corolla tube narrow, about 22 mm long; limb 8–10 mm long. Basal appendages of anther short, 1–2 mm long, almost undivided; filaments somewhat flat, finely papillose (visible under a hand lens!). Achenes compressed, smooth, glabrous, 8–9 mm long; pappus deciduous, plumose, with unequal bristle. Flowering June to July.

Loamy mountain slopes in steppe zone, mountain meadows.—*Soviet Central Asia*: mountainous Turkmenia. Endemic. Described from Turkmenia. Type in Leningrad.

Note. This species is similar to *S. latifolia* (Boiss.) Iljin, differing by having pubescence and larger capitula and achenes.

GENUS 1611. *Rhaponticum* Adans.^{1, 2}

Adans. Fam. II (1763) 117.—*Fornicium* Cass. in Bull. Soc. Philom. Paris. (1819) 93 and in Dict. Sc. nat. XVII (1820) 249.

Involucre many-rowed, imbricate; bracts coriaceous, yellowish-green at beginning of flowering, weakly stramineous outside in lower part, very strongly so inside, lustrous, with dry, papery, apical appendages; outer involucral bracts very short, obtuse, ovate, later gradually elongating, innermost narrow, almost as long as capitulum; outer and middle bracts with broad and oval appendages, often fan-like, lacerate

¹Treatment by Yu.D. Soskov.

²From the Greek word *Rha* and Latin *Pontus* (Black Sea and its coast); translated into Russian it means Black Sea rhubarb. This name was already given by pre-Linnaean systematists to one of the species of this genus, whose rhizome was used as a laxative and often substituted for rhubarb. In turn, the name rhubarb, *Rheum* (from the Greek word *Rha*), also originates from *Rha*—the ancient name of the Volga.

309 in some sections, innermost bracts with shorter, lanceolate or linear, always undivided appendages.

Receptacle somewhat bulged, bristly. Florets all bisexual, similar, violet-purple, less often yellow (*R. integrifolium* Winkl.), with tubular corolla, broadened in upper part, 5-fid into linear lobes. Stamen filaments covered with tiny papillae; anthers with small, broad, obtuse, continuous, often unequal basal appendages. Stigma bilobed, ciliate, with tuft of long, tasseled cilia at base, its branches somewhat divergent, obtuse. Pappus always longer than achene 2-many-rowed, usually free, of thick, barbate or short-plumose bristles, basally connate in ring, less often free; hairs on bristles not more than 10 times as long as thickness of bristles, bristles of inner row thicker and longer than those of outer rows; achenes glabrous, laterally compressed, oblong, rugose, more or less ribbed and tetraquetrous, basal hilum oblique. Rhizomatous herbs with simple, finely ribbed stem, at apex somewhat thickened, terminating into large, almost globose capitula. *R. nanum* Lipsky and *R. namanganicum* Iljin are stemless. In some species stem some times branched.

Type of genus: *R. scariosum* Lam.

Note. This genus comprises in all 17 species, distributed in a narrow, almost continuous belt in the northern hemisphere from the Atlantic Ocean to the shores of the Pacific Ocean, with the exception of one species in Australia (Soskov. in *Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XIX [1959] 398). The genus *Leuzea* DC., repeatedly reported for the flora of the USSR, is distributed in the Western Mediterranean, where it is represented by only three species. It is distinguished from the genus *Rhaponticum* by a long-plumose, soft, snow-white, many-rowed pappus, hairs on the bristles 20 and more times longer than the bristle thickness, and achenes that are brownish-barbate, subobtuse, and conically narrowed below.

Economic Importance. Many species of *Rhaponticum* were introduced into botanical gardens already in the 18th and 19th centuries. Two of them—*R. carthamoides* (Willd.) Iljin and *R. scariosum* Lam.—were specially introduced into cultivation (the latter is now no longer in cultivation). All the species are highly decorative. It would be interesting to test the members of this genus (their seeds and underground organs) for their tonic and stimulant properties.

1. Sheaths of dead leaves covering stem base on inside with long silky-white hairs. Involucral bracts with brown spot or border below appendage; bract appendages thin-scarious, transparent. Plants stemless or with stem not higher than 50 cm

- + Sheaths of dead leaves covering stem base glabrous on inside. Plants usually 30–180 cm high 6.
- 310 2. Pappus reddish, very stiff, about 3 cm long. Plants completely glabrous; leaves with cartilaginous teeth 8. **R. nitidum** Fisch.
- + Pappus white, about 1.5 cm long. Plants more or less pubescent 3.
3. Plants with stem 6–30 cm high 4.
- + Plants stemless or almost stemless, 3–5 cm high 5.
4. Plants whitish from dense, fine tomentum, 6–15 cm high; leaves somewhat crisped on margin 10. **R. karatavicum** Rgl. and Schmalh.
- + Plants more or less green, 15–40 cm high; leaves with scattered crisped hairs, leaf lobes scarious, acuminate or not acuminate 9. **R. aulieatense** Iljin
5. Leaves pinnately divided into toothed lobes 11. **R. namanganicum** Iljin
- + Leaves pinnately incised into pinnately divided or lobed lobes. Inner involucre bracts violet-purple under violet to reddish-brown appendages at the end of vegetative period 12. **R. namum** Lipsky
6. Florets yellows; pappus persistent, its bristles not connate in a ring at base. Leaves entirely undivided 4. **R. integrifolium** Winkl.
- + Florets violet-purple; pappus free 7.
7. Leaves mostly with undivided lamina 8.
- + Plants except for uppermost small, toothed leaves, with only pinnately divided or incised leaves 9.
8. Basal leaves slightly lyrate. Appendages of involucre bracts yellowish-smoky, semitransparent. Plants of mountain valleys 3. **R. lyratum** Winkl. ex Iljin
- + Basal leaves elliptical, acute, undivided or pinnately incised at base into 1–3 pairs of oblong lobes. Appendages of involucre bracts spatulate, with attenuate tip and light-brown band in middle narrowed to cusp. Plants of salt-marsh steppes 2. **R. serratuloides** (Georgi) Bobr.
9. Pappus short-plumose, 2-rowed, soft, reddish-brown to creamish. Mesophyllous plant of subalpine and alpine zones, (50)80–150(180) cm high, with horizontal branching rhizome and numerous roots 1. **R. carthamoides** (Willd.) Iljin
- + Pappus barbate, 3-rowed, stiff. Distinct xerophyte with grayish- or whitish-tomentose stem (at least in lower part) 10.
10. Leaves white-tomentose beneath. Plants highly ornamental 5. **R. pulchrum** Fisch. and Mey.
- + Leaves not tomentose beneath 11.

- 311 11. Stems 30–100 cm high, 0.5–1.0 cm thick, grayish tomentose below, later becoming glabrous; leaves of vegetative shoots large, 20–40 cm long, 7–10 cm wide, lyrate, with very large terminal lobe; cauline leaves shallowly pinnately divided into 4–6 pairs of oval-ovate lobes 6. **R. satzyperovii** Soskov
 + Stems (3)10–60 cm high, 0.3–0.6 cm thick, strongly grayish-tomentose; leaves pinnately divided or incised into 8–12 pairs of lanceolate lobes 7. **R. uniflorum** (L.) DC.

Section 1. Fornicium (Cass.) Soskov comb. nova.—*Fornicium* Cass. in Bull. Soc. Philom. Paris (1819) 93.—*Leuzea* sect. *fornicium* (Cass.) DC. Prodr. VI (1837) 665; Ldb. Fl. Ross. II, 2, (1846) 752 p. p.—*Centaurea* sect. *Fornicium* (Cass.) Benth. in Benth. and Hook. f. Gen. pl. II (1873) 479 p. p.; O. Hoffm. in Pflanzenfam. IV, 5 (1893) 326 p. p.—Plants with stems covered at base, with brown or glabrous inside sheaths of dead leaves. Corolla violet-purple. Pappus of short-plumose bristles, sometimes sordid-white, dorsally with more or less distinct row of sparse hairs perpendicular to bristles; hairs on bristles several times, but never more than 10 times, as long as its diameter.

Type of section: *R. serratuloides* (Georgi) Bobr.

Series 1. Carthamoidea Soskov.—Pappus creamish, with reddish-brown or yellowish tinge, 2–3-rowed, of short-plumose bristles, connate into ring at base, deciduous; hairs (barbula) of bristles 4–6 times as long as its diameter. Achenes more or less reddish-brown, tetraquetrous, ribbed, 5–8 mm long, 2–3 mm wide, apically spinulose on edge, less often unevenly crenate.

1. **R. carthamoides** (Willd.) Iljin in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 1 (1933) 204.—*Cnicus carthamoides* Willd. Sp. pl. III, 3 (1803) 1685.—*C. centauroides* Willd. *ibid.*, p. p. quoad pl. sibir.—*c. uniflorus* Sievers in Pall. Neue nord. Beitr. III (1796) 346, nomen nudum; DC. Prodr. VI 666, pro syn.—*Serratula carthamoides* Poir. in Lam. Encycl. meth. VI, (1804) 561.—*S. cynarifolia* Poir. *ibid.*, p. p. quoad pl. Sibir.—*Leuzea carthamoides* DC in Ann. Mus. Paris. XVI (1810) 205; DC. Prodr. VI, 666; Ldb. Fl. Ross. II, 2, 753; Turcz. Fl. baic.-dahur. II, 1, 135; Kryl. Fl. Zap. Sib. XI, 2943.—*L. altaica* Fisch. ex Schauer, Cat. Sem. hort. Vratisl. (1834) and in Linnaea, X (1835) 117, non Link (1822).—*Cirsium carthamoides* Link, Enum. pl. Hort. Berol. II (1822) 303.—*Halocharis carthamoides* MB. ex DC. Prodr. VI (1837) 666, pro syn.—*Centaurea carthamoides* Benth. in Benth. and Hook. f. Gen. pl. II (1873) 479.—**lc.**: Zemlinskii, Lekarstv. Rast. SSSR, 389.

Perennial. Rhizome woody, horizontal, sympodial, with specific resinous smell, dark brown, (5)10–15(20) mm thick, with numerous, thin, elastic, flexible roots 1–3(10) mm thick. Stem hollow, somewhat arachnoid-hairy, 50–180 cm high. Leaves weakly arachnoid-hairy, deeply pinnately divided, with larger terminal lobe and 5–8 pairs of lateral, lanceolate or ovate-lanceolate, acuminate, toothed lobes; lower leaves petiolate, 12–40 cm long and 5–20 cm wide, upper ones sessile, pinnately lobed, uppermost often undivided, more or less coarsely toothed. Capitula on average 4.7 cm in dia. Appendages of involucre bracts soft-scarious, brown, on both sides long-hairy, ovate, 5–8 mm wide, with somewhat elongate, divergent and recurved tip. Corolla 2–3 cm long, limb 1 cm long. Stamen filaments densely covered with oblong papillae. Pappus reddish-brown to creamish, 1.5–1.6 cm long, 2-rowed, of short-plumose bristles, connate into ring at base, deciduous; dorsal side of bristles with irregular row of hairs; bristle hairs 5–6 times as long as bristle thickness. Achenes reddish-brown, tetraquetrous, ribbed, weakly transversely rugose, 6–8 mm long, 2–3 mm wide, spinulose at tip along edge. Flowering July to August; fruiting August to September.

Subalpine and alpine meadows, occasionally entering bordering alpine tundra; often descending to forest zone, being found in tall-herb forest meadows and along forest edges.—*Western Siberia*: Altai; *Eastern Siberia*: Angara-Sayans (southwestern), Dauria (western); *Soviet Central Asia*: Dzhungaria-Tarbagatai. *General distribution*: Mongolia (Mongolian Altai). Described from Siberia. Type in Berlin.

Ssp. orientale (Serg.) Soskov. in *Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XIX (1959) 406.—*Cnicus centauroides* Willd. *Sp. pl.* III, 3 (1803) 1685 p. —*L. carthamoides* ssp. *orientalis* Serg. in *Kryl. Fl. Zap. Sib.* XI (1949) 2943.—Differs from the type subspecies by having less deeply divided, often glabrous leaves; larger capitula, on average 5.5 cm in dia; outer involucre bracts with appressed, stiff-scarious, yellowish-reddish-brown, lustrous, weakly pubescent, widely rounded-ovate, lacerate appendages.

Note. Thanks to a detailed study of the ecology of this species, important biological and morphological differences between the typical and the eastern (ssp. *orientale*) subspecies have been identified. Investigations of herbarium material and living plants in nature have shown that over 30% of all plants of the eastern subspecies have characters transitional to the typical subspecies. Such plants cannot be included with certainty in one or the other subspecies. All the same, these differences, under conditions of adequate biological isolation of the forms, could serve as basis for treating the eastern subspecies as a separate species.

The alpine f. *alpinum* Soskov (Soskov in *Bot. Mat. Gerb. Bot. Inst. Akad. Nauk*, XIX [1959] 406), observed in cultivation, occupies an intermediate position between the two subspecies in regard to the shape, consistency, and pubescence of the appendages of the involucreal bracts. Despite the fact that in its developmental biology (later flowering) and morphological features (relatively smaller capitula, stem, etc.) it differs more from the typical subspecies than the eastern subspecies, it is assigned the rank of only a form.

Economic Importance. Very recently, these plants have been put to medicinal use. For this purpose, tubers and roots are used, whose preparations possess tonic and stimulatory properties. Alkaloids have been detected in the plant (*Tr. VILAR*, X [1950]; *Otchet VILAR* (Report of VILAR) [1954]) that, as was demonstrated, give it tonic and stimulatory properties. Their seeds contain 0.26% alkaloids, while the roots contain traces. Moreover, the rhizome and roots contain about 0.1% ascorbic acid, vitamin A, traces of phosphorus, inulin, resin, up to 5% tannins, and up to 4% reducing substances (*Otchet VILAR* [1953]).

2. ***R. serratuloides*** (Georgi) Bobr. in *Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XX (1960) 19.—*R. salinum* Less. in *Linnaea*, X (1835) 179; Iljin in *Tr. Bot. Inst. Akad. Nauk SSSR*, Ser. 1, 1, 204.—*R. altaicum* Soskov in *Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XIX (1959) 403.—*Centaurea serratuloides* Georgi, *Reise*, I (1775) 231.—*C. altaica* Fisch. ex Spreng. *Pugill.* I (1813) 59.—*C. salina* Benth. in Benth. and Hook. *F. Gen. Pl.* II (1873) 479.—*Cnicus Simplex* Horn. *Hort. Hafn. Suppl.* (1819) 93.—*c. salinus* Willd. ex Ldb. *Fl. Ross.* II, 2 (1846) 752, pro. syn.—*Fornicium rhaponticoides* Cass. in *Bull. Soc. Philom. Paris* (1819) 93 and in *Dict. Sc. nat.* XVII (1820) 249.—*Leuzea altaica* Link, *Enum. pl. Hort. Berol.* II (1822) 356; Kryl. *Fl. Zap. Sib.* XI, 2942.—*L. salina* Spreng. *Syst. veg.* 3 (1826) 382; DC. *Prodr.* VI, 666; Ldb. *Fl. Ross.* II, 2, 752; Schmalh. *Fl.* II, 115.—*Malacocephalus altaicus* Tausch in *Flora*, XI, 31 (1828) 481.—*Cirsium salinum* MB. ex DC. loc. cit. (1837) pro syn.—*Aplotaxis bungei* Less. ex Ldb. op. cit., 753, pro syn. non DC.—**lc.**: Gmel. *Fl. sibirica*, II (1749) tab. 37; Fedtsch. and Fler. *Fl. Evrop. Ross.* Fig. 1024.

Perennial. Rhizome reduced, with 2–4 mm thick, fibrous roots. Stem hollow, weakly arachnoid-hairy, near capitula often even short-woolly, 40–100 cm high. Leaves elliptical, acute, glabrous or weakly arachnoid-hairy, especially beneath; lower leaves petiolate, 8–30 cm long, 3–15 cm wide, toothed, undivided or pinnately divided at base, with 1–3 pairs of oblong or almost lanceolate lobes; upper leaves

sessile, undivided, small-toothed or entire. Capitula 3–6(7) cm in dia. Outermost involucre bracts often short-plumose; appendages of outer and middle bracts oblong-ovate, spatulate, acuminate, subglabrous, stiff-
 314 scarious, with light-brown strips in middle, narrowed into point, along margin somewhat transparent and often somewhat lacerate, 5–7(10) mm wide, appendages of innermost bracts very narrow and acute, covered with long hairs. Corolla 2.5–3 cm long, its limb 1.2–1.5 cm long. Pappus creamish, 1.5–1.6 cm long, 2-rowed, of short-plumose bristles, connate in a ring at base, deciduous; dorsal side of bristles with regular row of hairs; bristle hairs 5–6 times as long as bristle thickness. Achenes light reddish-brown, 4-angled, ribbed, weakly transversely rugose, 6–8 mm long and 2–3 mm wide; spinulose at apex along edge. Flowering May to June; fruiting June to July.

Steppe regions in saline marshes, alkali soils and alkaline meadows.—*European Part*: Bessarabia, Middle Dnieper (southeastern), Black Sea Region, Lower Don, Volga-Don (south), Trans-Volga, Lower Volga; *Western Siberia*: Upper Tobol, Irtysh; *Soviet Central Asia*: Aralo-Caspian Region (northern), Lake Balkash Region (northern). Endemic. Gmelin's illustration in *Flora of Siberia* (Gmel. *Fl. sibirica*, II [1749], tab. 37) is type; classical locality—steppes of western Baraba.

3. **R. lyratum** Winkl. ex Iljin in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 1 (1933) 204, descr. ampl.; O. and B. Fedtsch. Rast. Turk. IV (1911) 290, nomen.—*Centaurea lyrata* B. Fedtsch. Rast. Turk. (1915) 757, nomen.

Perennial. Rhizome elongate, vertical, 7–10 mm thick, branched at apex, caudex-shaped. Stem 25–50 cm high, weakly arachnoid-hairy. Leaves grayish-green, weakly arachnoid-tomentose, occasionally subglabrous above; basal and lower cauline leaves numerous, 5–30 cm long and 2–4 cm wide; oblong-lanceolate, acuminate, often small-toothed, weakly lyrate, narrowed into short petiole; cauline leaves few, smaller, sessile, narrowed at base and often incised-toothed in lower part, with long scarious cusp. Capitula 2.5–3.5 cm in dia. Appendages of involucre bracts stiff-scarious, yellowish-smoky, semitransparent, appendages of outer bracts broadly ovate, lacerate, sometimes whitish, glabrous; appendages of middle bracts ovate, lacerate, subglabrous, inner ones lanceolate, short hairy on both sides. Corolla 3.5–3.6 cm long; limb 1 cm long. Pappus yellowish-creamish, 1.8–2.0 cm long, 3-rowed of short-plumose bristles, connate in ring at base; deciduous; dorsal side of bristles with irregular row of hairs; bristle hairs 3–4 times as long as bristle thickness. Achenes light reddish-brown, tetraquetrous, ribbed 5–6 mm long and 2–3 mm wide; unevenly crenate at tip. Flowering June to July; fruiting August.

Tall-herb valley slopes.—*Soviet Central Asia*: Tien Shan, Pamiro-Alai. Endemic. Described from Pamiro-Alai, source of Kyzylsu River. Type in Leningrad.

- 315 *Section 2. Eleutherochaetum* Soskov in Addenda XXVII, 607.—Pappus yellowish-ochreous or yellowish-creamish, of short-plumose, hard, persistent bristles not connate in ring at base, dorsal side of bristles with regular row of hairs perpendicular to bristle; bristle hairs (barbula) 2–3 times as long as bristle thickness. Achenes 8–12 mm long, and 3.0–4.5 mm wide, pale-yellow or yellowish-brown. Corolla yellow.

Type of section: *R. integrifolium* Winkl.

In the USSR, this section is represented by a single species. *R. caulescens* Coss. and Bal. grows in Morocco, which apparently also belongs to this section on the basis of the pappus structure. The color of the corolla is not known to me because of the absence of herbarium material in the flowering stage.

4. *R. integrifolium* Winkl. in Tr. Peterb. Bot. Sada IX, 2 (1886) 425; Iljin in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 1, 204.—*Leuzea salina* Rgl. ex O. Fedtsch. in Izv. Obshch. Lubit. Estestv. Antrop. i Etn. 103 (1902) 92, non Spreng.—*Centaurea integrifolia* B. Fedtsch. Rast. Turk. (1915) 757.—*Exs.*: H.F.A.M. No.199.

Perennial. Rhizome reduced, 10–20 mm thick, often branched at apex, with distinctive resinous smell. Stem hollow, 70–120 cm high, with dense, soft, very short-grayish pubescence, often even short-hairy in capitula. Leaves undivided, sometimes involute and with scarcely visible, occasional small teeth, with thin, occasional, short, slightly scarious, scabrous, appressed hairs, mostly on veins. Lower leaves 25–40 cm long and 6–10 cm wide, obtuse, gradually narrowed into short petiole; upper ones sessile, 5–20 cm long and 1.5–5.0 cm wide, ovate-lanceolate, narrowed at both ends. Capitula to 5 cm in dia. Appendages of involucre bracts 8–12 mm wide, ochraceous, stiff-scarious, spatulate, lacerate (except inner), semitransparent, with band in middle darker than appendage and narrowed at tip; appendages of outer bracts whitish, glabrous, of inner ones darker and short-pilose. Corolla 3.5–4.0 cm long; limb 1.5 cm long, pale yellow. Pappus yellowish-ochreous, 1.5 cm long, many-rowed, of short-plumose, stiff, persistent bristles, not connate in ring at base; dorsal side of bristle with regular row of hairs; hairs of bristle 3 times as long as bristle thickness. Achenes pale yellow, 4-angled, weakly ribbed, longer, (6) 8–10 mm long, 3–4 mm wide; unevenly crenate at apex. Flowering May to June; fruiting July.

In groups, in steppes, often on rubbly, tall-herb valley slopes, at 600–1,000 m, occasionally in subalpine zone at 1,800–2,000 m.—*Soviet Central Asia*: Pamiro-Alai, Tien Shan (southwestern). Endemic. Described from Hissar Range, near Gakimi along course of Karatag River. Type in Leningrad.

316 **Note.** This is the only species of the whole genus with undivided leaves.

Economic Importance. The plants are reported to contain alkaloids (*Soobshch. Tadzh. Fil. Akad. Nauk SSSR*, IX [1948] 10).

Section 3. Rhaponticum.—Sect. *Eurhaponticum* DC. Prodr. VI (1837) 666 p. p.; Ldb. Fl. Ross. II, 2, 751; Soskov in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX, 398.—Plants with stem covered with brownish sheaths of dead leaves at base, glabrous on inside. Appendages of involucre bracts stiff-scarious. Corolla violet-purple. Pappus ochraceous, 3-rowed, 1.2–1.5 cm long, of barbate, stiff bristles, connate in ring at base, deciduous; dorsal side of bristles with regular row of hairs perpendicular to bristle; bristle hairs (barbula) as long as bristle thickness.

Type of section: type of genus.

Series 1. Scariosa Soskov.—Leaves grayish-white-tomentose beneath; achenes distinctly spinulose at tip along edge, weakly undulate.

R. scariosum Lam., found in the Alps, belongs to this series.

5. **R. pulchrum** Fisch. and Mey. Ind. Sem. hort. Petrop. I (1835) 36; DC. Prodr. VI, 664; Ldb. Fl. Ross. II, 2, 752; Boiss. Fl. or. III, 591; Grossh. Fl. Kavk. IV, 194; Parsa, Fl. Iran. III, 622.—*R. zardabii* Rzazade in Dokl. Akad. Nauk Azerb. SSR, XIV, 3 (1958) 241.

Perennial. Rhizome elongate, more or less vertical, 8–20 mm thick, with few roots 0.5–1.5 mm thick. Stems arachnoid-white-tomentose, 20–50 cm high. Leaves oblong-elliptical, scarcely acuminate, scabrous and subglabrous above, with soft, dense, appressed white tomentum beneath, pinnately divided or incised into 5–10 pairs of ovate or lanceolate lobes, lobes often not opposite, narrowed below, unevenly toothed or lobed; lower leaves petiolate, 15–30 cm long and 2–5 cm wide, upper ones sessile, strongly reduced, 3–10 cm long and 1–2 cm wide, uppermost leaves sometimes pinnately lobed. Capitula 2.5–4.0 cm in dia. Appendages of outer and middle involucre bracts 7–10 mm wide, broadly ovate or ovate, 3–5 lobed, light reddish-brown, almost transparent, brownish at base, very weakly pubescent, sometimes glabrous; appendages of inner bracts densely short-pubescent. Corolla

2.0–2.5 cm long; limb 1.0–1.2 cm long. Pappus 1.5 cm long; achenes reddish-brown, weakly tetraquetrous, indistinctly ribbed, longitudinally rugose, 5–6 mm long and 2.5–3.0 mm wide, achenes weakly undulate at tip. Flowering June; fruiting July.

317 Dry, sunny, stony mountain slopes, on cliffs and rocks, at 900–1,200 m.—*Caucasus*: Eastern and Southern Transcaucasia, Talysh. *General distribution*: Iran-Afghanistan (northwestern). Described from Talysh. Type in Leningrad.

Note. Assigning the rank of species—*R. zardabii* Rzaade—to the plants differing from the typical ones mainly by the branched stem seems to us little justified. In the genus *Rhaponticum*, branching of the stem is also observed in *R. nitidum* Fisch. and *R. scariosum* Lam. It would be more correct to consider this phenomenon as a chance deviation from the typical form.

Series 2. Uniflora Soskov.—Leaves weakly appressed arachnoid-hairy beneath, more densely on veins near petiole. Corolla weakly infundibular. Achenes somewhat conical, with long acute apical teeth at tip.

6. *R. satzyperovii* Soskov in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX (1959) 400.—**Ic.**: Kom. and Alis. Opred. Rast. Dalnevost. Kr. II, Plate 315, sub *Centaurea monanthos* Georgi.

Perennial. Rhizome long, more or less vertical, strong, 15–30 mm thick, with flabby tubercular-fibrous surface and very few thin roots. Stem hollow, with sparse, appressed grayish-tomentum, mostly in lower part (later becoming glabrous), 30–100 cm high, 0.5–1.0 thick. Leaves long, scabrous on both sides, glabrous, or appressed, sparsely arachnoid-prickly-pubescent, more densely on veins; leaves on non flowering shoots and basal leaves petiolate, lyrate 20–40 cm long, pinnately lobed or divided from base to 2/3 length into 3–6 pairs of ovate-oblong, large-toothed lobes, gradually reducing toward base and merging with petiole, terminal lobe very large, ovate, large-toothed, 7–10 cm wide; lower cauline leaves 10–20 cm long and 4–8 cm wide, short-petiolate, ovate-lanceolate, shallowly pinnately parted into 4–6 pairs of ovate-oval, sparse sharp-toothed lobes; upper leaves 5–10 cm long, and 3–6 cm wide, sessile, often pinnately lobed. Capitula to 5–6 cm in dia. Appendages of outer and middle involucre bracts 1.0–1.3 cm wide, broadly lanceolate, thick, glabrous, not transparent, less divided, often involute; appendages of inner bracts ovate-lanceolate, toothed, very short-pubescent. Corolla weakly infundibular, 3.0–3.5 cm long; limb 1.5–2.0 cm long. Pappus 1.5 cm long; achenes reddish-brown, tetraquetrous, ribbed. Somewhat conical, with long, acute teeth at apex. Flowering June to July; fruiting July to August.

Rarely in large groups, in meadows, scrubs and forests on mountain slopes.—*Far East*: Ussuri. *General distribution*: China (north-western, near Sochintza, Matsyaokhe station). Described from Suchan Valley. Type in Leningrad.

318 **Note.** This species is similar to *R. uniflorum* (L.) DC. but is well differentiated from it by a robust stem, up to 1 m high, lyrate basal and large, shallowly divided, often pinnately lobed cauline leaves, and a series of other characters. The well delineated range and the absence of intermediate forms underscore the existence of a separate species.

7. ***R. uniflorum*** (L.) DC. in Ann. Mus. Paris, XVI (1810) 189; Prodr. VI, 664; Ldb. Fl. Ross. II, 2, 751; Turcz. Fl. baic.-dahur. II, 1, 133; Soskov in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX, 404.—*R. dahuricum* Turcz. in Bull. Soc. Nat. Mosc. XI (1838) 95.—*R. monanthum* (Georgi) Worosch. in Spisok Semyan Glavn. Bot. Sada, Akad. Nauk SSSR, 8 (1953).—*Cnicus uniflorus* L. Mant. altera (1771) 572.—*Centaurea monanthos* Georgi, Rise, I (1775) 231; Kom. and Alis. Opred. Rast. Dalnevost. Kr. II, 1086.—*C. grandiflora* Pall. Reise, III (1776) 237, 321, nomen.—*C. membranacea* Lam. Encycl. meth. I (1783) 666.—*Serratula uniflora* Spreng. Syst. veg. 3 (1826) 388.—*Leuzea daurica* Bge. in Mém. Acad. Sc. Pétersb. II (1835) 111.—**IC.**: Gmel. Fl. sibirica, II (1749) tab. 38.—**Exs.**: GRF No. 1073.

Perennial. Rhizome long, more or less vertical, strong, 10–30 mm thick, with flabby tubercular-fibrous surface and very few thin roots. Stem densely grayish-tomentose, strongly below, (3)20–60 cm high and 0.3–0.6 cm thick. Leaves long, scabrous on both sides, weakly arachnoid-pubescent, densely on veins nearer petiole, pinnately divided or incised into 8–12 pairs of lobes, often not exactly opposite, ovate-lanceolate or lanceolate, narrowed at both ends, less often sharp-toothed; lower leaves petiolate, 15–30 cm long and 4–7 cm wide, upper ones sessile 4–10 cm long and 2.0–2.5 cm wide. Capitula to 3–4 cm in dia. Appendages of outer and middle involucre bracts broadly ovate or ovate, not transparent, divided into few lobes, uneven on margin; appendages of innermost bracts elongate-lanceolate, toothed with very short pubescence. Corolla infundibuliform, 2.5–3.0 cm long; limb 1.5–2.0 cm long. Pappus 1.2–1.5 cm long; achenes reddish-brown, tetraquetrous, ribbed, 4–6 mm long and 2.0–2.5 mm wide, somewhat conical, with long sharp apical teeth. Flowering May to June; fruiting July.

Scattered on dry meadow-steppe mountain slopes with stony soil, along sandy river banks, occasionally in open pine and larch forests, sometimes growing in old fields.—*Eastern Siberia*: Angara-Sayans (south and eastern), Dauria; *Far East*: Zeya-Bureya (western), Ussuri

(as introduction on Putyatin Island, Muravyev-Amur Peninsula and in vicinity of Ussuriisk). *General distribution*: Mongolia (northern), China (northeastern, Shansi, Hanshu, Island of Taiwan), Korean Peninsula.

319 **Note.** Carl Linnaeus (L. loc. cit.), simultaneously referring to the excellent illustration of Gmelin (Gmel. op. cit.), gave a poor description of the species *Cnicus uniflorus*. Georgi (loc. cit.) referred the species to the genus *Centaurea* but could not retain the earlier proposed epithet, since it was already assigned by Linnaeus (1767) to another species.—*Centaurea uniflora* L.

Section 4. Rhaponticellum Soskov in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX (1959) 400.—Plants stemless or stems to 30 cm high, covered with dark reddish-brown or entirely black sheaths of dead leaves at base, on inner side, mostly in lower part, densely covered with long, silky-white hairs. Involucral bracts with brownish spot or border below thin-coriaceous, more or less transparent appendages. Corolla violet-pink. Pappus mostly white, deciduous, of barbate stiff bristles, connate into ring at base; tips of some large pappus bristles, often flattened and irregularly hairy; dorsal side of bristles glabrous; bristle hairs (barbula) as long as or shorter than bristle thickness. Achenes tetraquetrous, ribbed.

Type of section: *R. karatavicum* Rgl. and Schmalh.

Series 1. Nitida Soskov.—Plants entirely glabrous; corolla 4–5 cm long; pappus ochraceous, very stiff, many-rowed, about 3 cm long.

The series is represented by a single species.

8. **R. nitidum** Fisch. in DC. Prodr. VI (1837) 664; Ldb. Fl. Ross. II, 2, 751; Iljin in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 1, 205; Kryl. Fl. Zap. Sib. XI, 2944.—*R. caspicum* Fisch. and Mey. in Bull. Soc. Nat. Mosc. XII (1839) 160; O. and B. Fedtsch. Perech. Rast. Turk. IV, 289, pro syn.—*Centaurea nitida* B. Fedtsch. Rast. Turk. (1915) 757.

Perennial. Rhizome vertical, 3–5(15) mm thick, branched at tip, caudex-shaped, producing 1–2 stems and, sometimes, stemless non-flowering shoots comprising clusters of leaves. Stem 10–30 cm high, sometimes branched. Leaves glabrous, somewhat thick, oblong, deeply (up to 2/3 or base) pinnately divided into rounded-oblique-ovate or oblong-ovate lobes, in turn slightly lobed, cartilaginous-toothed, 0.7–2.2 cm long and 1.2–1.5 cm wide, lobes smaller in lower part of leaves; basal leaves on short petioles 1.5–4.0 cm long, including petiole (5)8–16 cm long and 1.5–4.0 cm wide; Cauline leaves sessile, (5)6–12 cm long and 1.5–4.0 cm wide. Capitula single on stem, less often 2. Involucre 2–3 cm in dia. Appendages of outer and middle

involucral bracts 6–9 mm wide, broadly roundish-ovate with distinct, scarcely acuminate tip, stiff, thinly-scarious, almost transparent, with reddish-brown tinge, finely ciliate on margin; appendages of innermost bracts oblong-ovate-lanceolate, acuminate, appressed hairy on both sides. Corolla 4–5 cm long; limb 1.2–1.5 cm long. Pappus ochraceous, about 3 cm long, many-rowed, stiffest of all species of this genus, bristles with much longer hairs; achenes dark-creamish, to 10 mm long and 2.5–3.0 mm wide; unevenly crenate at tip. Flowering April to May; fruiting May to June.

Typical of desert and desert-steppe regions, where it grows on clayey and sandy steppes, hill slopes, stony riverbanks and dry riverbeds.—*Soviet Central Asia*: Aralo-Caspian Region, Lake Balkhash Region. Endemic. Described from eastern coast of Caspian Sea. Type in Leningrad.

Note. The report (Krylov, op. cit.) of hairiness of the stamen filaments in this species and also in the genus is incorrect. Besides the typical form, considerably rarer is the chalk form in the western part of the range, which has been given the rank of a variety (var. *cretaceum* Iljin in herb.). It differs from the typical form by having white, matte, semitransparent appendages of the involucral bracts.

Series 2. Karatavica Soskov.—Plants 10–40 cm high. Corolla 1.7–2.3 cm long. Pappus white, light orange at base of bristles, 3-rowed, about 1.5 cm long.

9. **R. aulieatense** Iljin in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 1 (1933) 205.

Perennial. Rhizome more or less vertical, 7–20 mm thick, branched at tip, caudex-shaped, producing 1, occasionally 2–3 stems. Stems sparsely leafy, green, thinly pubescent, oblong, narrowed at both ends, pinnately incised, with oval or oval-oblong lobes, obtuse or almost round, unevenly crenate-toothed with or without solitary scarious point, all spreading upward, decurrent; basal and lower cauline leaves petiolate, 8–12 cm long and 2–3 cm wide; [other] cauline leaves sessile, pinnately lobed, unevenly crenate. Involucre 3.0–3.5 cm in dia, glabrous. Appendages of involucral bracts transparent, somewhat yellowish, stiff, thinly-scarious; appendages of outer and middle bracts broadly-ovate, divided into 3–5 lobes, 5–8 mm wide; appendages of innermost bracts oblong, undivided. Corolla 1.7–2.0 cm long; limb 1 cm long. Pappus white, light orange at base of bristles 1.0–1.5 cm long, 3-rowed; achenes whitish, with reddish-brown tinge, 5–6 mm long and 1.5–2.0 mm wide; weakly undulate at tip. Flowering May to June; fruiting June.

Stony mountain slopes.—*Soviet Central Asia*: Tien Shan (eastern part of Karatau, Ichkeletau, and eastern part of Kirghiz ranges). Endemic. Described from Talass Region (Ichkeletau Range, Dzhabul District, Ulkun-Kapka Ravine). Type in Leningrad.

Note. This species is close to *R. karatavicum* but differs from it in a series of characters: the leaves are green and subglabrous (except in f. *incanum* Iljin); the stem and capitula are larger in size; the margin of leaves is not crimped, and there are no cartilaginous teeth on it. The grayish form—f. *incanum* Iljin in herb—also deserves mention. The grayish form is found on the limestone outcrops; it differs from the typical form in having several xeromorphic characters: appressed grayish tomentum on the leaves and stem, a deeper division of the lamina, with its lobes being narrower and lanceolate-ovate.

10. ***R. karatavicum*** Rgl. and Schmalh. in Tr. Peterb. Bot. Sada, VI, 2 (1880) 320; Iljin in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 1, 206.—*Centaurea karatavica* B. Fedtsch. Rast. Turk. (1915) 757.

Perennial. Rhizome more or less vertical, 5–15 mm thick, branched at tip, caudex-shaped, producing 1, occasionally, 2 stems. Stems leafy, appressed grayish-tomentose, 6–15 cm high. Leaves somewhat thick, whitish from tiny dense tomentum, oblong, pinnately divided or even incised, with oval, obtuse, bidentate (teeth cartilaginous at tip), lobes and slightly crimped, all upward spreading, decurrent, gradually reduced below; basal leaves roughly as long as stem, 2–3 cm wide in upper part; cauline leaves slightly smaller. Involucre 2.0–2.5 cm in dia, glabrous; appendages of involucre bracts transparent, stiff, thinly scarious, slightly yellowish; appendages of outer and middle bracts broadly ovate, divided into 3–5 lobes, 4–6 mm wide; appendages of innermost bracts oblong-ovate, undivided. Corolla 2.0–2.3 cm long; limb 1.0–1.2 cm long. Pappus white, light orange at base of bristles, 1.0–1.5 cm long, 3-rowed; achenes whitish, 5–6 mm long and 1.5–2.0 mm wide, weakly undulate at tip. Flowering June; fruiting June to July.

Rubby mountain slopes, at 1,200–1,500 m.—*Soviet Central Asia*: Tien Shan (Karatau Range). Described from Karatau Range. Type in Leningrad.

Series 3. Nana Soskov.—Plants 3–5 cm high, stemless or almost stemless. Pappus white, many-rowed, about 1.5 cm long.

11. ***R. namanganicum*** Iljin in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 1 (1933) 206.

Perennial. Plants small, 3–5 cm high, stemless or almost stemless,

322 aerial part consisting of only capitulum in leaf rosette. Leaves short-petiolate, resting on ground, green, with inconspicuous sparse tomentum, pinnately divided, with oval, subobtusate, toothed lobes, slightly narrowed at base, apical leaves coalescent, others perpendicular to midrib. Involucre 1.5–2.0 cm wide, and 2.0–2.5 cm long, glabrous; involucre bracts with transparent, lustrous, often divided, stiff, thin-scarious appendage. Corolla 2.5–3.0 cm long, limb 1.0–1.2 cm long; pappus white, 1.5 cm long, many-rowed. Flowering July; fruiting August.

Rubble slopes in juniper zone, on gypsiferous rocks, above 2,000 m.—*Soviet Central Asia*: Tien Shan (basin of Angren River, Chatkal and Ugam ranges). Endemic. Described from Chatkal Range (Lake Gava). Type in Leningrad.

Note. The species is very similar to *R. nanum* but is clearly distinguished by the undivided leaf segments, absence of violet-purple tips of the inner involucre bracts, and the colorless appendages of the bracts.

12. ***R. nanum*** Lipsky in Tr. Peterb. Bot. Sada, XVIII, 1 (1900) 80; Iljin in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 1, 206.—*R. pellucidum* Rech. f. in Dan. Biol. Ser. 8, 2 (1955) 184 (Symb. Afg. II).—*Centaurea nana* B. Fedtsch. Rast. Turk. (1915) 757.—*C. pellucida* Rech. f. in oest. Bot. Zeitschr. 97 (1950) 251.—**lc.**: Lipsky in Tr. Peterb. Bot. Sada, XXIII (1904) Plate 11, Fig. 1–7.

Perennial. Plants 3–5 cm high, stemless or almost stemless, consisting of only capitulum above, in leaf rosette, with quite thick, 5–10 mm, rhizome and 1–2 mm-thick roots arising from it. Leaves petiolate, resting on ground, finely appressed tomentose on both sides, oblong, surpassing capitulum, 3–7 cm long and 1.5–2.0 cm wide, pinnately incised, with ovate or lanceolate segments almost perpendicular to midrib, reducing toward leaf base; segments pinnately divided or lobed, undivided or very finely cartilaginously toothed. Involucre 1.5–2.0 cm in dia, weakly oblong, glabrous; outer and middle bracts with transparent, lustrous, stiff, thinly scarious appendage 5–7 mm wide; innermost bracts with violet tinge under ovate-lanceolate, violate appendage (reddish-brown at end of vegetative period). Corolla 2.5–3.0 cm long; limb 1.0–1.2 cm long. Pappus white, about 1.5 cm long, many-rowed; immature achenes tetraquetrous and ribbed. Flowering June to July.

High-mountain region at 2,200–2,500 m, rubble slopes and stony mountain peaks.—*Soviet Central Asia*: Pamiro-Alai Region (western), Tien Shan (eastern end of Kuramin Range). *General distribution*: Afghanistan. Described from Yakkaba, village of Turka. Type in Leningrad.

GENUS 1612. *Amberboa* (Pers.) Less.^{1, 2}

Less. Synops. Comp. (1832) 8, nom. conserv.—*Chryseis* Cass. in Dict. Sc. nat. IX (1817) 154, non Lindl. (1825).—*Centaurea** *amberboa* Pers. syn. pl. V (1821) 316 p. p.—*Amberboa* sect. *Chryseis* (Cass.) DC. Prodr. VI (1837) 559.

Capitula heterogamous, medium-sized, or quite large, with many florets, solitary or many and then singly at tips of main stem and its lateral branches. Involucres elongate-ovate to broadly ovate and subglobose, 5–24 mm in dia, 10–25 mm long, glabrous or more or less finely arachnoid-tomentose; involucral bracts many-rowed, firmly imbricate, almost coriaceous, greenish, with inconspicuous veins, gradually broadening from broadly ovate outer to oblong innermost; outer and middle bracts obtuse, lacking appedage, inner ones with small, entire, lanceolate to almost rounded appendage. Receptacle almost flat, bristly. All florets tubular, pink or yellow, much surpassing involucre, heteromorphic; central florets (disk florets) bisexual, in somewhat irregular rows; peripheral florets (ray florets) sterile, lacking staminodes and rudimentary style, 1-rowed, usually quite strongly broadened, with infundibuliform limb of 4–20 lobes, often more or less hairy in middle. Anthers with very long, oblong basal appendage; apical appendage long and gradually long-acuminate; filaments weakly flattened, more or less covered with small papillose tubercles. Stigma very finely papillose, with collar of hairs at base, bifid almost to middle and usually exserted from anther tube. All achenes similar, oblong, weakly compressed laterally, 3–6 mm long, quite densely appressed-hairy, smooth or more or less distinctly alveolate, truncate at apex, with well-developed, more or less toothed crown; hilum lateral, surrounded by light-colored annular ridge, strongly raised above remaining surface, glabrous; pappus almost as long or not less than $\frac{2}{3}$ as long as achene, persistent, simple, of numerous serrate-toothed, bristle-like scales, gradually longer from very short outer to much longer inner ones, often lacking in some cultivated varieties. Annual or biennial herbs with erect, simple or more or less branched (sometimes strongly reduced), uniformly leafy stems. Leaves undivided, more or less toothed, to pinnately divided, like stem more or less covered with short-crisped hairs (to entirely glabrous); lower cauline leaves petiolate, upper ones sessile, not decurrent on stem.

¹Treatment by N.N. Tzvelev.

²From *amberboi*—French name for a cultivated species of the genus, which, in turn, is derived from the Latin word *amber* or *ambra*—an odorous substance with a pleasant, musk-like smell, earlier used in medicine and perfumery.

[*Asterisk in the text not explained—General Editor].

Type of genus: *A. moschata* (L.) Less.

Seven closely related species of this genus occur in the Caucasus, West Asia and Central and Soviet Central Asia.

Economic Importance. Two species of this genus.—*A. moschata* (L.) Less. and *A. amberboi* (L.) Tzvel.—are ornamental plants, long cultivated in the Orient.

1. Involucres (with florets) entirely glabrous, 5–11 mm in dia and 9–15 mm long; appendages of inner involucre bracts very small, lanceolate; florets pink, peripheral ones strongly enlarged, 3–7 mm longer than central florets; corolla of 8–16 lobes. Plants almost glabrous, 10–50 cm high, with simple or more or less branched stem, always without capitula at their base (Southern Transcaucasia) 3. **A. sosnovskiyi** Iljin
- + Involucres (with florets) more or less covered with arachnoid tomentum, often weakly developed and inconspicuous. Plant more or less covered with scattered, crisped hairs 2.
2. Relatively small (3–30 cm), ephemeral annuals, often strongly branched from base; often with 1 or more capitula on greatly shortened peduncles in center of rosette of basal leaves. Involucres (with florets) 5–12 mm in dia; appendages of inner bracts very small, lanceolate, thinly membranous, fast-withering. Florets yellowish-white, light yellow, or light pink; peripheral florets barely longer than central florets, relatively few with corolla of 5–10 lobes 3.
- + Usually taller (15–70 cm) biennials or annuals, with simple or branched stems, always without capitula at base. Involucres (with florets) 9–24 mm in dia; inner involucre bracts with quite large, oblong, ovate, or roundish appendages. Florets yellow or pink; peripheral ones rather numerous, with corolla of 8–20 lobes 4.
3. Peripheral florets light pink (Eastern and Southern Transcaucasia, Ustyurt) 4. **A. nana** (Boiss.) Iljin
- + Peripheral florets light yellow (Kazakhstan, Soviet Central Asia, Eastern Transcaucasia) 5. **A. turanica** Iljin
4. Florets pink (Caucasus) 5.
- + Florets yellow (Soviet Central Asia) 6.
5. Peripheral florets greatly enlarged, usually 5–10 mm longer than central florets; corollas of peripheral florets usually more or less hairy in middle (Southern Transcaucasia) 1. **A. moschata** (L.) DC.
- + Peripheral florets smaller, as long as or slightly longer than central florets; corollas of peripheral florets usually glabrous (Dagestan, Eastern Transcaucasia) 2. **A. glauca** (Willd.) Grossh.

6. Involucres 18–24 mm in dia, rather profusely (but more or less disappearing in fruit) arachnoid-tomentose; peripheral florets only slightly longer than central florets. Almost all leaves (except uppermost) petiolate, with undivided but more or less toothed laminae (mountains of Uzbekistan, Tadzhikistan and Eastern Turkmenia) ...
 7. **A. bucharica** Iljin
- + Involucres 9–20 mm in dia, less arachnoid-tomentose; peripheral florets usually 5–10 mm longer than central florets. Middle and upper leaves usually sessile, pinnately lobed or parted, or undivided (Kopetdag, Balkans) 6. **A. amberoi** (L.) Tzvel.

Series 1. Moschatae Tzvel.—Relatively large biennial or annual plants. Involucres 5–20 mm in dia; appendages of inner involucral bracts relatively large, roundish or oval, less often (in *A. sosnovskyi*) smaller, lanceolate. Florets pink; corolla of peripheral florets with 8–20 lobes.

1. **A. moschata** (L.) DC. Prodr. VI (1837) 560, quoad nomen; Boiss. Fl. or. III, 605 p. p.—*A. odorata* γ. *glauca* auct.: DC. loc. cit., non *Centaurea glauca* Willd.—*A. odorata* β. *floribus rubicundis* Ldb. Fl. Ross. II, 2 (1845) 683.—*A. glauca* auct. non Gross.: Iljin in Izv. Bot. Sada, Akad. Nauk SSSR, XXX, 1–2 (1932) 111, excl. ssp.: Grossh. Fl. Kavk. IV, 196, and Opred. Rast. Kavk. 489; Ter-Khachaturova in Fl. Gruzii, VIII, 528.—*Centaurea moschata* L. Sp. pl. (1735) 909, excl. β. *Amberboi*; Lam. Encycl. meth. I (1783) 664.

Biennial or annual. Plants 20–70 cm high. Stem erect, simple or more or less branched; more or less covered with short crisped hairs. Leaves more or less covered with scattered crisped hairs, often subglabrous; basal leaves with quite long petioles, undivided, more or less toothed, or pinnately lobed, middle and upper ones usually sessile or subsessile, strongly variable in shape: from undivided, more or less toothed to pinnately divided or incised. Capitula at tips of stem and its lateral branches, solitary, on long leafless peduncles. Involucres broadly ovate, with florets 10–20 mm wide, and 13–20 mm long, more or less finely arachnoid-tomentose; innermost bracts with quite large roundish or ovate, obtuse appendages. Florets pink, peripherals ones much larger, usually 5–10 mm longer than central florets; corolla with 10–20 lobes, more or less pilose in middle with long, flexuous hairs. Achenes 3.2–4.0 mm long, usually with almost as long pappus, very rarely lacking pappus. Flowering May to July.

Dry clayey and stony slopes of foothills and lower mountain zone; sometimes also as wild or introduced plant along roads and near inhabited places.—*Caucasus*: Eastern Transcaucasia (southwestern part;

probably only as introduced). Western Transcaucasia (southern part), Southern Transcaucasia. *General distribution*: Armenia and Kurdistan, Asia Minor (?). Described from cultivated plants apparently originating from Turkey. Type in London.

Note. Not having an opportunity to study the type specimen of *Centaurea moschata* L. I am not entirely convinced that this name should be assigned to this species and not the next (following De Candolle and Ledebour). In the USSR I have not seen plants of this species with the achenes lacking a pappus (*A. moschata* γ. *epapposa* Boiss. op. cit. 606); apparently, it is found only in cultivation.

Economic Importance. Like the following species, it also is an ornamental plant, introduced long ago into cultivation. In the USSR, it is cultivated mostly in the more southern regions.

2. ***A. glauca*** (Willd.) Grossh. in Tr. po Geob. Obsl. Pastb. Azerb. SSR, Ser. A, 7 (1931) 105; Agadj. in Fl. Azerb. VIII, 431.—*A. moschata* (L.) DC. Prodr. VI (1837) 560, quoad, pl.; Ldb. Fl. Ross. II 2, 683; p. p.; Boiss. Fl. or. III, 605 p. p.—*A. glauca* ssp. *biennis* Iljin in Izv. Bot. Sada Akad. Nauk SSSR, XXX, 1–2 (1932) 113.—*A. biennis* (Iljin) Grossh. Fl. Kavk. IV (1934) 196 and Opred. Rast. Kavk. 489; Iljin, loc. cit. pro. syn.; Ter-Khachaturova in Fl. Gruzii, VIII, 529.—*Centaurea glauca* Willd. Sp. pl. III, 3 (1803) 2278.—*C. moschata* β. *glauca* (Willd.) MB.—Fl. taur.-cauc. II (1808) 342.—*C. moschata* auct. non L.: Schmalh. Fl. II (1897) 120.—*Chryseis glauca* (Willd.) Cass. in Dict. Sc. nat. XLIV (1826) 39.

Biennial. Plants 20–70 cm high. Stem erect, simple or more or less branched, more or less covered with short crisped hairs. Leaves more or less covered with short crisped hairs, often subglabrous; basal leaves very long-petiolate, undivided and more or less toothed, or pinnately lobed; middle and upper ones usually sessile, more or less toothed, pinnately lobed or divided. Capitula solitary at tips of stem and its lateral branches, on long, leafless peduncles. Involucre broadly ovate, with florets 10–18 mm in dia and 13–18 mm long, more or less very finely arachnoid-tomentose; innermost involucral bracts with quite large, rounded or ovate appendages. Florets pink; peripheral ones relatively small, only very slightly longer than central florets, corolla glabrous, 10–20 lobed, Achenes 3–4 mm long, almost as long as pappus, occasionally pappus entirely lacking. Flowering May to July. (Plate XVIII, Fig. 1).

Dry clayey and stony slopes, screes, sometimes along roads and on gravel beds; in foothills and lower montane zone.—*Caucasus*: 327 Dagestan, Eastern Transcaucasia, Southern Transcaucasia (eastern part).

Endemic. Described from Georgia. Type in Berlin; isotype (?) in Leningrad.

Note. The name "*Amberboa glauca*" was assigned by M.M. Iljin and, following him, by the authors of Caucasus floras, to the preceding species, although *Centaurea glauca* Willd. was described from the collections of A.A. Mussin-Puschkin from Georgia, most probably from the vicinity of Tbilisi, where the preceding species is not found at all. In the Herbarium of the Botanical Institute of the Academy of Sciences of the USSR, there is one specimen from Ledebour's herbarium with the label "*Centaurea glauca* Mussin-Puschkin," apparently an isotype of this species. Another specimen with the label "*Centaurea glauca* mihi. Habitat ad Tiflis et in Kasach" belongs either to Adams or also to Mussin-Puschkin. Both specimens belong not to the typical form of "*A. glauca*," as understood by M.M. Iljin (op. cit.), but to its subspecies "*A. glauca* ssp. *biennis*," for which I retain the name *Amberboa glauca* as the priority name. In Dagestan, and, apparently also in Transcaucasia, along roads and near settlements, one comes across plants of *A. glauca* with somewhat larger peripheral florets, approaching the preceding species but rather well differentiated from it. Apparently, they belong to a separate, large-flowered form of *A. glauca* introduced into cultivation but escaped. Among such plants, we occasionally come across specimens with achenes lacking a pappus.

3. **A. sosnovskyi** Iljin in *Izv. Bot. Sada, Akad. Nauk SSSR*, XXX, 1–2 (1932) 113; *Grossh. Fl. Kavk.* IV, 195 and *Opred. Rast. Kavk.* 489; *Agadzh. in Fl. Azerb.* VIII, 433.—*Centaurea sosnovskyi* Iljin, loc. cit. pro syn.

Annual or biennial. Plants 10–50 cm high. Stem erect, simple or more or less branched, glabrous or subglabrous. Leaves more or less covered with scattered crisped hairs, sometimes entirely glabrous; basal leaves very long-petiolate, undivided, more or less toothed, or pinnately lobed; middle and upper cauline leaves sessile or subsessile, undivided, pinnately lobed or parted. Capitula solitary at tips of stem and its lateral branches, on long leafless peduncles. Involucre ovate, with florets 5–11 mm in dia and 9–15 mm long, entirely glabrous; innermost involucre bracts with very small lanceolate appendages. Florets pink, peripheral florets much larger, usually 3–7 mm longer than central florets, glabrous or very weakly hairy in middle; corolla 8–16-lobed. Achenes 3.5–4.5 mm long; pappus usually slightly shorter than achenes. Flowering May to June.

Dry clayey and stony slopes of foothills, usually with distinctly saline soils.—*Caucasus*: Southern Transcaucasia (Nakhichevan ASSR and bordering regions of Armenia), Eastern Transcaucasia (reported

from the Mugan Steppe.) *General distribution*: probably found in regions of Iran bordering Nakhichevan ASSR. Described from vicinity of Nakhichevan. Type in Leningrad.

328 *Series 2. Nanae* Tzvel.—Small ephemeral, annual plants, often almost stemless or with 1 or several capitula on very short peduncles at very base of plants. Involucres with florets 5–12 mm in dia; appendages of inner involucral bracts very small, lanceolate, withering early; florets light pink, light yellow or yellowish-white; corolla of peripheral florets 5–10 lobed.

4. *A. nana* (Boiss.) Iljin in *Izv. Bot. Sada Akad. Nauk SSSR*, XXX, 1–2 (1932) 113; *Grossh. Fl. Kavk.* IV, 195 and *Opred. Rast. Kavk.* 489; Iljin in *Fl. Turkm.* VII, 255; *Agadzh. in Fl. Azerb.* VIII, 432.—? *A. moschata* β . *nana* Boiss. *Fl. or.* III (1875) 606.—*A. iljiniana* *Grossh. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XIII (1950) 29 and *Opred. Rast. Kavk.* (1949) 489.—*Centaurea caspica* Iljin loc. cit. (1932) pro syn.

Annual. Plants 2–35 cm high. Stem erect or ascending, near base, often strongly shortened, simple or more or less branched, scatteredly hairy with short crisped hairs. Leaves more or less covered with short crisped hairs and thin arachnoid tomentum, often subglabrous; basal leaves petiolate, usually undivided, more or less toothed, less often pinnately lobed, middle and upper ones usually pinnately lobed or parted, sessile or subsessile. Capitula solitary at tips of stem and lateral branches, often also on strongly shortened peduncles near plant base, sometimes almost in center of rosette of basal leaves. Involucres oblong-ovate or ovate with florets 5–12 mm in dia and 10–16 mm long, more or less covered with thin arachnoid tomentum to subglabrous; innermost involucral bracts with very small, lanceolate, early-withering appendages. Florets light pink or (?) light yellow with pinkish tinge; peripheral ones smaller, scarcely surpassing central florets; corolla 5–10-lobed, more or less hairy in middle. Achenes 3.5–5.0 mm long; pappus usually slightly shorter than achenes. Flowering May to June.

Dry clayey and stony foothill slopes, sometimes on gravel beds.—*Caucasus*: Eastern Transcaucasia, Southern Transcaucasia (eastern part); *Soviet Central Asia*: Aralo-Caspian Region (Ustyurt Plateau). *General distribution*: Armenia and Kurdistan (eastern part), Iran (western part). Described from Iran (vicinity of Shakhrud). Type in Geneva.

Note. According to the nomenclatural rules, the type of this species is not the specimen from the Bozdag Mountain in Azerbaidzhan, designated by M.M. Iljin (op. cit.) as the type of *A. nana* (Boiss.) Iljin,

but one of the two specimens cited in the description of the variety *A. moschata* β . *nana* Boiss. Both of the latter specimens (from the vicinity of Shakhrud in northern Iran and from the area between Baku and Shemakha) apparently are missing in the Herbarium of the Botanical Institute of the Academy of Sciences of the USSR, but it is entirely possible that the florets in both of these specimens are yellow without any pinkish tinge. In such a case, *A. nana* (Boiss.) Iljin should be considered a synonym of the next species, and the Caucasian-Iranian pink-flowered race should be called *A. iljiniana* Grossh. (described from Bozdag Mountain in Azerbaidzhan). *A. nana* and *A. turanica* are, in general, very close ecogeographical races, differing from each other only by the color of the florets. Because of the poor preservation of the herbarium material of both species (many specimens have no florets at all, or their color cannot be precisely established), the boundary between their ranges is not well delimited even to this day and needs to be refined. In the Nakhichevan ASSR, only the race with light pink florets is found, while in Eastern Transcaucasia we begin to find the yellow-flowered race. In Soviet Central Asia, the yellow-flowered race of *A. turanica* is widespread, while specimens with somewhat pinkish florets are known from Mangyshalk and Ustyurt. In Iran, too, both races are found, although, apparently, the yellow-flowered race is predominant. Following S.D. Agadjanov (op. cit.), I combine under one species the almost stemless plants (*A. nana* proper) and the ones with a well-developed stem (*A. iljiniana*). Although the stemless plants, as a rule, become common in the more southern part of the range of this species, they are connected by numerous intermediates to the long-stemmed specimens, and the stemless habit, in this case, evidently is only an acquired adaptation to more arid habitats.

5. *A. turanica* Iljin in Izv. Bot. Sada Akad. Nauk SSSR, XXX, 1-2 (1932) 110; Kryl. Fl. Zap. Sib. XI, 2947; Iljin in Fl. Turkm. VII, 256.—*A. odorata* var. *flava* Trautv. in Tr. Peterb. Bot. Sada, I, 2 (1872) 275.—*A. moschata* var. *Suaveolens* auct.: Trautv. ibid., V, 2 (1878) 445.—*Centaurea turanica* Iljin, loc. cit. (1932) pro syn.

Annuals. Plants 2-50 cm high. Stem erect or ascending near base, usually strongly reduced, simple or more or less branched, more or less pubescent with short crisped hairs. Leaves as in preceding species. Capitula solitary at tips of stem and lateral branches, often also on strongly shortened peduncles near plant base, sometimes almost in center of rosettes of basal leaves. Involucres oblong-ovate or ovate, with florets 5-12 mm in dia and 10-16 mm long, more or less covered with thin arachnoid tomentum to subglabrous; innermost involucre bracts with very small, lanceolate, early-withering appendages. Florets light



yellow or yellowish-white, peripheral ones smaller (scarcely surpassing central florets), often relatively few; corolla 5–10-lobes, more or less hairy in middle. Achenes 4.5–5.0 mm long; pappus slightly shorter than achenes. Flowering May to June.

Clayey and stony slopes, gravels, sands, alkali soils.—*European Part*: Lower Volga; *Caucasus*: Eastern Transcaucasia; *Western Siberia*: 331 Upper Tobol (southern part), Irtysh (southern part), Altai (southern and southwestern foothills); *Soviet Central Asia*: All regions, but in mountains only in lower montane zone. *General distribution*: Iran-Afghanistan, Dzhungaria-Kashgaria. Described from western Kazakhstan (between Emba River and Ustyurt). Type in Leningrad.

Note. As in the previous species, plants with a well-developed, erect stem (to which belongs the type of the species) predominate in the more northern parts of the range of *A. turanica*, while plants with the capitulum close to the base on a greatly reduced peduncle, as if lateral in relation to the other branches of the stem, predominate in the more southern and more eastern parts.

Series 3. Flaviflorae Tzvel.—Relatively large biennial or annual plants. Involucres 9–24 mm in dia; appendages of inner involucre bracts relatively large, ovate or ovate-lanceolate. Florets yellow, corolla of peripheral florets 8–20-lobed.

6. **A. amberboi** (L.) Tzvel. comb. nova.—*A. odorata* (Cass.) DC. *α. ambracea* (Schkuhr) DC. Prodr. VI (1837) 560.—*A. odorata α. floribus flavis* Ldb. Fl. Ross. II, 2 (1845) 682.—*A. moschata* auct. non DC.: Boiss. Fl. or. III (1875) 605 p. p.—*A. suaveolens* (Willd.) Iljin in Izv. Bot. Sada Akad. Nauk SSSR, XXX, 1–2 (1932) 107; Grossh. Fl. Kavk. IV, 195 and Opred. Rast. Kavk. 489; Iljin in Fl. Turkm. VII, 255.—*Centaurea moschata β. amberboi* L. Sp. pl. (1753) 909.—*C. amberboi* (L.) Lam. Encycl. meth. I (1783) 664.—*C. suaveolens* Willd. Sp. pl. III, 3 (1803) 2279.—*C. ambracea* Schkuhr, Bot. Handb. III (1803) 157.—*Chryseis odorata* Cass. in Dict. Sc. nat. IX (1817) 154.—**lc.**: Schukur, loc. cit. tab. CLXI.—**Exs.**: Sintenis, It. transcasp.-pers. 1900–1901, No. 1616 (sub *A. moschata*).

Annual or biennials. Plants 20–60 cm high. Stem erect, simple or more or less branched, more or less covered with short crisped hairs. Leaves more or less crisped-hairy to subglabrous; basal leaves quite long-petiolate, usually undivided but more or less toothed; middle and upper ones usually sessile or subsessile, more or less pinnately lobed or divided. Capitula solitary at tips of stem and lateral branches, on long leafless peduncles. Involucres broadly ovate, with florets 9–17 mm in dia and 12–17 mm long, covered with very thin arachnoid

tomentum; innermost involucre bracts with quite large, ovate or broadly lanceolate appendages. Florets yellow, peripheral much larger, usually 4–10 mm longer than central florets; corolla 8–20-lobed, more or less hairy in middle. Achenes 3.5–4.5 mm long; pappus usually slightly longer than achenes. Flowering May to July.

Clayey and stony slopes of foothills and lower mountain zone, especially on gypsiferous rocks, sometimes also as introduced or escaped plant, along roads and close to settlements.—*Caucasus*: Eastern and Southern Transcaucasia (very rarely and only as an introduced or escaped plant near large towns); *Soviet Central Asia*: mountainous Turkmenia. *General distribution*: Iran. Described from cultivated specimens originating, apparently, from Iran. Type in London.

Note. I am restoring the prior epithet—*amberboi*—of this species, which does not exactly match with the generic name “*Amberboa*” and thus is entirely valid.

Economic Importance. Like *A. moschata*, this species has long been cultivated as an ornamental plant, but mostly in the countries of the Orient.

7. *A. bucharica* Iljin in *Izv. Bot. Sada Akad. Nauk SSSR*, XXX, 1–2 (1932) 108 and in *Fl. Turkm.* VII (1960) 255.—*A. odorata* var. *bucharica* Winkl. ex O. and B. Fedtsch. *Perech. Rast. Turk.* IV (1911) 267, nom nudum.—*Centaurea bucharica* Iljin, loc. cit. (1932) pro syn.

Annuals or biennials. Plants 15–60 cm high. Stem erect, simple or more or less branched, more or less covered with short crisped hairs. Leaves more or less covered with short crisped hairs (sometimes also with very thin arachnoid-tomentum); basal and lower cauline leaves very long-petiolate, usually undivided, but more or less toothed; middle cauline leaves usually also petiolate, undivided, more or less toothed or shallowly-pinnately lobed; upper cauline leaves sessile or short-petiolate, toothed or pinnately lobed. Capitula solitary at tips of stem and lateral branches, on long leafless peduncles. Involucres broadly ovate, 16–24 mm in dia, 16–24 mm long, usually with very copious (but on fruiting more or less disappearing) arachnoid tomentum; innermost involucre bracts with quite large, ovate-lanceolate or oblong, almost coriaceous appendages. Florets yellow, peripheral florets relatively small, only scarcely surpassing central florets; corolla 8–20 lobed, glabrous or weakly hairy in middle. Achenes 4–6 mm long; pappus slightly longer than achenes. Flowering May to July. (Plate XVIII, Fig. 2; Plate XX, Fig. 3).

Stony and clayey slopes of foothills and lower montane zone (usually to 1,500 m), especially on outcrops of gypsiferous rocks.—

Soviet Central Asia: Tien Shan (southwestern part), Syr-Darya, Amu-Darya, Pamiro-Alai Region (western part), mountainous Turkmenia (eastern part). *General distribution*: probably Iran. Described from Syr-Darya River valley. Type in Leningrad.

Economic Importance. Perhaps used as an ornamental plant.

GENUS 1613. **Grossheimia** Sosn. and Takht.^{1, 2}

Sosn. and Takht. in Dokl. Acad. Nauk Arm. SSR, II, 1 (1945) 22.
—*Centaurea* sect. *Jacea**** *Macrocephalae* Boiss. Fl. or. III (1875) 616.

333 Capitula heterogamous, large, with many florets. Involucre ovate-cylindrical or globose-cuboid, 20–50 mm in dia, glabrous or arachnoid-hairy; involucre bracts many-rowed, densely imbricate, coriaceous, smooth, greenish (yellowish when dry), from ovate outer ones to oblong and oblong-lanceolate inner ones, with large, membranous, light reddish-brown or blackish, irregularly fimbriate, deeply palmately- or pinnately parted, stiff, bristly appendage, not decurrent on bracts. Receptacle flat, densely setose. All florets tubular, yellow, surpassing involucre, heterogenous; corolla glabrous; central florets (disk florets) bisexual, in several rows; peripheral florets (ray florets) sterile, with 4–5-parted corolla, 1-rowed, not broadened. Anthers with short basal appendages, apical appendages acute; stamen filaments flattened, covered with papillae. Style unbranched almost to tip, very short-woolly, with collar of hairs at base, entirely exerted from anther tube. All achenes alike, oblong, strongly compressed, 6–8 mm long, truncate above, with small-toothed or obtuse crown, smooth, lustrous, initially scatteredly fine-hairy, mature achenes subglabrous, hilum lateral; pappus as long as or slightly longer than achenes, ochraceous, persistent, double, outer one many-rowed, of serrate bristles, gradually longer from short outer to inner, not connate into ring at base, inner pappus 1-rowed, of short, serrate, acute scales. Perennial herbs with simple stems, more or less strongly bulged below capitulum.

Type of genus: *G. macrocephala* (Muss.-Puschk.) Sosn. and Takht.

Besides the two species growing in the Caucasus, one more—*C. helenoides* (Boiss. and Hausskn.) Sosn. and Takht.—is found in Asia Minor (Turkish Lazistan).

¹Treatment by D.I. Sosnowsky.

²Named in honor of the eminent Soviet botanist, Academician A.A. Grossheim.

[***—Not explained in the text—General Editor].

1. Involucre glabrous; appendages of involucre bracts light reddish-brown, membranous, lustrous, irregularly fimbriate
..... 1. **G. macrocephala** (Muss.-Puschk.) Sosn. and Takht.
- + Involucre arachnoid-hairy; appendages of involucre bracts blackish, palmately or pinnately divided into long stiff bristles almost to base 2. **G. ossica** (C. Koch) Sosn. and Takht.

Series 1. Macrocephalae Sosn. and Takht. in Dokl. Akad. Nauk Arm. SSR, II, 1 (1945) 23.—Appendages of involucre bracts membranous, irregularly fimbriate, occasionally deeply palmately fimbriate.

1. **G. macrocephala** (Muss.-Puschk.) Sosn. and Takht. in Dokl. Akad. Nauk Arm. SSR, II, 1 (1945) 23; Grossh. Opređ. Rast. Kavk. 489.—*G. macrocephala* var. *minor* Sosn. and Takht. op. cit. 24.—*Centaurea macrocephala* Muss.-Puschk. in Willd. Sp. pl. III, 3 (1803) 2298; Adams in Web. Mohr. Beitr. I, 73; MB. Fl. taur.-cauc. II, 351, III, 592; DC. Prodr. VI, 568; Ldb. Fl. Ross. II, 2, 638; Boiss. Fl. or. III, 632; Lipsky, Fl. Kavk. 364; Grossh. Fl. Kavk. IV, 210.—*Phaeopappus macrocephalus* (Muss.-Puschk.) Boiss. Diagn. pl. or. ser. I, 6 (1845) 124; C. Koch. in Linnaea, XXIV, 437.—*Chartolepis macrocephala* (Muss.-Puschk.) Takht. in Ind. Sem. hort. bot. erev. (1940) 8.—**lc.**: Bot. Mag. XXXI (1809) tab. 1248.—**Exs.**: Hayek, Cent. exs. crit. fasc. II, No. 66.

Perennial. Root neck densely covered with dark fibers. Stem to 1 m high, simple, erect, thick, sulcate, more or less densely covered with crisped hairs, densely leafy. Lower leaves oblong, narrowed into short petiole; cauline leaves gradually reduced, sessile, decurrent, uppermost linear; all leaves remotely small-toothed, sometimes almost entire, scatteredly pubescent on both sides and densely glandular with small sessile glands. Capitula large. Involucre ovate-globose, 30–50 mm in dia; appendages of involucre bracts membranous, almost rounded irregularly and usually shallowly fimbriate, occasionally deeply palmately fimbriate (var. *minor* Sosn. and Takht.), imbricate and entirely covering coriaceous part of bracts. Florets bright yellow. Flowering July to September.

Glades in forests of upper montane zone and in tall-herb vegetation.—*Caucasus*: Eastern and Southern Transcaucasia. *General distribution*: Asia Minor (Turkish Lazistan), Armenia and Kurdistan. Described from Georgia. Type in Leningrad.

Series 2. Helenioides Sosn. and Takht. in Dokl. Akad. Nauk Arm. SSR, III, 1 (1945) 24.—Appendages of involucre bracts deeply palmately or pinnately divided into stiff bristles.

2. *G. ossica* (C. Koch) Sosn. and Takht. in Dokl. Akad. Nauk Arm. SSR, II, 1 (1945) 24; Kolak. Fl. Abkhazii, IV, 284; Grossh. Oprod. Rast. Kavk. 490.—*G. ossica* var. *tuba* (Somm. and Lev.) Sosn. and Takht. loc. cit.—*Phaeo-pappus ossicus* C. Koch. in Linnaea, XVII (1843) 40; XXIV (1851) 436.—*Centaurea polyphylla* Ldb. ex Nordm. in Bull. Acad. Sc. Pétersb. II (1837) 311; Ldb. Fl. Ross. II, 2, 712.—*C. ossica* (C. Koch.) Boiss. Fl. or. III (1875) 632; Alb. Prodr. Fl. Colch. 148; Lipsky Fl. Kavk. 148; Grossh. Fl. Kavk. IV, 211.—*C. tuba* Somm. and Lev. in Tr. Peterb. Bot. Sada, XII, 1 (1892) 156, XVI (1900) 282; Lipsky, op. cit. 365; Grossh. Fl. Kavk. IV, 211.—**lc.**: Somm. and Lev. loc. cit. XVI (1900) tab. XXIV.

Perennial. Stem to 1.5 m high, simple or weakly branched, erect, thick, sulcate, usually sparsely covered with crisped hairs, densely leafy. Leaves oblong-lanceolate, lower ones narrowed into petiole, others sessile, sometimes auriculate at base, not decurrent; all leaves remotely small-toothed or almost entire, sparsely short-pubescent on both sides, with very tiny sessile glands above. Capitula large. Involucre subglobose, 20–30 mm in dia, more or less densely arachnoid-hairy; appendages of involucre bracts imbricate, almost to base palmately divided into stiff usually recurved bristle, sometimes appendages pinnately incised; middle cilia much longer than lateral (var. *tuba* (Somm. and Takht.) Sosn. and Takht.). Florets bright yellow. Flowering July to September.

Glades in forests of upper mountain zone.—*Caucasus*: Eastern, Western, and Southern Transcaucasia (western part). Endemic. Described from Ossetia. Type in Berlin.

GENUS 1614. *Chartolepis* Cass.^{1, 2}

Cass. in Dict. Sc. nat. XLIV (1826) 36, L (1827) 247, LIV (1829) 492; Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 460.—*Centaurea* sect. *Chartolepis* (Cass.) DC. Prodr. VI (1837) 568 p. p. excl. *Centaurea macrocephala* Muss.-Puschk.; Benth. in Benth. and Hook. f. Gen. pl. II (1873) 479; O. Hoffm. in Pflanzenfam. IV, 5 (1893) 329.—*Centaurea* subgen. *Chartolepis* (Cass.) Schmalh. Fl. Yugo-Zap. Ross. (1886) 328; Fl. II (1897) 120.—*Chartolepis* subgen. *Euchartolepis* Jaub. and Spach. Ill. pl. or. III (1847–1850) 136.

Capitula heterogamous, medium-sized or somewhat large, with many florets, solitary at tips of stem and lateral branches or in race-

¹Treatment by S.K. Czerepanov.

²From the Greek words *chartes*—sheet, paper, and *lepis*—scale; probably named for the membranous appendages of the involucre bracts.

mose, racemose-corymbose or corymbose inflorescence, less often single on plant. Involucres oblong-ovate, ovate to subglobose (8)10–30 mm in dia, glabrous; involucre bracts many-rowed, densely imbricate, coriaceous, smooth, greenish (yellowing when dry), from broadly elliptical and elliptical-ovate outer ones to oblong-linear and almost linear innermost; appendages of involucre bracts more or less large, slightly decurrent on bract, thinly-membranous, semitransparent, with dark reddish-brown, brown, or slightly brownish spot at base, almost rounded to ovate (in innermost bracts), erose-toothed, mostly lacerate. Receptacle bristly. All florets tubular, yellow, far surpassing involucre, heterogeneous, corolla glabrous; central florets (disk florets) bisexual, in many rows; peripheral florets (ray florets) sterile, lacking staminodes and rudiment of style, with 4–5-parted corolla, 1-rowed, not large. Anthers with very small basal appendages, apical appendages acute; stamen filaments flattened, covered with papillae. Stigma very short-plumose, with collar of hairs connate at base (its branches connate to tip) or slightly bilobate, entirely exerted from anther tube.

- 336 All achenes alike, oblong-elliptical or oblong, 5–6 mm long, truncate above, with small-toothed crown at apex, compressed, smooth, scatteredly hairy; hilum lateral; pappus longer than achenes, weakly ochraceous, persistent, double (simple in *C. saligna* C. Koch), outer one of few irregular rows of flat, plumose, filiform bristles, gradually longer from outer to inner ones and connate into ring at base; inner one much shorter than outer, 1-rowed, usually broader, in upper part irregularly ciliate, on outside brown, almost scarious bristles. Perennial herbs with erect, branched, winged stems, leafy throughout, covered with arachnoid, occasionally woolley hairs; basal and lower cauline leaves petiolate, sometimes toothed or lyrate divided, others sessile, long-decurrent on stem, entire, all scabrous from short spiny hairs.

Type of genus: *C. glastifolia* (L.) Cass.

The genus comprises seven species distributed in the southern European part of the USSR, Transcaucasia, Kazakhstan, Kirghizia, the eastern part of Asia Minor, and Iran. *C. lyrata* Boiss. (Iran and the Herat Province of Afghanistan), *C. umesaoi* Kitamura (Afghanistan), and *C. saligna* C. Koch (eastern part of Turkey) are not found in the USSR.

1. Involucre globose-ovate or subglobose, 20–30 mm in dia, appendages of involucre bracts completely overlapping coriaceous part of bracts, with dark reddish-brown basal spot 1. ***C. glastifolia*** (L.) Cass.
- + Involucre ovoid or oblong-ovate, (8)10–15 mm in dia; appendages of involucre bracts partially overlapping coriaceous part of bracts.....

- 2.
2. Capitula in rather compact corymbose inflorescence; appendages of involucre bracts with dark reddish-brown spot at base. Stem more or less scabrous, broadly winged 3. **C. pterocaula** (Trautv.) Czer.
- + Capitula in lax racemose or racemose-corymbose inflorescence; appendages of involucre bracts with pale brownish spot at base or almost entirely semitransparent 3.
3. Stem more or less well proportioned, narrowly-winged; cauline leaves narrow, usually oblong-linear to narrowly linear (Transcaucasia) 4. **C. biebersteinii** Jaub. and Spach.
- + Stem rather scabrous, broadly-winged; cauline leaves broader (southern European part of USSR, Kazakhstan and Kirghizia) 2. **C. intermedia** Boiss.

1. **C. glastifolia** (L.) Cass. in Dict. Sc. nat. LIV (1829) 492 p. p. quoad nom.; Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 461; Karjagin in Fl. Azerb VIII, 435.—*Centaurea glastifolia* L. Sp. pl. (1753) 915 p. p. quoad pl. ex. "Oriente," ed. 2 (1763) 1294 p. p.; DC. Prodr. VI, 568 p. p.; Ldb. Fl. Ross. II, 2, 687 p. p. quoad pl. e Caucaso.—*C. tournefortii* (Jaub. and Spach) Walp. Ann. Bot. I (1848–1849) 448.—*C. glastifolia* var. *tournefortii* (Jaub. and Spach) Gugler in Ann. hist.-nat. Mus. Nat. Hung. VI (1908) 239.—*Chartolepis tournefortii* Jaub. and Spach, III, pl. or. III (1847–1850) 9; Boiss. Fl. or. III, 696; Iljin in Izv. Bot. Sada Akad. Nauk SSSR, XXX, 3–4, 353; Grossh. Fl. Kavk. IV, 196.—**lc.**: Jaub. and Spach, op. cit. tab. 207.

Perennial. Root woody, oblique. Stem 40–80 cm high, erect, quite scabrous, finely ribbed, broadly winged, branched from middle or slightly above, weakly arachnoid-hairy or woolly, occasionally subglabrous, lateral branches upward spreading, more or less long. Leaves subacute, to short-acuminate, entire, scabrous from numerous pointed spinous hairs, often mixed with occasional arachnoid hairs and sessile, golden, punctate glands. Basal and lower cauline leaves oblong-ob lanceolate, elliptical-lanceolate, or almost lanceolate, sometimes weakly toothed, relatively short, to 5 mm wide, long-petiolate, others oblong-lanceolate to linear, sessile, long-decurrent on stem forming broad wings 2–7 mm wide. Capitula solitary at tips of stem and lateral branches, in racemose-corymbose or corymbose inflorescence. Involucre globose-ovate or subglobose, 23–30 mm long and 20–30 mm in dia; appendages of involucre bracts thinly membranous, completely overlapping coriaceous part of bracts and much longer than them. Achenes reddish-brown, 5.5–6.0 mm long and 2.0–2.3 mm wide; pappus 11–12 mm long. Flowering July to August. (Plate XIX, Fig. 2).

Meadow slopes, forest edges and glades; in mid- and upper-montane zones, at 1,700–2,200 m.—*Caucasus*: Eastern Transcaucasia (Lesser Caucasus), Southern Caucasia. *General distribution*: Armenia and Kurdistan, Asia Minor (eastern part). Described from Turkish Armenia from collections of Tournefort. Type in Paris.

Note. Arguments in favor of using the name *C. glastifolia* (L.) Cass. for this species have been presented by us in an earlier published paper (Czerepanov, op. cit.).

2. *C. intermedia* Boiss. Diagn. pl. or. ser. II, 3 (1856) 64; Fl. or. III, 696, in adnot.; Iljin in Izv. Bot. Sada, Akad. Nauk SSSR, XXX, 3–4 (1932) 352, 353; in Fl. Yugo-Vost. VI, 420; Kryl. Fl. Zap. Sib. XI, 2947; Grossh. Opred. Rast. Kavk. 490; Dobroc. in Visn. Rosl. URSS, 571; Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX, 463.—*C. biebersteinii* Jaub. and Spach, Ill. pl. or. III (1847–1850) 11 p. p.—*Centaurea glastifolia* L. Sp. pl. (1753) 915 p. p., ed. 2 (1763) 1294 p. p. quoad pl. sibir.; DC. Prodr. VI, 568 p. p.; Ldb. Fl. Ross. II, 2, 687 p. p.; Schmalh. Fl. II, 120 and auct. al. fl. Ross. (excl. pl. transcauc.).—*C. glastifolia* var. *intermedia* (Boiss.) Gugler in Ann. hist.-nat. Mus. Nat. Hung. VI (1908) 239.—Ic.: Iljin in Fl. Yugo-Vost. VI (1936) Fig. 708; Dobroz. op. cit. Fig. 300; Stank. and Tal. Opred. Vyssh. Rast. ed. 2, Fig. 395.

Perennial. Root woody, branched, thickened at root collar. Stem 50–100(150) cm high, erect, very scabrous, thinly ribbed, broadly winged, branched from middle or slightly above, weakly arachnoid-hairy, occasionally subglabrous, moderately covered with sessile, golden glands, lateral branches upward spreading, more or less long. Leaves subacte to short-acuminate, entire, scabrous from numerous, pointed, spiny hairs, usually with few arachnoid hairs, with sessile, golden, punctate glands. Basal and lower cauline leaves oblong- or elliptical-oblong to almost lanceolate, sometimes weakly toothed, 2–6 cm wide, petiolate, petioles 4–20(25) cm long, others oblong-lanceolate, oblong, or oblong-linear, sessile, long-decurrent on stem forming broad, 2–10 mm wide wings. Capitula solitary at tips of stem and lateral branches, in relatively lax racemose or racemose-corymbose inflorescence. Involucre oblong-ovate, 22–25 mm long and 10–15 mm in dia; appendages of involucre bracts thinly membranous, partially overlapping coriaceous part of bracts, with pale brownish spot at base or almost completely semitransparent. Florets yellow. Achenes brownish-creamish, 5.5–6.0 mm long, about 2.3 mm wide; pappus 8–10 mm long. Flowering July to August.

Alkaline wet meadows and salt-marsh meadows, in cheegrass thickets, river valleys, and on lake shores.—*European Part*: Bessarabia

(extreme south), Black Sea Region, Middle Dnieper (southeastern part), Volga-Don (south), Lower Don, Lower Volga, Trans-Volga, Volga-Kama (southeastern part); *Western Siberia*: Upper Tobol (southern part), Irtysh (southern part), Altai (extreme southwest); *Soviet Central Asia*: Aralo-Caspian Region, Lake Balkhash Region, Dzhungaria-Tarbagatai, Tien Shan. *General distribution*: Dzhungaria-Kashgaria (Kuldzha, Kemerchik River in Mogolian Altai). Described from Central Russia, Siberia and Dzhungaria. Type in Geneva.

3. **C. pterocaula** (Trautv.) Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 463; Karjagin in Fl. Azerb. VIII, 435.—*C. biebersteinii* auct. p. p. non Jaub. and Spach; Boiss. Fl. or. III (1875) 696; Grossh. Fl. Kavk. IV, 196; Opred. Rast. Kavk. 490.—*C. finitima* (Bordz.) Iljin in Izv. Bot. Sada Akad. Nauk SSSR, XXX, 3–4 (1932) 353.—*Centaurea pterocaula* Trautv. in Tr. Peterb. Bot. Sada II (1873) 552, excl. syn. non Romel (1874).—*C. finitima* Bordz. in Tr. Bot. Sada Yurevsk. Univ. XIII (1912) 24.

339 Perennial. Root woody, branched. Stem to 100 cm high, erect, scabrous, finely ribbed, broadly winged, branched above, weakly arachnoid-hairy, covered with scattered, sessile, golden glands, lateral branches upward-spreading, short. Leaves acute to short-acuminate, entire, scabrous from numerous, acute, spinous hairs, with few thin arachnoid hairs, and sessile, golden, punctate glands; basal and lower cauline leaves oblong-ob lanceolate or lanceolate, sometimes weakly toothed, 2–3 cm wide, petioles, to 12 cm long, others oblong-lanceolate, lanceolate-linear, less often almost linear, sessile, long-decurrent on stem forming wings 2–6(8) mm wide. Capitula solitary at tips of stem and short lateral branches, in compact corymbose inflorescence. Involucre ovate, rarely oblong-ovate, 20 cm long and 10–13 mm in dia; appendages of involucre bracts thinly membranous, partially overlapping coriaceous part of bracts, with dark reddish-brown spot at base. Florets yellow. Achenes 5 mm long about 2 mm wide; pappus 8–10 mm long. Flowering July to August.

Meadow slopes, forest edges and glades, in mid- and upper-montane zones, to 2,500 m.—*Caucasus*: Southern Transcaucasia. *General distribution*: Armenia and Kurdistan, ? Iran (Khvoy District). Described from Turkish Armenia (Kazikibaran). Type in Leningrad.

4. **C. biebersteinii** Jaub. and Spach, Ill. pl. or. III (1847–1850) 11 p. p.; Boiss. Fl. or. III, 696 p. p. max.; Iljin in Izv. Bot. Sada, Akad. Nauk SSSR, XXX, 3–4, 353 p. p. excl. specim. nonnull.; Grossh. Fl. Kavk. IV, 196 p. p. and Opred. Rast. Kavk. 490 p. p.; Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX, 464; Karjagin in Fl.

Åzerb. VIII, 435.—*C. glastifolia* auct. non Cass.; C.A.M. Verzeichn. (1831) 231, excl. syn.—*Centaurea glastifolia* auct. non. L.: MB. Fl. taur.-cauc. II (1808) 355, excl. syn. Tourn.; Ldb. Fl. Ross. II, 2, 687 p. p.—*C. biebersteinii* (Jaub. and Spach) Walp. Ann. Bot. I (1848–1849) 448.—*C. glastifolia* var. *biebersteinii* (Jaub. and Spach) Gugler in Ann. hist.-nat. Mus. Nat. Hung. VI (1908) 239.—**lc.**: Jaub. and Spach, op. cit. tab. 208.

Perennial. Root woody, branched. Stem 60–100(120) cm high, erect, very well proportioned, thinly ribbed, narrowly winged, branched from slightly above middle, weakly arachnoid hairy or subglabrous, sparsely glandular with sessile, golden glands, lateral branches upward spreading, quite long. Leaves acute to short-acuminate, entire, scabrous from short spines or spiny hairs, fewer toward midrib, with occasional arachnoid hairs covered with sessile, golden, punctate glands; basal and lower cauline leaves almost oblong or lanceolate, to 2 cm wide, long-petiolate, others oblong- or lanceolately linear to narrowly
340 linear, sessile, long, sometimes short, decurrent on stem forming narrow wings 1–3 mm wide. Capitula solitary at tips of stem and lateral branches; in more or less lax racemose-corymbose inflorescence. Involucre ovate, less often oblong-ovate, about 20 mm long and (8)10–14 mm wide; appendages of involucral bracts thinly membranous, partially overlapping coriaceous part of bracts, with brownish spot at base or almost completely semitransparent. Florets yellow. Achenes 5.0–5.5 mm long and 2.0–2.3 mm wide; pappus 10–11 mm long. Flowering July to August.

Dry slopes; in mid-montane zone.—*Caucasus*: southern Transcaucasia (southern part), Talysh (Zuvant). *General distribution*: Iran-Afghanistan (northwestern part), Armenia and Kurdistan (Sarykamysh). Described from Caucasus. Type in Paris; isotype in Leningrad.

GENUS 1615. **Callicephalus** C.A.M.^{1, 2}

C.A.M. Verzeichn. (1831) 66; Czer. in Fl. Turkm. VII (1960) 262.—*Phalolepis* Cass. in Dict. Sc. nat. L (1827) 248 p. p.—*Centaurea* sect. *Phalolepis* (Cass.) DC. Prodr. VI (1837) 568 p. p.—*Centaurea* sect. *Callicephalus* (C.A.M.) O. Hoffm. in Pflanzenfam. IV, 5 (1893) 327.

¹Treatment by S.K. Czerepanov.

²From the Greek words *kallos*—beautiful, and *kephalon*—head.

Capitula homogamous, medium-sized, many-flowered, solitary at tips of stem and lateral branches, in more or less racemose or corymbose-racemose inflorescence, less often single on plant. Involucres globose-ovate, 15–20 mm in dia, glabrous; involucre bracts many-rowed, imbricate, thinly-coriaceous, with 5–8 distinct, veins, greenish, oblong-elliptical outer ones to linear innermost; appendages of involucre bracts large, not decurrent on bracts, completely overlapping coriaceous part of bracts, finely ciliate, semitransparent (in outer and often middle bracts), slightly brownish to dark lilac-purple (in middle and innermost bracts), lustrous, bulged on outside, roundish and roundish-rhombic to ovate, undivided, usually somewhat lacerate, with small brownish cusp, mostly at base of small apical notch. Receptacle setose. All florets tubular, pale lilac-pink, surpassing involucre, homogeneous, bisexual; corolla glabrous. Anthers with small basal appendages; apical appendages subobtusate; stamen filaments flat, covered with papillae. Stigma short-plumose, with collar of hairs at base, bilobed, included in or exerted from anther tube by its lobes. All achenes similar, 4-angled-cuneate, 4.0–4.5 mm long, truncate above, with scarcely toothed crown at apex, rugose-tuberculate, glabrous, hilum lateral; pappus longer than achene, ochraceous, persistent, simple, of numerous serrate, elastic bristles, longer from outer to inner, connate in ring at base; 4 inner pappus bristles noticeably longer and broader than outer ones. Annual herbs with erect, branched, throughout leafy stem and scabrous, pinnately incised, sessile leaves not decurrent on stem.

A monotypic genus.

1. **C. nitens** (MB.) C.A.M. Verzeichn. (1831) 66; Boiss. Fl. or. III, 703; Grossh. Fl. Kavk. IV, 197; Oprod. Rast. Kavk. 490; Czer. in Fl. Turkm. VII, 262; Agadj. in Fl. Azerb. VIII, 436.—*Centaurea nitens* MB. in Willd. Sp. pl. III, 3 (1803) 2305; MB. Fl. taur.-cauc. II, 354, III, 593; DC. Prodr. VI, 568; Ldb. Fl. Ross. II, 2, 668.—*Serratula nitens* (MB.) Spreng. Syst. veg. 3 (1826) 389.—**lc.**: Jaub. and Spach, Ill. pl. or. III (1847–1850) tab. 219; Czer. in Fl. Turkm. VII (1960) Plate XL.—**Exs.**: Herb. Fl. cauc. No. 147; Fl. cauc. exs. No. 25; Pl. or. exs. No. 124; Ed. Hort. Bot. Petri Magni, No. 100; Aucher-Eloy, Herb. d'Orient. No. 4840; Sintenis, It. transcasp.-pers. 1900–1901, No. 1880.

Annual. Whole plant green, scabrous from pointed, spiny hairs. Stems 20–80 cm high, erect, branched from middle or above, with thin, virgate, upward spreading long branches. Leaves pinnately incised, sessile, not decurrent on stem; leaf segments narrowly linear, terminating into small bristle, entire, convolute. Capitula in more or



less lax racemose or corymbose-racemose inflorescence, occasionally single on plant. Involucre globose-ovate, 15–20 mm long and as much in dia; appendages of outer and middle involucre bracts semitransparent or slightly brownish, roundish, and roundish-rhombic, weakly lacinate, with small notch at tip; appendages of inner involucre bracts brownish to dark lilac-purple, ovate, not lacinate, lacking notch at tip. Florets pale lilac-pink. Achenes 4.0–4.5 mm long and about 1.5 mm wide; pappus 12–15(17) mm long. Flowering June to July. (Plate XXI, Fig. 1).

Dry stony and rubbly slopes, on screes and rocks; in lower and mid-montane zones.—*Caucasus*: Dagestan (south), Eastern and Southern Transcaucasia; *Soviet Central Asia*: mountainous Turkmenia (Kopetdag Range). *General distribution*: Armenia and Kurdistan (former Artvin District), Iran-Afghanistan (northwestern part). Described from Caucasus. Type in Leningrad.

343 **Note.** In *Flora Turkmenia* (Vol. VII, Plate XL) there is an error in the illustration of the pappus of the achenes. It is that, in reality, the four inner pappus bristles are narrower in the upper part, setaceous, and longer than the outer bristles, but not to the extent shown in the plate.

GENUS 1616. *Acroptilon* Cass.^{1,2}

Cass. in Dict. Sc. nat. L (1827) 464; Czer. in Fl. Turkm. VII (1960) 257.—*Centaurea* sect. *Acroptilon* (Cass.) Benth. in Benth. and Hook. f. Gen. pl. II (1873) 478; O. Hoffm. in Pflanzenfam. IV, 5 (1893) 327.—*Centaurea* subgen. *Acroptilon* (Cass.) Schmalh. Fl. Yugo-Zap. Ross. (1886) 328; Fl. II (1897) 118.

Capitula homogamous, very small or medium-sized, with many florets, solitary at tips of stem and lateral branches, in racemose-corymbose or paniculate inflorescence. Involucres ovate, oblong-ovate or subglobose, 5–13(15) mm in dia; glabrous; involucre bracts many-rowed, imbricate, thinly coriaceous, with inconspicuous veins, greenish (yellowing when dry), from more or less round and semielliptical outer ones to linearly lanceolate innermost; appendages of involucre bracts scarious, in outer and middle bracts as broad, semitransparent, short-hairy border, in innermost bracts very narrow, linearly lanceolate, densely long-pilose. Receptacle bristly. All florets tubular, pink or

¹Treatment by S.K. Czerepanov.

²From the Greek words *acron*—pointed, tip, and *ptilon*—wing; named for the pointed appendages of the involucre bracts.

lilac-pink, 1.5 times as long as involucre, homogeneous, bisexual; corolla glabrous. Anthers with small basal appendages, apical appendages obtuse; stamen filaments glabrous. Stigma very short-woolly, with collar of hairs at base, bifid almost to middle, entirely or only their branches exerted from anther tube. All achenes similar, ellipsoidal-obovate, 3–4 mm long, sharply rounded above, compressed, with indistinct longitudinal veins, glabrous, hilum slightly oblique; pappus usually 3 times as long as achene, whitish, very readily deciduous, with simple or serrate, flattened bristles, longer from short outer ones to inner, not connate into ring at base; innermost pappus bristles short-hairy above. Perennial herbs with erect, strongly branched stems, densely leafy throughout; leaves arachnoid-hairy, scabrous on margin, sessile, not decurrent on stem, pinnately divided or with remote teeth.

Type of genus: *A. repens* (L.) DC.

The two species of this genus are distributed in the southeastern European part of the USSR, extreme south of Western Siberia, throughout Soviet Central Asia, West Asia and farther in the east up to Mongolia inclusively.

- 344 1. Involucres 13–18(23) mm long and 7–13(15) mm in dia; appendages of outer and middle involucral bracts acuminate, completely overlapping and considerably surpassing coriaceous part of bracts.....1. **A. australe** Iljin
 + Involucres 10–13 mm long and 5–7 mm in dia; appendages of outer and middle involucral bracts obtuse to acute, partially overlapping and usually not surpassing coriaceous part of bracts.....2. **A. repens** (L.) DC.

1. **A. australe** Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VII, 3 (1937) 59; Czer. in Fl. Turkm. VII, 258.—**lc.**: Iljin op. cit. Fig. 4.—**Exs.**: Bornm. It. Pers.-turc. 1892–1893, Nos. 4065, 4066, 4067, 4069, 4089; Sintenis, It. transcasp.-pers. 1900–1901, Nos. 359, 359c, 698, 698b.

Perennial. Root string-like, long, with lateral, more or less horizontal or obliquely rising, long suckers. Stem 1 or few (2–3), 30–70 cm high, erect, ribbed, strongly branched almost from base or slightly above, grayish-arachnoid hairy, underground part of stem blackish-brown with blackish or brownish scales. Leaves stiff, oblong to almost linear, usually with small, whitish, cartilaginous cusp, pinnatifid and remotely toothed to entire upper cauline, mostly weakly arachnoid-hairy, scabrous or spinulose along margin, with sessile punctate glands, sessile, not decurrent on stem. Capitula solitary at tips of stem and lateral branches, in lax racemose-corymbose or paniculate inflores-

cence. Involucre oblong-ovate, ovate, or subglobose, 13–18(23) mm long and 7–13(15) mm in dia; appendages of involucre bracts scarious, completely overlapping in outer and middle bracts and much surpassing coriaceous part of bracts, acuminate, entire, pubescent, in innermost bracts very narrow, linear-lanceolate, densely pilose, slightly recurved, 6–12 mm long. Florets lilac-pink. Achenes (3.0)3.5–4.0 mm long and 1.5–2.0 mm wide; pappus 8–12(13) mm long. Flowering May to August.

Clayey, sandy, and stony mountain slopes, up to 2,100 m, along sandy-gravelly banks of rivers and lakes; as weed in crops, in old fields, etc.—*Soviet Central Asia*: mountainous Turkmenia, Kara-Kum (Krasnovodsk), Aralo-Caspian Region (chalky mountains near Ak-Chaimak in Mangyshlak), Pamiro-Alai (Alai Range, vicinity of Gulcha), Tien Shan (Issykkul Depression, Ketmen Range, Trans-Ili Alatau Range; vicinity of Alma-Ata), Lake Balkhash Region (Ili-Borokhudzir crossing), Dzhungaria-Tarbagatai (southwestern part of Dzhungarian Alatau). *General distribution*: Iran, Dzhungaria-Kashgaria (Uchturfan, “Chernyi” [Black] Irtysh River above mouth of Kran River, Tekes River), Mongolia (western part). Described from Kopetdag (Kizil-Imam on Chandar River). Type in Leningrad.

345 **Note.** It is distinguished from *A. repens* (L.) DC. by larger involucre, acuminate appendages of the outer and middle involucre bracts that entirely overlap the bracts and are much longer than the coriaceous part of the inner involucre bracts, and by the longer appendages of the inner involucre bracts.

Forms with intermediate features are commonly found where the ranges of the two species come in contact. The absence of similar intermediate forms in regions where these species do not grow together leads us to assume a hybrid origin.

Economic Importance. A noxious weed of crops.

2. *A. repens* (L.) DC. Prodr. VI (1837) 663; Grossh. Opred. Rast. Kavk. 490; Kryl. Fl. Zap. Sib. XI, 2945; Czer. in Fl. Turkm. VII, 257; Agadzh. in Fl. Azerb. VIII, 437.—*A. obtusifolium*, *subdentatum*, *serratum* and *angustifolium* Cass. in Dict. Sc. nat. L. (1827) 465, 466.—*A. picris* (Pall. ex Willd.) C.A.M. Verzeichn. (1831) 67; DC. op. cit. 662; Ldb. Fl. Ross. II, 2, 750; Boiss. Fl. or. III, 612; O. and B. Fedtsch. Perech. Rast. Turk. IV, 289; Grossh. Fl. Kavk. IV, 197; Dobrocz. in Vizn. Rosl. URSR, 572; Iljin in Fl. Yugo-Vost. VI, 418; Stank. and Tal. Opred. Vyssh. Rast. ed. 2, 412.—*Centaurea repens* L. Sp. pl. ed. 2 (1763) 1293.—*C. picris* Pall. Tabl. phys. et topogr. taur. (1795) 58 and ed. 2 (1796) 141, nomen; Willd. Sp. pl. III, 3, 2302, descr.; MB. Fl. taur.-cauc. II, 352; Schmalh. Fl. II, 118.—*Serratula picris* (Pall. ex

Willd.) MB. Fl. taur.-cauc. III (1819) 546; Ldb. Fl. alt. IV, 41.— *Ic.:* Jaub. and Spach, Ill. pl. or. I (1842–1843) tab. 10, 11; Malkov, Glavn. Sornyaki Turkm. SSR (1936), fig. 7; Iljin in Fl. Yugo-Vost. VI, Fig. 706; in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VII, 3 (1937) Fig. 4A; Stank. and Tal. loc. cit. Fig. 394.— *Exs.:* GRF Nos. 1881, 1983a, 1983b; Herb. Fl. cauc. No. 148; Dörfler, Herb. norm. No. 4150.

Perennial. Root string-like, very long (to 6 m), with lateral, more or less horizontal or obliquely rising, long (to 1 m and more) suckers. Stem single or few (2–3), 15–60(75) cm high, erect, ribbed, strongly branched almost from base or slightly above, grayish-arachnoid-hairy, occasionally subglabrous; underground part of stem blackish-brown, covered with brown or blackish scales. Leaves stiff, oblong to almost linear, with very small cusp, pinnatifid and with remote teeth to entire upper cauline, grayish arachnoid-hairy, sometimes almost lacking arachnoid pubescence, usually scabrous only along margin from acute, short, spiny hairs or obtuse spines, covered with punctate sessile glands, sessile, not decurrent to stem. Capitula solitary at tips of stem and lateral branches, in lax racemose-corymbose or paniculate inflorescence. Involucre oblong-ovate or ovate, 10–13 mm long and 5–7(8) mm in dia; appendages of involucre bracts scarious in outer and middle bracts, partially overlapping and not surpassing coriaceous part of inner bract, obtuse to acute, often weakly lacerate, short-hairy, narrow in innermost bracts, densely long-hairy, somewhat recurved, 3.0–4.5 mm long. Florets pink. Achenes (2.5) 3.0–4.0 mm long and (1.5) 2.0 mm wide; pappus 8–11 mm long. Flowering May to August.

Clayey, sandy, and stony steppes, on alkaline meadows and salt marshes, cheegrass thickets, sandy-gravelly and rocky shores of rivers and lakes, stony and clayey mountain slopes, from lowlands to 2,600–2,800 m; as weed in crops, in old fields, roadsides, in residential areas, etc.— *European Part:* Crimea, Black Sea Region (in the west to Kherson Region inclusively), Lower Don, Volga-Don (vicinity of Voronezh, introduced), Lower Volga, Trans-Volga (south); *Caucasus:* Ciscaucasia, Dagestan, Eastern and Southern Transcaucasia, Talysh (Zuvant); *Western Siberia:* Upper Tobol (southern part), Irtysh (southern part), Altai southwestern part); *Soviet Central Asia:* all regions (absent in Kopetdag). *General distribution:* Mongolia, Dzhungaria-Kashgaria, Iran (mostly northern part), Armenia and Kurdistan, Asia Minor (mostly northern part, in west up to Esk). Described from “Orient.” Type in London.

Note. This species is highly variable in appearance over its vast range, but no geographic pattern could be found in its variation. Cassini described some forms of *A. repens* (L.) DC. without discrete ranges, as separate species (cf. synonymy), which quite rightly are not recog-

nized even by De Candolle (loc. cit.). Kuntz (*Tr. Peterb. Bot. Sada*, X, 1 (1887) 201) studied polymorphism in this species. The majority of the infraspecific taxa described by him do not merit, in my opinion, separate names.

Economic Importance. A noxious, hardy weed of crops.

GENUS 1617. *Oligochaeta* C. Koch^{1,2}

C. Koch in *Linnaea*, XVII, (1843) 42; Czer. in *Fl. Turkm.* VII (1960) 259.—*Serratula* sect. *Oligochaeta* (C. Koch) DC. *Prodr.* VI (1837) 671.—*Microlonchus* auct. p. p. non Cass.: Boiss. *Fl. or.* III (1875) 700.—*Centaurea* sect. *Microlonchus* (Cass.) O. Hoffm. in *Pflanzenfam.* IV, 5 (1893) 329 p. p.—*Cousinia* subgen. *Oligochaeta* (C. Koch) Winkl. in *Tr. Peterb. Bot. Sada*, XIV, 2 (1898) 188, 217.

347 Capitula homogamous, with many-florets, 2–5(7), aggregated, occasionally solitary at tips of stem and axillary. Involucres oblong or oblong-ovate, 4–5 mm in dia, whitish-arachnoid-hairy; involucral bracts many-rowed, imbricate, semicoriaceous, with indistinct veins, greenish (yellowing when dry), from triangular or oblong-lanceolate outer ones to lanceolate and lanceolate-linear innermost, with rather long, strongly recurved and light-colored (in outer and middle bracts) or straight and violet-carmine (in inner bracts) awn-like spine. Receptacle bristly, more or less deeply lobeate. All florets tubular, lilac-pink, homogeneous, bisexual; corolla glabrous. Anthers with small basal appendages; stamens filaments flattened, covered with papillae. Stigma very short-hairy, with collar of hairs at base, bifid to collar of hairs, with divergent branches, fully or partly exerted from anther tube. Achenes variable or similar, oblong-ellipsoidal, scarcely narrowed toward base, 2.0–2.5 mm long, truncate above, with obtuse or scarcely toothed corona at tip, slightly compressed, glabrous; peripheral achenes transversely rugose, dark-smoky, sometimes weakly tetraquetrous, occasionally, obtuse above, with very light-colored, entirely deciduous pappus or like inner ones; inner achenes smooth, dark reddish-brown or dark sandy, narrower, with persistent, slightly longer pappus; hilum basal, punctate; pappus as long as achenes or longer, white, double: outer one with relatively few, gradually longer from outer to inner, serrate-scabrous hair-like bristles, connate into ring at base; inner ones with 1 (rarely 2) serrate-scabrous, broadened below, stiff bristles, longer

¹Treatment by S.K. Czerepanov.

²From the Greek words *oligis*—less, few, and *chaete*—hairs; named for the achenes that are scarcely toothed above.

than outer pappus, and 3–5 small, unequal scales, projecting from upper edge of ring. Annual herbs with divaricately branched stem and arachnoid-hairy or arachnoid-tomentose, sometimes subglabrous, undivided or lyrate pinnately incised leaves.

Type of genus: *O. divaricata* (Fisch. and Mey.) C. Koch.

The genus includes three species distributed in Transcaucasia, Soviet Central Asia, and Iran.

1. Florets much longer than involucre; corolla 12–15 mm long; achenes variable (Transcaucasia) 2.
- + Florets barely longer than involucre; corolla 7.5 mm long; all achenes alike; plants low or dwarf (Soviet Central Asia) 3. **O. minima** (Boiss.) Briq.
2. Plants weakly arachnoid-hairy or subglabrous; leaves remotely toothed, rarely lyrate 1. **O. divaricata** (Fisch. and Mey.) C. Koch
- + Plants arachnoid-hairy-tomentose; leaves lyrate 2. **O. tomentosa** Czer.

1. **O. divaricata** (Fisch. and Mey.) C. Koch in Linnaea, XVII (1843) 43; Ldb. Fl. Ross. II, 2, 723; Grossh. Opred. Rast. Kavk. 490; Agadz. in Fl. Azerb. VIII, 440.—*Serratula divaricata* Fisch. and Mey. Ind. Sem. hort. Peterop. I (1835) 37; DC. Prodr. VI, 671.—*Microlonchus oligochaetus* Boiss., Fl. or. III (1875) 701; Grossh. Fl. Kavk. IV, 198.—*Cousinia Massalskyi* Winkl. in Tr. Peterb. Bot. Sada, 348 XIV, 2 (1898) 217.—**Ic.**: Iljin in Sov. Bot. 5 (1935) Fig. 1 and p. 123; Agadj. loc. cit. Plate XLIV.—**Exs.**: Pl. or. exs. No. 49. excl. syn.

Annual. Stem (5)10–40 cm high, usually very strongly divaricately branched almost from root collar, with weakly white-arachnoid-hairy or subglabrous, remote, spreading, lower usually more or less divaricate, ribbed, branches sparsely leafy throughout. Leaves glabrous or with scattered hairs above, weakly white-arachnoid-hairy or subglabrous beneath, sometimes mixed with spiny hairs, oblong or oblong-lanceolate, with small, thin, white cusp, remotely toothed, less often lyrate, short-petiolate, upper ones subsessile. Capitula 2–5(7), aggregated at tips and axillary, usually many on plant. Involucre oblong or oblong-ovate, 8–12 mm long and 4–5 mm in dia; involucre bracts with quite long, awn-like spine. Florets lilac-pink, much surpassing involucre; corolla 12–15 mm long. Achenes variable: peripheral ones transversely rugose, dark-smoky, 2.0–2.2 mm long and about 0.9–1.0 mm wide; inner ones smooth, dark reddish-brown, 2.2 mm long and about 0.8 mm wide. Pappus 2–3 mm long; bristles of inner pappus scarcely longer, slightly broadened toward base. Flowering May to July.

Dry, stony, stony-sandy, and clayey slopes up to lower mountain zone.—*Caucasus*: Southern Transcaucasia (Araks River Basin). *General distribution*: Armenia and Kurdistan (Kagyzman District), Iran (northwestern part). Described from northwestern Iran (Khuoy). Type and isotype in Leningrad.

Note. It differs from the closely related *O. tomentosa* Czer. by having weakly arachnoid pubescence on the entire plant, mostly undivided leaves, and somewhat different distribution. From another closely related species, *O. minima* (Boiss.) Briq., it is well distinguished by larger florets that are much longer than the involucre, variable achenes in the capitulum, a higher growth in general, the pubescence and shape of the leaves, and the well delimited range.

In 1957, N.N. Tzvelev and I collected *O. divaricata* (Fisch. and Mey.) C. Koch near the southwestern edge of Ekhegnadzor (Daralgyez). Most likely, it was introduced incidentally at the reported locality from the Araks River valley.

2. *O. tomentosa* Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX (1959) 455.

Annual. Stem 30–40 cm high, strongly divaricately branched much above root collar, with remote, spreading, ribbed, more or less long branches, sparsely leafy to tip. Leaves weakly arachnoid-hairy or subglabrous above, like stem white-arachnoid-hairy tomentose beneath, lyrate or lyrati-pinnately incised, short-petiolate, upper sessile, sometimes undivided, deeply toothed, lateral leaf segments 2–4 on each side, terminating in small, thin, white cusp. Capitula 2–3 or solitary at tips and axillary, rather numerous on plant. Involucre oblong or oblong-ovate, 10–12 mm long and 4–5 mm in dia; involucre bracts with rather, long awn-like spine. Florets lilac-pink, far surpassing involucre; corolla 12–13 mm long. Achenes variable, peripheral ones transversely rugose, dark-smoky, 2 mm long and about 0.9 mm wide, inner ones smooth, dark reddish-brown, 2.2 mm long and about 0.8 mm wide; pappus 2 mm long, inner pappus bristles scarcely longer, basally slightly broadened. Flowering June to July.

Dry steppes.—*Caucasus*: Eastern Transcaucasia (Naftalan, Gean steppe). Endemic. Described from Naftalan, Azerbaidzhan SSR. Type and paratype in Leningrad; isotype in Baku.

3. *O. minima* (Boiss.) Briq. in Archiv. Sc. Phys. et Nat. Geneve, 5, XII (1930) 113 n. v.; Iljin in Sov. Bot. 5, 121; Czer. in Fl. Turkm. VII, 260.—*Microlonchus minimus* Boiss. Fl. or. III (1875) 701; O. Fedtsch. in Izv. Bot. Sada, VI, 29; O. and B. Fedtsch. Perech. Rast. Turk. IV, 280; Bornm. in Beih. Bot. Centralbl. LIX B (1939) 305;

Parsa, Fl. Iran, III, 703.—*Jurinea korolkowi* Rgl. and Schmalh. in Tr. Peterb. Bot. Sada, VI, 2 (1880) 322.—*Centaurea minima* (Boiss.) B. Fedtsch. Rast. Turk. (1915) 757; Pavlov, Fl. Tsentr. Kazakhst. III, 322, 323.—*C. vvedenskyi* M. Pop. in Tr. Sredneaz. Gos. Univ. Ser. VIIIb, Bot. 3 (1928) 111 (Sched. ad Herb. Fl. As. Med. fasc. XX).—**Exs.:** Bornm. It. Pers.-turc. 1892–1893, No. 4048; H.F.A.M. No. 500.

Annual. Plant low or dwarf. Stem very much reduced, terminating into single capitulum, divaricately branched almost from root collar with remote, spreading or more or less divaricate, ribbed branches, sparsely leafy to tip, usually densely crisped-hairy, with sordid-white hairs. Leaves usually not densely arachnoid-hairy above, later subglabrous, scabrous beneath from more numerous, articulate, weakly flexuous, stiff hairs, mostly mixed with occasional, thin, flexuous or intertwined hairs, often white-arachnoid-hairy along margin, oblong-obovate or oblong-lobate, like teeth on leaves with small, thin, white cusp, sinuate to spiny-toothed, very short-petiolate, upper ones subsessile, smaller; apical leaves densely crowded below capitulum. Capitula aggregated 2–3(5), rarely solitary at stem tips and axillary, less numerous on plant. Involucre oblong, 10–13 mm long and 4–5 mm in dia; involucre bracts with quite long, awnlike spine. Florets lilac-pink, almost not surpassing involucre; corolla 7.5 mm long. All achenes alike, smooth, dark sandy, usually with reddish-brown spots, (2.5) 2.8–3.0 mm long and 0.9–1.0 mm wide; pappus 3.5–4.0 mm long, inner pappus bristles 5–6 mm long, strongly thickened at base. Flowering April to May. (Plate XIII, Fig. 2; Plate XX, Fig. 2).

Compacted sandy, rubbly-sandy places in depressions and hollows of sand ridges atop outlier ridges in desert and on gentle gypsiferous slopes in foothills.—*Soviet Central Asia:* Kara-Kum, Kzyl-Kum (areas bordering Amu-Darya), Amu-Darya (Karakul, Charshanga), Pamiro-Alai Region (Termez). *General distribution:* Iran. Described from Iran (area between Kashan and Nasrabad, vicinity of Kerman, area between Shakhrud and Nishapur). Type in Geneva.

Note. A comparison published by M.G. Popov of isotypes of *Centaurea vvedenskyi* M. Pop. with authentic specimens of *O. minima* (Boiss.) Briq. has shown that the former species is very close to the latter and can hardly be considered a separate species. The reference to the whitish color of the florets in *C. vvedenskyii* M. Pop. needs to be verified. O.V. Czerneva (*Fl. Uzbek.* IV (1962) 412, pl. XXXVIII, Fig. 2) recognizes *O. vvedenskyii* (M. Pop.) Tschern. as a separate species and indicates that it differs from *O. minima* (Boiss.) Briq., which, according to her, does not grow in Soviet Central Asia, by having larger achenes, a longer pappus, and whitish florets.

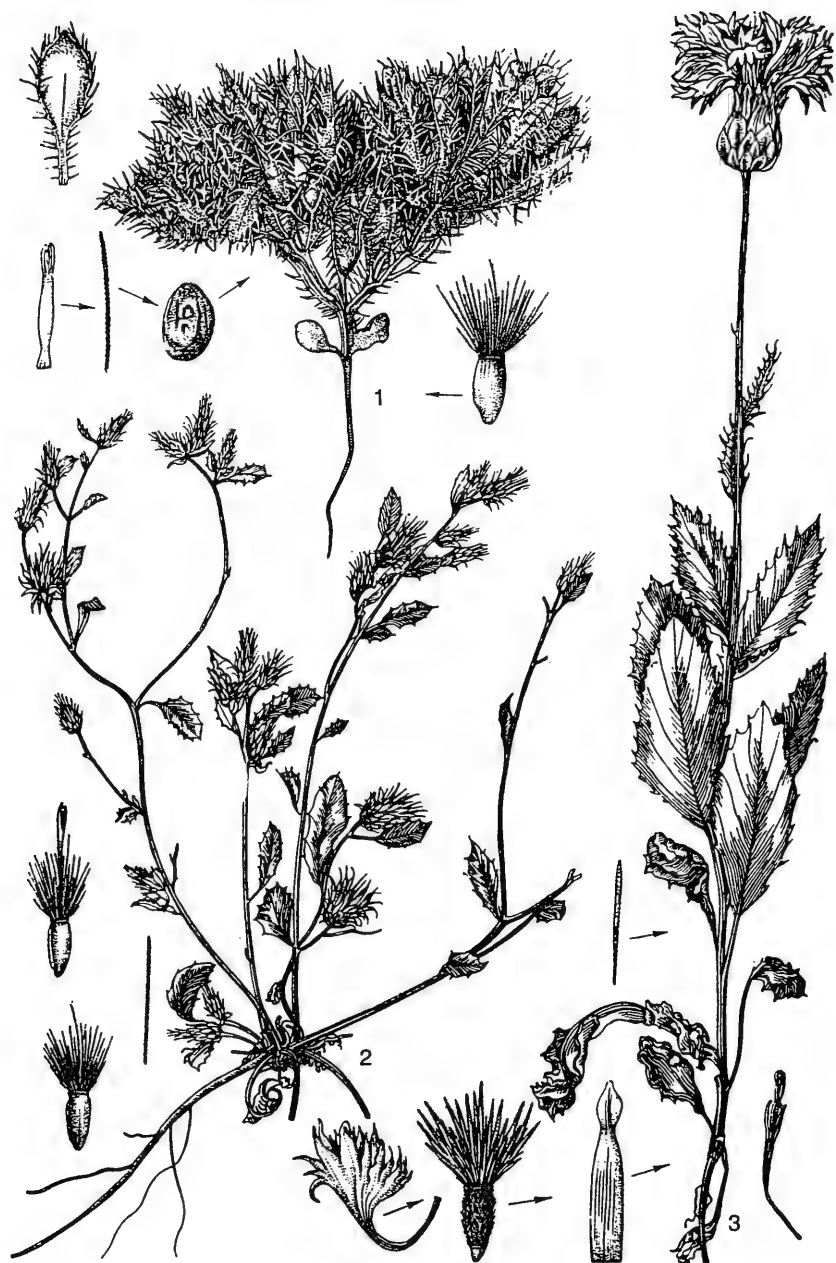


Plate XX.

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1—*Schischkinia albispina* (Bge.) Iljin; 2—*Oligochaeta minima* (Boiss.) Briq.;
3—*Amberboa bucharica* Iljin.

A form has been reported with lyrate divided leaves: *f. lyratisecta* Czer.—*foliis lyratisectis* (Irania, inter oppida Tegeran et Kerman, Naugumbez. 19. IV. 1906, No. 84, K. Adamova).

GENUS 1618. **Schischkinia** Iljin^{1,2}

Iljin in Fedde, Repert. XXXVIII (1935) 73; Nikitin in Fl. Turkm. VII (1960) 260.

Capitula heterogamous, small, with few florets, at tips of greatly shortened branches, on very short peduncles or sessile. Involucres oblong-cylindrical, 4–5 mm in dia, glabrous; involucre bracts many-rowed, imbricate, herbaceous, with inconspicuous veins, greenish, from ovate-lanceolate outer to linearly lanceolate innermost, with white membranous border, terminating in stiff, scarious, nonspiny, subulate cusp; innermost involucre bracts often lilac at tip. Receptacle more or less deeply alveolate; alveoles bordered with thin short cilia. All florets tubular, yellow, not surpassing involucre, heterogeneous, central florets (disk florets) bisexual with 5-fid corolla, basally covered with 352 few, short glandular hairs; peripheral florets (ray florets) sterile, lacking staminodes and rudiment of style, 1-rowed, with 4–5-fid glabrous corolla. Anthers with oblong, undivided and obtuse basal appendages, apical appendages obtuse; stamen filaments flattened, covered with papillae. Stigma very short-woolly, with collar of hairs at base, not exerted from anther tube, bilobed, lobes not divergent, short. Achenes oblong-obovate or obovate, narrowed toward base, 3.5–4.0(4.5) mm long, truncate above, with toothed crown at tip, compressed, glabrous, smooth, lustrous, peripheral immature, transversely rugose; hilum lateral, deep slit-like; pappus longer than achene, white or slightly ochreous, persistent, double, outer one of more numerous, gradually longer from outer to inner serrate-scarious hair-like bristles, connate in ring at base, inner one comprising single serrate-scarious, stiff, scarious bristle somewhat thicker below, surpassing outer pappus bristles and arising from mostly irregularly toothed upper edge of ring. Annual herbs with very short stem, usually branched from base, or stemless and with undivided leaves, bearing white, thin, stiff bristles on margin.

A monotypic genus.

1. **S. albispina** (Bge.) Iljin in Fedde, Repert. XXXVIII (1935) 73; Nikitin in Fl. Turkm. VII, 262.—*Microlonchus albispinus* Bge. Delect.

¹Treatment by S.K. Czerepanov.

²Named in honor of the eminent Soviet botanist, florist, and systematist, B.K. Schischkin (1886–1963).

Sem. hort. Dorpat. (1843) 8; O. and B. Fedtsch. Perech. Rast. Turk. IV, 281.—*Centaurea albispina* (Bge.) B. Fedtsch. Rast. Turk. (1915) 757.

Annual. Plants small, with hemispherical crown, stemless or almost stemless, with short stems, usually branched from base. Stem and its branches whitish, finely white-pubescent. Leaves oblong-lobate, obtuse, narrowed into petiole, entire or crenate, with white, thin, stiff, mostly palmately branched bristles on margin, glabrous on both sides or often with scattered tiny whitish hairs beneath. Capitula aggregated in small numbers at tips of strongly reduced branches, very short-pedunculate or sessile, surrounded by few apical leaves, far surpassing capitulum. Involucre oblong-cylindrical, 12–14 mm long and 4–5 mm in dia; involucre bracts herbaceous, white-membranous along margin and at tip, terminating in stiff, membranous, nonspiny, subulate cusp; innermost bracts lilac at tip. Florets yellow. Inner achenes 3.5–4.0 (4.5) mm long and 2.0–2.5 mm wide; pappus 6–7 mm long; inner pappus bristles to 9 mm long. Flowering May. (Plate XX, Fig. 1).

353 Deserts along lower mountain slopes.—*Soviet Central Asia*: Karakum (southern Ustyurt, Kryk-Sekiz collective farm), Amu-Darya, Kyzyl-Kum, Pamiro-Alai Region (western part). Aralo-Caspian Region (extreme southeast), Lake Balkhash Region (Muyun-Kums). *General distribution*: Iran-Afghanistan (Iran, Afghanistan and Baluchistan). Described from Lehmann's collections from desert in Aral Sea region. Type and isotypes in Leningrad.

Note. *Oligochaeta leucosmerinx* Rech. f. and Köie (in *Dan. Biol. Skr.* 8, 2 [1955] 184, Fig. 126 (*ymb. Afgh.* II) is, apparently, simply a synonym of *S. albispina* (Bge.) Iljin.

GENUS 1619. *Aetheopappus* Cass.^{1, 2}

Cass. in *Dict. Sc. nat.* L (1827) 250; LI (1827) 53.—*Centaurea* sect. *Aetheopappus* (Cass.) DC. *Prodr.* VI (1837) 574; O. Hoffm. in *Pflanzenfam.* IV, 5 (1893) 330 p. p.

Capitula heterogamous, rather large, with many florets, solitary at tip of stem. Involucre ovate-globose or hemispherical, 15–25 mm in dia; involucre bracts many-rowed, imbricate, outermost entirely membranous, silver-white to dark reddish-brown, fimbriate-ciliate, more or less densely short-pubescent like appendages of outer and middle bracts, others coriaceous, smooth, greenish (yellowing upon drying) from ovate

¹Treatment by D.I. Sosnowsky.

²From the Greek words *aethes*—unusual, and *pappus*—beard.

and oblong-ovate middle to oblong-linear innermost; appendages of middle and inner bracts large, not decurrent but entirely overlapping bracts, membranous, reddish-brown to dark reddish-brown, ovate or broadly-ovate, fimbriate-ciliate. Receptacle setose. Florets bright-pink (in USSR species) less often yellow, variable; corolla glabrous; central florets (disk florets) bisexual, tubular, many-rowed, slightly surpassing involucre, with deeply 5-fid corolla, peripheral florets (ray florets) sterile, lacking staminodes and rudiment of style, tubular-infundibuliform, one-rowed, strongly broadened, 2 times as long as involucre, with deeply (5) 6–8-fid corolla. Anthers with small obtuse basal appendages, apical appendages obtuse; stamen filaments flattened, covered with papillae. Stigma short-bilobed, almost entirely exerted from anther tube. All achenes alike, oblong, about 6 mm long, truncate above, with small-toothed crown, compressed, smooth, glabrous, hilum lateral, pappus longer than achene, ochraceous, persistent, simple, of numerous, short, hairy bristles, gradually longer from short outer to inner ones, connate into ring at base. Perennial herbs with undivided or pinnately incised leaves.

354 Type of genus: *A. pulcherrimus* (Willd.) Cass.

This genus comprises at least five [sic., three] species, which grow in the Caucasus and Asia Minor.

1. Root collar covered with undivided, rather broad remnants of petioles of basal leaves; appendages of involucre bracts one-colored; dark reddish-brown or reddish-brown 1. **A. vvedenskii** (Sosn.) Sosn.
- + Root collar covered with fibrous remnants of petioles of basal leaves; appendages of involucre bracts bicolorous: outer silver-white or light stamineous, middle and inner reddish-brown 2
2. Leaves, except some basal and uppermost, pinnately incised, with 3–7 pairs of ovate-oblong or ovate-roundish, decurrent lateral segments, divergent at right angle to rachis 2. **A. caucasicus** Sosn.
- + Leaves lanceolately linear or linear, undivided or some basal and lower cauline leaves pinnatifid with fewer lanceolate or linear, acuminate lobes, divergent at acute angle to rachis, less often all cauline leaves pinnately divided **A. pulcherrimus** (Willd.) Cass.

1. **A. vvedenskii** (Sosn.) Sosn. in Fl. Gruzii, VIII (1952) 550; in Zam. po. Sist. i Geogr. Rast. Tbil. 17 (1953) 15.—*A. pulcherrimus* var. *peduncularis* Somm. and Lev. in Tr. Peterb. Bot. Sada, XVI (1900) 273.—*A. raddeanus* (Trautv.) Sosn. ex Grossh. Opred. Rast. Kavk.

(1949) 493 p. min. p.; Kolak. Fl. Abkhazii, IV, 283.—*A. fedorovii* Charkevich in Bot. Zhurn. SSSR, XXXVI, 4 (1951) 400.—*Psephellus vvedenskii* Sosn. in Grossh. Fl. Kavk. IV (1934) 201 in Zam. po Sist. i Geogr. Rast. Tbil. 14, 13; Grossh. Opred. Rast. Kavk. 492.—**Exs.:** Pl. Abchaz. exs. No. 259.

Perennial. Rhizome oblique, thin; root neck covered with dark brown, undivided, rather broad, remnants of petioles of basal leaves. Stem 40–50 cm high, erect, simple, arachnoid-hairy, leafy to middle. Leaves on both sides, particularly beneath, densely floccose-arachnoid-hairy; basal leaves undivided, linearly lanceolate or lanceolate, long-petiolate, about 15 cm long, to 2.5 cm wide, petiole to 8 cm long; cauline leaves lyrate-pinnately parted, with oblong, acuminate terminal lobe considerably larger than lateral ones; lateral lobes 1–3 pairs, oblong, acuminate, coalescing mutually and with terminal lobe, reduced toward leaf base. Capitula large. Involucre hemispherical, to 2.5 cm in dia; appendages of involucre bracts broadly ovate, all reddish-brown or dark reddish-brown. Florets violet-pink. Flowering July to August.

355 Meadows and stony slopes of subalpine zone.—*Caucasus*: Ciscaucasia (Main Range), Western Transcaucasia (Abkhazia). Endemic. Described from Great Bambak Mountain. Type in Tbilisi; isotype in Leningrad.

2. *A. caucasicus* Sosn. in Zam. po Sist. i Geogr. Rast. Tbil. 17 (1953) 14, descr. latina; in Fl. Gruzii, VIII (1952) 550, descr. georgica; Karjagin in Fl. Azerb. VIII, 448.—*A. pulcherrimus* var. *foliosus* Somm. and Lev. in Tr. Peterb. Bot. Sada, XIV (1900) 272.—*A. pulcherrimus* auct. p. p. non Cass.: Boiss. Fl. or. III (1875) 603; Grossh. Fl. Kavk. IV, 204; Opred. Rast. Kavk. 493.—**Exs.:** GRF No. 320.

Perennial. Rhizome more or less thick, long; root collar densely covered with brown fibers. Stem 7–20(35) cm high, simple, erect or assurgent at base, tomentose, usually leafy throughout. Leaves short-petiolate, on both sides, especially beneath, densely grayish-arachnoid-tomentose, occasionally subglabrous, leaves of nonflowering shoots and some basal leaves sometimes undivided, ovate-lanceolate others pinnately incised, lanceolate, with 3–7 pairs of ovate-oblong or ovate-roundish, indistinctly smooth-toothed or sinuate-toothed, decurrent, lateral segments at right angle to rachis, terminal lobe somewhat larger. Capitula large. Involucre ovate-globose, to 2.5 cm in dia; outer involucre bracts silver-white, membranous, short fimbriate-ciliate, middle and inner ones with reddish-brown, membranous, fimbriate-ciliate appendage. Florets bright pink. Flowering July to August.

Rocks and rubbly places of alpine and subalpine zones.—*Caucasus*: Ciscaucasia, Eastern and Western Transcaucasia (area of Main Caucasus Range and Adzharo-Imeretian Range). Endemic. Described from Kazbeg District of Georgian SSR. Type in Tbilisi.

3. **A. pulcherrimus** (Willd.) Cass. in Dict. Sc. nat. LI (1827) 54; Boiss. Fl. or. III, 603 p. p.; Grossh. Opred. Rast. Kavk. 493 p. p.; Sosn. in Zam. po Sist. i Geogr. Rast. Tbil. 17, 15; Karjagin in Fl. Azerb. VIII, 449.—*A. pulcherrimus* var. *denticulatus* C. Koch in Linnaea, XXIV (1851) 422.—*A. pulcherrimus* var. *raddeanus* (Trautv.) Bordz. in Vestn. Tifl. Bot. Sada, Nov. Ser. 5 (1931) 65; Grossh. Fl. Kavk. IV, 204.—*A. raddeanus* (Trautv.) Sosn. ex Grossh. Opred. Rast. Kavk. (1949) 493 p. p.—*Centaurea pulcherrima* Willd. Sp. pl. III, 3 (1803) 2298; DC. Prodr. VI, 574; Ldb. Fl. Ross. II, 2, 694.—*C. raddeana* Trautv. in Tr. Peterb. Bot. Sada, II (1873) 475.—*C. pulcherrima* var. *intermedia* Trautv. op. cit. IV (1876) 381.—**lc.**: Rchb. Pl. crit. VIII (1838) tab. 716; Karjagin, op. cit. Plate XLV, Fig. 2.

356 Perennial. Rhizome oblique, thin or more or less thick; root neck densely covered with brown fibers. Stem to 60 cm high, erect or as-surgent at base, simple or sometimes with 1–2 branches, occasionally stem short, 10–15 cm high. Leaves green or grayish-green above, slightly arachnoid-hairy, sometimes later becoming glabrous, densely grayish-arachnoid-hairy-tomentose beneath, occasionally glabrous on both sides, lanceolately linear or linear, serrate-toothed or almost entire, very often some basal and lower cauline leaves lyrate-divided, with large, lanceolate, acuminate terminal lobe and few, small, linearly lanceolate or lanceolate lateral lobes, at acute angle to rachis, occasionally almost all cauline leaves pinnately parted. Capitula large. Outer involucre bracts silver-white, membranous, short-fimbriate-ciliate; middle and inner bracts with reddish-brown, membranous, ovate, fimbriate-ciliate appendages. Florets bright pink, very rarely white. Flowering July to August.

Meadows in subalpine and alpine zones.—*Caucasus*: Dagestan, Eastern Transcaucasia (Lesser Caucasus), Southern Transcaucasia. *General distribution*: Armenia and Kurdistan, Asia Minor (northeastern part). Described from "Orient." Type in Berlin.

GENUS 1620. *Cheirolepis* Boiss.^{1, 2}

Boiss. Diagn. pl. or. ser. I, 10 (1849) 106; Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 466.—*Centaurea* sect. *Mesocentron* (Cass.) DC. Prodr. VI (1837) 592 p. p. min.—*Chartolepis* subgen. *Cheirolepis* (Boiss.) Jaub. and Spach. Ill. pl. or. III (1847–1850) 136.—*Centaurea* sect. *Seridia* (Juss.) Benth. in Benth. and Hook. f. Gen. pl. II (1873) 481 p. p. non DC.—*Phaeopappus* sect. *Cheirolepis* (Boiss.) Boiss. § 1. *Eucheirolepidi* Boiss. Fl. or. III (1875) 594.—*Centaurea* sect. *Cheirolepis* (Boiss.) O. Hoffm. in Pflanzenfam. IV, 5 (1893) 330.

Capitula heterogamous, medium-sized, with many florets, solitary at tips of stem and few lateral branches. Involucre ovate or oblong-ovate, 8–20 mm in dia, subglabrous; in involucral bracts many-rowed, densely imbricate, coriaceous, smooth, greenish (yellowing when dry), from triangular and ovately triangular outer ones to oblong-linear innermost; appendages of outer and middle involucral bracts small, not decurrent on bracts, coriaceous, brownish, with palmately divergent spines, of which middle spine usually longer than lateral ones; appendages of inner bracts small, membranous, irregularly toothed. Receptacle bristly, variable; corolla glabrous; central florets (disk florets) bisexual, many-rowed; peripheral florets (ray florets) sterile, lacking 358 staminodes and rudiment of style, with 4–5-fid corolla, one-rowed, not enlarged. Anthers with small basal appendages and acute apical appendages; stamen filaments flattened, covered with papillae. Stigma very short-woolly, with collar of hairs at base, united (its branches connate to tip) or scarcely bilobed, entirely exerted from anther tube. All achenes alike, oblong-ellipsoidal, 4–7 mm long, truncate, with small-toothed crown at apex, compressed, glabrous, hilum lateral; pappus longer than achenes, whitish or ochraceous, persistent, simple, of many irregular rows of flattened, plumose, hair-like, bristles, gradually elongated from outer to inner, connate in ring at base. Perennial herbs, with erect, arcuately ascending, or assurgent stem, simple or with few branches, not winged, leafy to tip, covered with arachnoid hairs or almost tomentose pubescent. Basal and lower cauline leaves petiolate, others sessile, not decurrent on stem, all entire to sinuate-pinnately lobed, scabrous or scabrous-lanate from spiny or long-articulate hairs to finely arachnoid tomentose.

Type of genus: *C. drabifolia* (Sibth. and Smith) Boiss.

Of the nine species in this genus belonging to two phylogenetic

¹Treatment by S.K. Czerepanov.

²From the Greek words *cheir*—wrist, and *lepis*—scale; named for the palmately divided appendages of the involucral bracts.



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Plate XXI.

1—*Callicephalus nitens* (MB.) C.A.M.; 2—*Tomanthea phaeopappa* (DC.)
Takht. ex Czer.

series and distributed mainly in Asia Minor, only one species enters Southern Transcaucasia.

Series 1. Kotschyanae Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 467.—Stem medium-high, erect or arcuately ascending. Involucre (18)20–32 mm long and (10)12–20 mm in dia. Achenes 5–7 mm long; pappus (10)12–18 mm long.

Besides the southern Caucasian species, this series includes. *C. kotschyi* Boiss. and Heldr. (Turkey-Lycaonia, Cappadocia and probably Cilicia), *C. floccosa* (Boiss.) Czer. (Turkey—Ankara Province), *C. cataonica* (Boiss. and Hausskn.) Czer. (southeastern Turkey—Cataonia), *C. longispina* (Post) Czer. (southwestern Syria).

1. ***C. persica*** Boiss. Diagn. pl. or. ser. I, 10 (1849) 108; Grossh. Opred. Rast. Kavk. 493; Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX, 468; Karjagin in Fl. Azerb. VIII, 441.—*Phaeopappus cheirolophus* Boiss. in Kotschy, Pl. exs. Pers. bor. No. 629, nomen; Grossh. Fl. Kavk. IV, 205.—*P. kotschyi* β . *persicus* (Boiss.) Boiss. Fl. or. III (1875) 595.—*Chartolepis cappadocica* auct. non Fenzl: Jaub. and Spach, Ill. pl. or. III (1847–1850) 137 p. p.—*C. kotschyi* (Boiss. and Heldr.) Fenzl. in Tchih. As. Min. II (1860) 328 p. p.; Diagn. pl. or. observ. bot. (1860) 66 p. p.—**Exs.**: Kotschy, Pl. exs. Pers. bor. No. 629; Bornm. Pl. exs. Anat. or. 1889, No. 1097; It. Pers. alter. 1902, No. 7278.

359 Perennial. Whole plant green, with long, creeping, woody, branched rhizome. Stems few, 15–40 cm high, erect or slightly arcuate, simple; sometimes with few branches, weakly arachnoid-hairy. Leaves almost oblong, oblong-linear, occasionally linear, acute or obtuse, entire or partly sinuate-small-toothed, scabrous from sharp spiny hairs, glandular with sessile, yellow, punctiform glands. Basal and lower cauline leaves petiolate, sparsely covered with prickly arachnoid pubescence, others sessile, not decurrent on stem. Capitula solitary at tips of stem and lateral branches. Involucre ovate or oblong-ovate, (18)20–28 mm long and 10–15(17) mm in dia; appendages of outer and middle involucre bracts with 6–10 palmately divergent, thin spines, of which middle spine scarcely surpassing lateral ones; appendages of inner bracts membranous, irregularly toothed, small. Florets yellow. Achenes 6–7 mm long and 2.5–3.0 mm wide; pappus 12–15 mm long. Flowering second half of June to July (Plate XIX, Fig. 1).

Dry, stony, steppe slopes; in mid-montane zone.—*Caucasus*: Southern Transcaucasia (Armenia, Nakhichevan ASSR; vicinity of village of Buzgov). *General distribution*: Asia Minor (eastern part), Iran (north). Described from northern Iran from Demavend Mountain. Type in Geneva; isotype in Leningrad.

Note. It is distinguished from the very closely related Asia Minor species *C. kotschyi* Boiss. and Held. by the middle spine [of the appendages of the involucre bracts] that are almost as long as lateral spines (and not two times longer), shorter pappus, and scabrous leaves from short spinose hairs (and not scabrous-woolly from long-articulate, weakly flexuous hairs).

GENUS 1621. **Tomanthea** DC. ^{1, 2}

DC. Prodr. VI (1837) 564; Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 472.—*Amberboa* sect. *Phaeopappus* DC. op. cit. 560 p. p. excl. *A. lancifolia* DC.—*Phaeopappus* (DC.) Boiss. Diagn. pl. or. ser. I, 6 (1845) 122 p. p. excl. *P. macrocephalus* (Muss.-Puschk.) Boiss.—*Phaeopappus* sect. *Rhaponticoides* Jaub. and Spach, Ill. pl. or. III (1847–1850) 13.—*Phaeopappus* sect. *Euphaeopappus* Boiss. § 3. *Macrocephali* Boiss. Fl. or. III (1875) 593 p. p.—*Centaurea* sect. *Acrolophus* auct. p. p.; Benth. in Benth. and Hook. f. Gen. pl. II (1873) 480.—*Centaurea* sect. *Phaeopappus* (DC.) O. Hoffm. in Pflanzenfam. IV, 5 (1893) 330 p. p.—*Tomanthea* sect. *Rhaponticoides* (Jaub. and Spach) Takht. in Tr. Molodykh. Nauchn. Rabotn. Arm. Fil. Akad. Nauk SSSR (1939) 240.

Capitula heterogamous, large- or medium-sized with many florets, solitary at tips of stem and lateral branches. Involucre ovate, globose-ovate or subglobose, (13)15–30 mm in dia; glabrous; involucre bracts 360 many-rowed, densely imbricate, coriaceous, smooth, greenish (yellowing on dry) from roundish-ovate outer ones to oblong-lanceolate innermost; appendages of outer and middle involucre bracts mostly large, not decurrent on bracts, entirely coriaceous, often only in middle, dark reddish-brown to scarcely brownish, semicircular or ovate-triangular, with thin, small, spine at tip, membranous along margin, white, cristate or almost palmate-ciliate; appendages of inner bracts smaller, membranous, irregularly toothed. Receptacle bristly. All florets tubular, yellow or dark wine-red, far surpassing involucre, variable. Corolla glabrous, central florets (disk florets) bisexual, many-rowed; peripheral florets (ray florets) sterile, lacking staminodes and rudiment of style, with 4–5-fid corolla, one-rowed, unbroadened. Anthers with small basal appendages, apical appendages acute; stamen filaments flattened, covered with papillae. Stigma very short-woolly with collar of hairs at

¹Treatment by S.K. Czerepanov.

²From the Greek words *tome*—cut, section, and *anthos*—flower; named for the lacerate corolla.

base, weakly bilobed, entirely exerted from anther tube. All achenes alike, oblong, more or less tetraquetrous, sometimes very slightly curved, 6–8 mm long, truncate above, with obtuse or indistinctly toothed crown at tip, usually weakly transversely rugose, glabrous, hilum lateral; pappus usually 2 times as long as achenes, ochraceous or ochraceous-violet, persistent, simple, of few serrate, setose, elastic bristles, smooth in lower part, gradually longer from very short, smooth, unequally toothed only at tip, outermost to inner, connate into ring at base. Perennial herbs with erect, simple or with fewer branches; stems leafy to tip. Leaves pinnately incised to entire, arachnoid-hairy or finely arachnoid-tomentose; basal and lower cauline leaves petiolate, others sessile, not decurrent on stem.

Type of genus: *T. aucheri* DC.

The genus is represented by 12 species, which grow in Southern Transcaucasia, Iran, and Turkey.

1. Florets dark wine-red; leaves usually pinnately incised 4. **T. daralaghezica** (Fom.) Takht.
 + Florets yellow 2.
2. Involucre 22–30 mm in dia; appendages of outer and middle involucre bracts relatively small, semicircular, completely coriaceous, almost digitate-ciliate; their apical spine as long as or scarcely longer than reddish-brown stiff lateral cilia 1. **T. spectabilis** (Fisch. and Mey.) Takht.
 + Involucre 13–23(25) mm in dia; appendages of outer and middle involucre bracts large, ovate-triangular, thinly coriaceous in middle, membranous along margin, cristate-ciliate; apical spine twice as long as white elastic lateral cilia 3.
- 361 3. Leaves entire or undivided; basal and lower cauline leaves mostly lyrate, terminal segment much longer than lateral 2. **T. aucheri** DC.
 + Leaves pinnately incised, terminal segment not larger than lateral 3. **T. phaeopappa** (DC.) Takht. ex Czer.

Series 1. Spectabiles Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 472.—Involucres large (22–35 mm in dia); appendages of outer and middle involucre bracts more or less small, partially overlapping coriaceous part of bracts, entirely coriaceous, dark reddish-brown or reddish-brown, semicircular, almost digitate-ciliate on margin, their apical spine as long as or scarcely longer than stiff lateral cilia. Leaves arachnoid-hairy or finely arachnoid-tomentose, less often covered with long-articulate, weakly flexuous hairs; middle and upper cauline leaves sessile, not decurrent on stem.

Besides our species, included here are *T. microlopha* (Boiss.) Czer. (eastern Turkey), *T. araneosa* (Boiss.) Takht. (eastern Turkey), *T. rupestris* (Boiss. and Hausskn.) Takht. (Turkey-Cataonia), and *T. aintabica* (Post) Czer. (Turkey-Gazi-Antep).

1. ***T. spectabilis*** (Fisch. and Mey.) Takht. in Tr. Molodykh Nauchn. Rabotn. Arm. Fil. Akad. Nauk SSSR (1939) 241 p. p.; Grossh. Oprod. Rast. Kavk. 493; Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX, 473; Karjagin in Fl. Azerb. VIII, 450.—*Psephellus spectabilis* Fisch. and Mey. Ind. Sem. hort. Petrop. IV (1837) 43; DC. Prodr. VI, 561, pro syn.—*Amberboa spectabilis* (Fisch. and Mey.) DC. ibid., 561; Ldb. Fl. Ross. II, 2, 683.—*Phaeopappus spectabilis* (Fisch. and Mey.) Boiss. Diagn. pl. or. ser. I, 6 (1845) 124; Fl. or. III, 597; Grossh. Fl. Kavk. IV, 206.—*P. armenus* Jaub. and Spach, Ill. pl. or. III (1847–1850) 13; Boiss. Fl. or. III, 598 p. p.—*Centaurea balsamita* auct. non Lam. nec Fenzl; Don in Sweet, Brit. Fl. Gard. ser. II, IV, 355.—*C. specabilis* (Fisch. and Mey.) Sch. Bip. in Linnaea, XIX (1846) 326; Bordz. in Zap. Kievsk. obshch. Est. XXV, 1, 126.—*C. armena* (Jaub. and Spach) Rech. f. and Koje in Dan. Biol. Skr. 8, 2 (1955) 184 (Symb. Afgh. II).— *Ic.*: Don, op. cit. tab. 355; Jaub. and Spach. loc. cit. tab. 210.

Perennial. Whole plant grayish-green or grayish, arachnoid-hairy, sometimes thinly arachnoid-tomentose. Root woody, somewhat thick, more or less vertical, 1-headed; root collar covered with brownish remnants of old leaves. Stem single, 40–60 cm high, erect, simple or branched slightly below middle, with 1–2 upward spreading branches. Basal and lower cauline leaves petiolate, petiole 4–18 cm long, strongly thickened at base, large (10–25 cm long) from pinnate or lyrate to undivided, less often entire, lateral segments lanceolate, oblong-oblan-
362 ceolate, or elliptical-lanceolate, entire, with very small cusp; terminal segment mostly much larger than lateral ones; middle and upper cauline leaves sessile, not decurrent on stem, usually undivided and entire, lanceolate to almost oblong, short-cuspidate. Involucre subglobose or globose-ovate, 25–30 mm long and 22–30 mm in dia; appendages of outer and middle involucre bracts more or less small, entirely coriaceous, semicircular, almost digitate-ciliate. Florets yellow. Achenes 7–8 mm long and about 3 mm wide; pappus 12–16 mm long. Flowering July to August.

Mixed herb meadows and meadow-steppe slopes, among scattered shrubs; in mid-montane zone.—*Caucasus*: Southern Transcaucasia. *General distribution*: Armenia and Kurdistan. Described from Nakhichevan ASSR, from Koshadara River. Type in Leningrad; isotypes in Leningrad and Geneva.

Note. The species varies strongly in the incision of the leaves and the size of the appendages of the outer and middle involucre bracts. In northeastern Turkey (Bingyol-Dag Mountain), it is replaced by a very close geographic race *T. microlopha* (Boiss.) Czer.

Series 2. *Aucherianae* Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk. SSSR, XX (1960) 475.—Involucre medium-sized (13–23(25) mm in dia); appendages of outer and middle involucre bracts large, almost completely overlapping coriaceous part of bract, ovate-triangular, thinly coriaceous in middle part, dark reddish-brown to scarcely brownish, membranous along margin, white, cristately ciliate, apical spine of appendages twice as long as lateral cilia. Leaves arachnoid-hairy or arachnoid-tomentose; middle and upper cauline leaves sessile, not decurrent on stem (except *T. haussknechtii* (Boiss.) Takht.).

Besides the southern Caucasian species, this series includes *T. depressa* (Boiss.) Czer. (central and western Iran) and *T. haussknechtii* (Boiss.) Takht. (northeastern Syria).

2. ***T. aucheri*** DC. Prodr. VI (1837) 564; Takht. in Tr. Molodykh Nauchn. Rabotn. Arm. Fil. Akad. Nauk SSSR (1939) 242 p. p.; Grossh. Opred. Rast. Kavk. 494 p. p.; Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX, 476.—*Phaeopappus leuzeoides* Boiss. Diagn. pl. or. ser. I, 6 (1845) 124.—*P. leuzeoides* β . *integrifolius* Boiss. Fl. or. III (1875) 597.—*P. aucheri* β . *integrifolius* (Boiss.) Bornm. in Verh. Zool.-Bot. Ges. Wien. LX (1910) 142.—*Tomanthea phaeopappa* (DC.) Takht. in sched. p. p.—Exs.: Bornm. It. Pers. alter. 1902, No. 7272.

Perennial. Whole plant grayish-green or grayish, covered with appressed arachnoid hairs or thin arachnoid tomentum. Root woody, mostly somewhat thick, vertical or oblique, 1–4-headed, often bearing rosette of sterile leaves on individual, strongly reduced, branched root; root collar covered with brownish remnants of old leaves. Stem single or few, (15)20–40 cm high, erect, simple or branched slightly above middle, with 1–2(3) upward spreading branches. Basal and lower cauline leaves petiolate, petiole to 10 cm long, leaves strongly broadened at base, large (8–16 cm long), lyrate, often lyrate-pinnately incised, less often undivided and entire; lateral segments lanceolate to almost oblong, entire, lateral segments lanceolate to almost oblong, entire, with very small cusp; middle and upper cauline leaves sessile, lanceolate or oblong, short-cuspidate. Involucre globose-ovate or ovate, 22–30 mm long and 15–25 mm in dia; appendages of outer and middle involucre bracts large, ovate-triangular, coriaceous in middle, membranous along margin, lacerate, cristate-ciliate. Florets yellow. Achenes

7–8 mm long and 2.8–3.0 mm wide; pappus 12–16 mm long. Flowering June to July.

Dry stony slopes, low- and mid-montane zones, in xeric-steppe phytocoenoses.—*Caucasus*: Southern Transcaucasia (southern Armenia and Nakhichevan ASSR, rarely). *General distribution*: Iran. Described from western Iran. Type in Geneva.

Note. We have given our viewpoint about the circumscription of this species in our earlier published paper (Czerepanov, op. cit.).

3. **T. phaeopappa** (DC.) Takht. in sched. p. p.; ex Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk. SSSR, XX (1960) 477; Karjagin in Fl. Azerb. VIII, 451.—*Amberboa phaeopappa* DC. Prodr. VI (1837) 560.—*Psephellus phaeopappus* Fisch. and Mey. ex DC. Ibid., pro syn.—*Centaurea phaeopappa* (DC.) Sch. Bip. in Linnaea, XIX (1846) 326.—*Phaeopappus szovitsii* Boiss. Diagn. pl. or. ser. I, 6 (1845) 123; Grossh. Fl. Kavk. IV, 207.—*P. macracanthus* Boiss. and Bushe in Nouv. Mém. Soc. Nat. Mosc. XII (1860) 129.—*P. leuzeoides* γ . *szovitsii* (Boiss.) Boiss. Fl. or. III (1875) 597 p. p.—*P. scleroblepharus* Freyn in Bull. Herb. Boiss. ser. II, 1 (1901) 271.—*P. aucheri* γ . *szovitsii* (Boiss.) Bornm. in Beih. Bot. Centralbl. XX, 2 (1906) 166; in Verh. Zool.-Bot. Ges. Wien. LX (1910) 142.—*Tomanthea aucheri* auct. p. non. DC.: Takht. in Tr. Molkdykh Nauchn. Rabotn. Arm. Fil. Akad. Nauk SSSR (1939) 242; Grossh. Opred. Rast. Kavk. 494.—**Exs.**: Kotschy, Pl. Pers. bor. No. 431; Bornm. It. Pers. alter. 1902, No. 7269.

Perennial. Whole plant grayish, covered with thin arachnoid tomentum. Root woody, somewhat thick, vertical or oblique, 1–3-headed; root neck covered with brownish remnants of old leaves. Stem single or few (2–3), 10–40 cm high, erect, simple or branched slightly below middle, with 2(4) spreading branches. Leaves pinnately incised; basal and lower cauline leaves large (8–15 cm long) petiolate, petiole 2 cm long, strongly broadened at base, lateral segments linear, lanceolately linear, less often lanceolate, entire or some of them lyrate, with very small cusp, terminal segment not larger than laterals; middle and upper
364 cauline leaves sessile, not decurrent on stem, apical leaves lyrate pinnately incised, deeply lobate, sometimes entire, linear or lanceolately linear, short-cuspidate. Involucres globose-ovate or ovate, 22–25(30) mm long, 13–23 mm in dia; appendages of outer and middle involucre bracts large, ovate-triangular, cristate-ciliate. Florets yellow. Achenes 6–7 mm long and about 2.5 mm wide; pappus 12–14(16) mm long. Flowering June to July. (Plate XXI, Fig. 2).

Dry, stony, stony-rubbly and clayey slopes of mountains and low hills; in low- and mid-montane zones, in xeric-steppe and semidesert

phytocoenoses.—*Caucasus*: Southern Transcaucasia (southern Armenia and Nakhichevan ASSR). *General distribution*: Iran chiefly northwestern part), Armenia and Kurdistan (east of Lake Van). Described from northwestern Iran (Said-Hadji Mountains in Khvoy District).

Type in Geneva; isotypes in Leningrad.

Note. In 1957, N.N. Tzvelev found an intergeneric hybrid, *Centaurea rhizantha* C.A.M. X *Tomanthea phaeopappa* (DC.) Takht. and Czer., in the vicinity of the village of Burgov (Nakhichevan ASSR, Shakhbuz District).

4. **T. daralaghezica** (Fom.) Takht. in Tr. Moldykh Nauchn. Rabotn. Arm. Fil. Akad. Nauk SSSR (1939) 242; Grossh. Opred. Rast. Kavk. 493; Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX, 479; Karjagin in Fl. Azerb. VIII, 450.—*Phaeopappus daralaghezicus* Fom. in Izv. Kavk. Muz. III (1907–1908) 282; Grossh. Fl. Kavk. IV, 205.

Perennial. Extremely similar to preceding species, from which it is distinguished mainly by the dark wine-red florets; in general, less dense pubescence on the entire plant and less scabrous stems; leaves that are pinnately incised, relatively less often lyrate, sometimes mostly middle and upper cauline leaves are lyrate to entire. Flowering June to July.

Dry stony slopes; in mid-montane zone, in xeric-steppe phytocoenoses.—*Caucasus*: Southern Transcaucasia (Daralgeyz in Armenia, Nakhichevan ASSR). Endemic. Described from area between villages of Kusha and Gerger (Daralgeyz). Type in Tbilisi.

GENUS 1622. *Stizolophus* Cass.^{1, 2}

Cass. in Dict. Sc. nat. XLIV (1826) 35, 36 and LI (1827) 49.—*Centaurea* sect. *Stizolophus* (Cass.) DC. Prodr. VI (1837) 574; O. Hoffm. in Pflanzenfam. IV, 5 (1893) 331.—*Centaurea* sect. *Balsamitophyllum* Boiss. Fl. or. III (1875) 618; O. Hoffm. op. cit. 331.

365 Capitula heterogamous, medium-sized, with many florets, few solitary at tips of stem and lateral branches, less often (in very large plants) aggregated in lax paniculate inflorescence. Involucre globose-ovate to subglobose, 8–23 mm in dia, more or less covered with very short papillae and mixture of arachnoid tomentum, sometimes subglabrous; involucre bracts many-rowed, imbricate, coriaceous, greenish, with 3–7 inconspicuous veins, gradually longer from broadly

¹Treatment by N.N. Tzvelev.

²From the Greek words *stizein*—to prick, and *lophos*—crest; because of the presence of the awn-like point and cristate-ciliate appendages of the involucre bracts.

ovate outer to oblong innermost; appendages of involucre bracts thinly coriaceous, broadly triangular to lanceolate, slightly decurrent on bracts at base and not distinctly delimited from them, attenuate into long (to 4 mm), prickly apical cusp, cristate-ciliate. Receptacle bristly; bristles numerous, whitish. All florets tubular, yellow, 1.5–2 times as long as involucre, heterogeneous; central florets (disk florets) bisexual, in many irregular rows, with corolla of 5 linear lobes; peripheral florets (ray florets) 1-rowed, sterile, not large, with corolla of 4–5 linear lobes with staminodes far exerted from its throat. Anthers with short, usually 2-toothed, basal appendages, apical appendages free in upper 1/3, gradually narrowed to obtuse tip; stamen filaments almost not flattened, glabrous. Stigma simple, glabrous, with ring of hairs only at base. Achenes oblong, laterally compressed, glabrous and smooth, 3–6 mm long, mature achenes usually dark colored and slightly lustrous, peripheral ones lacking pappus, with weakly developed crown, others with pappus and small-toothed crown at tip, hilum lateral; pappus persistent, many-rowed, almost as long as achene or slightly shorter, whitish, often with smoky tinge, double, outer one of numerous irregular rows of bristles, flattened and very short-hairy on 2 sides (hairs 1.5–2 times as long as wide), gradually longer from very short outer ones to middle and inner ones, inner pappus of 1 row of bristles, like those of outer, but 1/4–1/3 as long as longest of them and usually narrower. Annual herbs with erect, uniformly leafy stems; leaves alternate, undivided or pinnately lobed, scabrous from short crisped hairs and covered with punctate glands.

Type of genus: *S. balsamita* (Lam.) Cass. ex Takht.

Five species of this genus are found in West Asia and Soviet Central Asia, Iran, Afghanistan, and in the Caucasus. Two of them enter the USSR.

The principal morphological features confirming the independence of this genus—often considered as a section of the genus *Centaurea* L.—are the glabrous and apically undivided stigma, glabrous stamen filaments, greatly elongated staminodes of the peripheral florets, and the entirely glabrous achenes, the peripheral ones of which are often without a pappus.

- 366 1. Involucre 15–23 mm in dia and 16–23 mm long; leaves almost always undivided, oblong 1. ***S. balsamita*** (Lam.) Cass. ex Takht.
 + Involucre 8–14 mm in dia and 12–18 mm long; leaves in part pinnately lobed, narrower 2. ***S. coronopifolius*** (Lam.) Cass.

1. ***S. balsamita*** (Lam.) Cass. ex Takht. in Takht. and Fed. Fl. Yerevana (1945) 329; Grossh. Opred. Rast. Kavk. 494.—S.

balsamitaefolius Cass. in Dict. Sc. nat. LI (1827) 50.—*Centaurea balsamita* Lam. Encycl. meth. I (1783) 667; DC. Prodr. VI, 574; Ldb. Fl. Ross. II, 2, 694; Boiss. Fl. or. III, 679; Grossh. Fl. Kavk. IV, 209.—**lc.**: Takht. and Fed. Fl. Yerevana, Atlas (1946) Plate 120.

Annual. Plant 25–120 (150) cm high, more or less scabrous from short crisped and bristly hairs, usually with insignificant mixture of arachnoid tomentum. Stem erect, branched in upper half, with upward spreading branches, terminating into solitary capitula, sometimes simple. Leaves oblong, green; basal and lower cauline ones fast withering, short-petiolate (petiole to 3 cm long), very short and irregularly cristate, occasionally weakly lobate, middle and upper cauline sessile or subsessile, with stiff, spine at tip to 3 mm long. Capitula relatively large. Involucre 15–23 mm in dia and 16–23 mm long; appendages of involucre bracts triangular-lanceolate, light yellowish-brown, attenuate at apex into spiny, cusp to 3–4 mm long, with 5–9 yellow cilia on each side, of which longest one as long as width of appendage. Florets yellow. Achenes 4–6 mm long, peripheral ones often lacking pappus, others with pappus 4–5 mm long.

Stony slopes, gravel beds, often as weed in crop fields and along roads, up to lower montane zone.—*Caucasus*: Southern Transcaucasia; *Soviet Central Asia*: Tien Shan, Syr-Darya, Amu-Darya, Pamiro-Alai Region, mountainous Turkmenia. *General distribution*: Armenia and Kurdistan, Iran-Afghanistan. Described from garden-grown plant, apparently originating from Armenia. Type in Paris.

Note. Apparently, splits off into several, very weakly isolated, ecogeographical races, differing in the size of the capitula and shape of the appendages of the involucre bracts.

2. ***S. coronopifolius*** (Lam.) Cass. in Dict. Sc. nat. LI (1827) 51; Boiss. Fl. or. III, 612; Grossh. Fl. Kavk. IV, 207 and Opred. Rast. Kavk. 494.—*Centaurea coronopifolia* Lam. Encycl. meth. I (1783) 667; MB. Fl. taur.-cauc. II, 342; DC. Prodr. VI, 574; Ldb. Fl. Ross. II, 2, 694.—*C. exaltata* Adams in Web. and Mohr, Beirt. I (1805) 74.—**Exs.**: Herb. Fl. cauc. No. 149; Pl. or. exs. No. 375.

367 Annual. Plant 15–80 cm high, scabrous from very short-spiny and crisped hairs, usually with insignificant mixture of fine arachnoid hairs. Stem erect, with upward spreading branches, terminating in solitary capitula, sometimes (in very small plants) simple. Leaves dark-green, basal and lower cauline fast withering, more or less lyrate, with very large, irregularly toothed, terminal lobes and few lateral lobes; middle and upper cauline leaves oblong to linear, entire or with 1–3 lobes near base, sessile or subsessile, with apical spine 1 mm long. Capitula smaller than in preceding species. Involucre 8–14 mm in dia and 12–

18 mm long; appendages of involucre bracts triangular to broadly lanceolate, light yellowish-brown, attenuate into spiny cusp 3–4 mm long, with 2–6 stiff cilia on each side, slightly longer than width of appendage. Florets yellow. Achenes 3–4 mm long, peripheral ones often lacking pappus, others with pappus 2.5–3.0 mm long. Flowering June to August. (Plate XXVII, Fig. 1).

Stony slopes, steppes, roadsides, to lower montane zone.—*Caucasus*: Eastern and Southern Transcaucasia. *General distribution*: Asia Minor (eastern part), Armenia and Kurdistan (northwestern part). Described from reference to a Tournefort specimen, which apparently came from Georgia or Armenia. Type in Paris.

Note. Like the preceding species, it varies greatly in the size of the capitula and the shape of the involucre bracts, possibly breaking up into a several, weakly marked and narrowly endemic ecogeographical races.

GENUS 1623. *Hyalea* (DC.) Jaub. and Spach^{1,2}

Jaub. and Spach, Ill. pl. or. III (1847–1850) 19 p. p.—*Centaurea* sect. *Hyalea* DC. Prodr. VI (1837) 565.—*Eremopappus* Takht. in Dokl. Akad. Nauk Arm. SSR, II, 1 (1945) 26.

Capitula heterogamous, very small, with few florets, aggregated in lax paniculate or almost corymbose inflorescence, less often (in small plants) solitary. Involucre oblong or ovate, 4–12 mm in dia; involucre bracts many-rowed, imbricate, thinly coriaceous, glabrous, greenish, with darker midrib, outer ones broadly ovate, innermost much longer, linearly lanceolate; appendages of involucre bracts almost entirely (except thick and usually dark colored middle part), membranous, transparent, strongly bulged outside, entire (but often with lacerate margin), decurrent on bracts, and broader, such that usually appressed to involucre surface, in outer and middle bracts broadly crescent-shaped, in innermost as broad membranous margin. Receptacle setose with numerous whitish bristles. Florets pale-pink or whitish with very weak pinkish tinge, not more than 1.5 times as long as involucre; central
368 florets (disk florets) tubular, bisexual, in many irregular rows, with corolla of five lanceolate-linear lobes; peripheral florets (ray florets) tubular-infundibuliform, sterile 1-rowed, not enlarged or very slightly enlarged, lacking staminodes, with (3)4(5) often unequal linear lobes,

¹Treatment by N.N. Tzvelev.

²From the Greek word *hyalos*—glass; because of the presence of the transparent membranous appendages of the involucre bracts.

usually 5–15. Anthers with short 2-toothed basal appendages, apical appendages almost entirely connate, obtuse; stamen filaments flattened, fimbriate. Stigma shortly bifid, covered with thin papillae. All achenes similar, laterally compressed, narrowed at base, lacking prominent, longitudinal ribs, 2.5–3.0 mm long, uniformly and sparsely very-short-hairy, later subglabrous, somewhat lustrous, hilum lateral; pappus persistent, many-rowed, as long as or somewhat longer than achene, whitish, double, inner of 8 broadly linear, vertical and sparsely hairy scales outside, terminating in tuft of erect, quite long hairs; outer pappus 3–3.5 times as long as inner, of several irregular rows of laterally weakly scabrous identical bristles, gradually longer from very short outer to middle and inner ones. Annual herbs with erect, uniformly leafy stems, usually strongly branched, with thin, whitish, somewhat lustrous branches and alternate, undivided or partly weakly lobate, more or less arachnoid tomentose, glabrescent leaves.

Type of genus: *H. pulchella* (Ldb.) C. Koch.

The two species of this genus are distributed in the eastern part of the ancient Mediterranean, from Altai and western regions of China to West Asia.

There is a detailed justification for splitting off this section of the genus *Centaurea* L. into a separate genus in the paper of A.L. Takhtadjan (*Dokl. Akad. Nauk Arm. SSSR*, II, 1 [1945] 25–26), who proposed for it the new name *Eremopappus* Takht. However, according to the Nomenclatural Rules, we are retaining for it the prior name *Hyalea* (DC.) Jaub. and Spach.

- | | | |
|----|---|---|
| 1. | Involucre 12–15 mm long, 9–12 mm in dia | 1. H. tadshicorum (Tzvel.) Sojak |
| + | Involucre 10–12 mm long, 4–6 mm in dia | 2. H. pulchella (Ldb.) C. Koch |

1. **H. tadshicorum** (Tzvel.) Sojak in Nov. bot. Hort. bot. Univ. Carol. Prag. (1962) 47.—*Centaurea tadshicorum* Tzvel. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSR, XIX (1959) 414.—**lc.**: Tzvel. *ibid.* 415.

369 Annual. Plants to 70–80 cm high, more or less arachnoid-tomentose below, subglabrous above. Stem erect, branched in upper part or almost from middle, with thin whitish, somewhat lustrous branches, terminating in one or several capitula on long peduncles. Leaves lanceolate to lanceolately linear, sessile, usually with broad and round base, finely and remotely toothed to almost entire; basal and lower cauline leaves fast withering, apical leaves strongly reduced. Capitula aggregated in lax paniculate or almost corymbose inflorescence, some-

times solitary. Involucre ovate, 12–15 mm long and 9–12 mm in dia; appendages of involucre bracts almost rounded (in innermost involucre bracts), strongly bulged, entire, decurrent on bracts. Florets pale pink. Achenes 2.5–3.0 mm long, pappus 3–4 mm long. Flowering May to July.

Stony slopes and gravel beds.—*Soviet Central Asia*: Pamiro-Alai Region (western part). Endemic. Described from Tadzhik SSR (valley of Kafirnigan River near village of Shaartuz). Type in Leningrad.

2. **H. pulchella** (Ldb.) C. Koch in *Linnaea*, XXIV (1851) 418.—*Centaurea pulchella* Ldb. *Ic. pl. Fl. Ross.* I (1829) 22 and *Fl. alt. IV* (1833) 47; *DC. Prodr.* VI, 565; *Ldb. Fl. Ross.* II, 2, 685; *Boiss. Fl. or. III*, 620; *Grossh. Fl. Kavk.* IV, 208; *Kryl. Fl. Zap. Sib.* XI, 2951.— *C. viminea* Less. in *Linnaea*, VI (1831) 83.— *Eremopappus pulchellus* (Ldb.) Takht. in *Dokl. Akad. Nauk Arm. SSR*, II, 1 (1945) 26; *Grossh. Oprod. Rast. Kavk.* 494.— *Ic.*: *Ldb. loc. cit.* (1829) tab. 93; *Takht. and Fed. Fl. Yerevana, Atlas* (1946) Plate 118.— *Exs.*: *Hayek, Cent. exs.* No. 34; *GRF No.* 1878.

Annual. Plants 70–80 cm high, more or less arachnoid-tomentose below, subglabrous above. Stem erect, branched in upper part, occasionally almost from base, with thin, whitish, weakly lustrous branches, terminating in one or several capitula on long peduncles. Leaves lanceolate to lanceolate-linear, sessile, usually with broad and rounded base, small-toothed to almost entire; basal leaves withering, short-petiolate, oblong-lanceolate, often pinnately shallowly lobed, arachnoid-tomentose, mixed with short papillae; apical leaves strongly reduced. Capitula in lax paniculate or almost corymbose inflorescence, sometimes solitary. Involucre oblong, 10–12 mm long and 4–6 mm in dia; involucre bracts light green, with darker midrib; appendages of involucre bracts almost entirely membranous, broadly crescent shaped to oval, strongly convex, entire (but often lacerate), decurrent on bracts, usually with brownish middle part. Florets pink or whitish, with very weak pink tinge. Achenes about 3 mm long, with almost as long as pappus; tuft of hairs on scales of innermost pappus row longer than in previous, species. Flowering May to July.

370 Stony slopes, talus, rocks, sometimes on sands, to mid-montane zone.—*Caucasus*: Southern Transcaucasia, Talysh; *Soviet Central Asia*: all regions. *General distribution*: Asia Minor, Armenia and Kurdistan, Iran, Dzhungaria-Kashgaria. Described from eastern Kazakhstan (area of Lake Zaisan). Type and isotype in Leningrad.

Note. The varieties recognized by De Candolle, *Centaurea pulchella* α . *viminea* (Less.) DC., *op. cit.* 565, with an arachnoid-tomentose base of the stem, and *C. pulchella* β . *glabra* DC. *op. cit.* 566 with a glabrous stem, apparently do not have any taxonomic significance.

GENUS 1624. *Centaurea* L.^{1, 2}

L. Sp. pl. (1753) 909 p. p.; Gen. pl. ed. 6 (1764) 442 p. p.; DC. Prodr. VI (1837) 565 p. p.; Benth. in Benth. and Hook. f. Gen. pl. II (1873) 477 p. p.; O. Hoffm. in Pflanzenfam. IV, 5 (1893) 326 p. p.—*Solstitiaria* Hill. Veg. Syst. IV (1762) 21.—*Calcitrapa* Adans. Fam. II (1763) 116.—*Jacea* Juss. Gen. pl. (1789) 173.—*Cyanus* Juss. *ibid.* 174.—*Lepteranthus* Neck. Elem. I (1790) 73.—*Psephellus* Cass. in Dict. Sc. nat. XLIII (1826) 488.—*Platylophus* Cass. *ibid.* XLIV (1826) 36.—*Stenolophus* Cass. *ibid.* XLIV (1826) 36, L (1827) 499.—*Acrocentron* Cass. and *Lopholoma* Cass. *ibid.*, XLIV (1826) 37. *Microlophus* Cass. *ibid.* XLIV (1826) 37, LIV (1829) 490.—*Mesocentron* Cass. and *Triplocentron* Cass. *ibid.* XLIV (1826) 38.—*Verutina* Cass. *ibid.* XLIV (1826) 38; LVIII (1829) 8.—*Centaureium* Cass. *ibid.* XLIV (1826) 39, non Gilib. (1781).—*Spilacron* Cass. *ibid.* L (1827) 238.—*Phalolepis* Cass. *ibid.* L (1827) 248.—*Heterolophus* Cass. *ibid.* L (1827) 250.—*Odontolophus* Cass. *ibid.* L (1827) 252.—*Acrolophus* Cass. *ibid.* L (1827) 253.—*Piptoceras* Cass. *ibid.* L (1827) 469; LIV (1829) 487.—*Phrygia* S.F. Gray, Nat. Arrang. Brit. Pl. II (1821) 441.—*Hippophaestum* S.F. Gray and *Leucantha* S.F. Gray, *ibid.* 443.—*Tetramorphaea* DC. in Guill. Archiv. Bot. II (1833) 331; Prodr. VI (1837) 609.—*Hyalea* (DC.) Jaub. and Spach, Ill. pl. or. III (1847–1850) 19 p. p.—*Amblyopogon* (DC.) Jaub. and Spach, *ibid.* 23.—*Xanthopsis* (DC.) C. Koch in Linnaea, XXIV (1851) 422.—*Bielzia* Schur. Enum. pl. Transsilv. (1866) 409—*Sosnovskaya* Takht. in Sov. Bot. 5 (1936) 98.

Capitula heterogamous, small- to rather large-sized, with many florets, less often with few florets (subgenus *Xanthopsis*), solitary at tips of stem (stems) and its branches, less often 2–6, aggregated in corymbose, paniculate or racemose inflorescence, occasionally single on plant. Involucre globose and ovate to short cylindrical, (2.5)4–30(40) mm wide, arachnoid-hairy or glabrous; involucre bracts many-rowed, densely imbricate, coriaceous, with inconspicuous to quite distinct veins, greenish (yellowing on dry), from semicircular, ovate, or triangular-ovate outer ones to oblong-ovate, oblong, or linear inner-

¹Treatments by: M.V. Klokov (subgenera *Acrolophus*, *Heterolophus*, *Phalolepis*), D.I. Sosnowsky (Subgenus *Psephellus*), N.N. Tzvelev (subgenera *Amblyopogon*, *Centaurea*, *Hyalinella*, *Lopholoma*, *Microlophus*, *Odontolophopsis*, *Odontolophus*, *Pseudohyalea*, *Rhizocalathium*, *Xanthopsis*), S.K. Czerepanov (subgenera *Calcitrapa*, *Cyanus*, *Czerniakovskaya*, *Jacea*, *Seridia*, *Solstitiaria*, *Sosnovskya*, *Tetramorphaea*; he also prepared the description of the genus and the key to the subgenera).

²Name of the plant in Hippocrates; possibly, the name originates from the Greek word *Kentauros* (*kentein*—to prick, *tauros*—bull), i.e., pricking bulls.

371 .most, with membranous, sometimes thinly coriaceous, entire, irregularly toothed, fimbri-briate, or cristate-ciliate appendages, decurrent or non-decurrent on bracts, or terminating in short or mostly long and thick spine, usually armed at base with few small spines at base, less often lacking appendages, obtuse or acuminate. Receptacle bristly. All florets tubular, of different colors, usually 1.5–2 times as long as involucre, variable; corolla glabrous, central florets (disk florets) bisexual, many-rowed, peripheral florets (ray florets) sterile, with or without staminodes, with (4)5–8(10)-fid corolla, one-rowed, small (sometimes even slightly smaller) or large, and then mostly tubular-infundibuliform. Anthers with small basal appendages; stamen filaments flattened, covered with papillose hairs or papillae. Stigma very short-woolly, bifid or bisected by collar of hairs. Achenes (2.0)2.5–8.0 mm long, truncate above, with toothed crown (border) on edge, scatteredly hairy, subglabrous (mature) or glabrous; hilum lateral. Pappus as long as, longer (not more than twice) or $1/7$ – $2/3$ as long as achene, usually whitish, white, or brownish, persistent, sometimes more readily deciduous, subgenus, *Psephellus*, double, outer pappus of several irregular rows of scabrous, serrate, or serrate-ciliate bristles, occasionally bristly scales, gradually longer from outer ones to inner, inner pappus as long as outer, often $1/6$ – $2/3$ as long, of one row of scales or bristles, often conically converging at tips, sometimes entirely reduced (and then pappus secondarily simple) occasionally pappus simple (subgenus *Sosnovskya*, except *C. arvensis*) or achenes lacking pappus (some species of subgenera *Calcitrapa* and *Acropophus*). Perennial, biennial, or annual herbs with erect, assurgent, or prostrate stems (occasionally stemless) and entire to pinnately incised leaves.

Type (Lectotype) of genus: *C. centauricum* L.

A chiefly Mediterranean genus, comprising 530–550 species, of which there are 178 in the USSR.

KEY TO SUBGENERA

1. Plants stemless or almost stemless (stems to 5 cm high), with long, strongly branched rhizomes. Capitula mostly single in center of rosette of basal leaves; florets yellow, peripheral not large; pappus $1/5$ – $1/3$ as long as achene 19. Subgenus **Rhizocalathium** (Tzvel.) Tzvel. (p. 563)
- + Plants with stems developed. Capitula solitary at tips of stem and its branches, rarely 2–6; florets of various colors 2.
- 372 2. Perennials, lacking creeping underground runners, with well-developed, strongly branched caudex at base, usually (at least during

- flowering) lacking rosette of basal leaves; stems mostly numerous, erect, more or less uniformly covered with thin, narrow, entire, undivided, occasionally pinnately lobed or incised (and then broader), sessile or subsessile, nondecurrent leaves, almost virgate. Involucral bracts at tips always with membranous, cristate-ciliate, occasionally irregularly toothed appendages; pappus $1/7-2/3$ as long as achenes, rarely (in one species of subgenus *Sosnovskya* (Takht.) Czer.) as long as achene 3.
- + Plants with different combination of characters 6.
3. All leaves with single, not always prominent vein. Florets light yellow, yellowish-white, or whitish, sometimes with weak pinkish-violet tinge, less often pale pink; peripheral florets not enlarged...4.
- + Lower and middle cauline leaves with 3 almost parallel prominent veins. Florets pink; peripheral florets enlarged 5.
4. Capitula few-flowered (with 6–15 florets); appendages of involucral bracts very large, entirely covering bracts themselves. Peripheral florets (often entirely absent) with staminodes hardly exerted from corolla tube. Achenes 3.5–5.0 mm long; pappus one-fifth to one-seventh as long as achene, double, with oblong scales of inner pappus longer than strongly reduced, much narrower, erose-ciliate scales of outer pappus occasionally almost as long. Stem strongly branched almost from base or only in upper part 8. Subgenus **Xanthopsis** (DC.) Tzvel. (p. 472)
- + Capitula many-flowered, appendages of involucral bracts small, partially covering bracts; peripheral florets with staminodes rather far exerted from corolla tube. Achenes 5–7 mm long; pappus $1/2-2/3$ as long as achene, sometimes as long as achene, simple, consisting of scabrous bristles, gradually longer from very short outer to inner, rarely (in *C. arpensis* (Czer.) Czer.) double, but then oblong inner pappus scales almost $1/2$ as long as outer pappus bristles. Stems strongly branched in lower part 9. Subgenus **Sosnovskya** (Takht.) Czer. (p. 475)
5. Appendages of involucral bracts relatively small, almost as wide as bracts (occasionally narrower) and decurrent on them; peripheral florets more or less greatly enlarged, usually with staminodes far exerted from corolla tube, occasionally (in *C. avarica* Tzvel.) without them; inner pappus bristles scarcely differing in form from scabrous outer pappus bristles, $1/4-1/2$ as long as them 10. Subgenus **Odontolophus** (Cass.) Hayek (p. 479)
- 373 + Appendages of involucral bracts very large, wider than bracts and not decurrent on them; peripheral florets less enlarged, with staminodes not exerted from corolla tube; inner pappus scales oblong-spatulate, erose-ciliate, greatly differing in form from

- scabrous outer pappus bristles, $1/3-2/3$ as long 11. Subgenus **Odontolophopsis** Tzvel. (p. 483)
6. Involucral bracts gradually acuminate, usually terminating in short spine, without well developed appendages; florets yellow. Plants lacking creeping underground runners, with string-like roots; middle and upper cauline leaves sessile, decurrent on stem as wide wings 17. Subgenus **Microlophus** (Cass.) Hayek (p. 558)
- + Involucral bracts at tip with more or less developed appendages of diverse shapes and sized, sometimes without, but then cauline leaves (except upper) petiolate, not decurrent on stem 7.
7. Involucral bracts obtuse; without appendages or with appendages in form of fragile, always entire, but usually more or less lacerate, membranous border; achenes entirely glabrous, weakly transversely rugose in upper part; florets yellow. Perennial plants, lacking creeping underground runners, with string-like root 1. Subgenus **Centaurea** (p. 375)
- + Involucral bracts at tip with prickly or membranous, mostly well developed appendages, rarely with few cilia on margin or terminating in short spine; achenes sparsely short-hairy, sometimes mature achenes almost glabrous, smooth; florets of different color 8.
8. Annuals, biennials, or perennials with string-like root 9.
- + Perennials with long or more or less short rhizomes 16.
9. Appendages of involucral bracts large, round, usually convex, membranous as whole or only on margin, entire or indistinctly toothed, not decurrent on bracts. Biennials, less often perennials; leaves (except uppermost) pinnately- or bipinnately incised, with filiform, narrowly linear, linear, linear-lanceolate, occasionally oblong segments 16. Subgenus **Phalolepis** (Cass.) Dobrocz. (p. 536)
- + Appendages of involucral bracts different. Leaves entire and undivided to bipinnately incised 10.
10. Florets yellow 11.
- + Florets pink of different shades, purple, dark red, blue, sky blue, sometimes whitish or white (albinos) 12.
11. Involucral bracts at tip with 5(7) palmately divergent spines, of which middle spine usually much longer (to 30 mm long) and thicker than others (2.5-4.0 mm long); achenes 2.5 mm long, outermost without pappus. Leaves (except lower) entire or almost entire, sessile, long-decurrent on stem as narrow wings 20. Subgenus **Solstitiaria** (Hill) Dobrocz. (p. 568)
- + Involucral bracts at tip with thin-coriaceous or membranous, cristate-ciliate, appendages decurrent on bracts, terminating in short or recurved spine; achenes 4-6 mm long, all with pappus. Leaves (except upper) pinnately parted or lobed, sometimes, in part, bipin-

- nately incised, petiolate, not decurrent (see also couplet 15)
 14. Subgenus **Lopholoma** (Cass.) Dobroc. (section *Acrocentron* (Cass.) DC. and *Orientalis* (Hayek) Tzvel. (p. 491)
12. Peripheral florets blue or sky-blue, greatly enlarged, oblique, tubular-infundibuliform, with corolla limb 1/3–1/2 incised into lobes unequal in length; middle florets lilac-pink or violet-lilac; styles bifid to collar of hairs, with branches divergent; appendages of involucre bracts membranous, not spiny, very long-decurrent on bracts as border, fimbriate or irregularly toothed, including on border. Annual weeds (cf. also couplets 18 and 23)
 2. Subgenus **Cyanus** (Juss.) Hayek (section *Cyanus*) (p. 385)
- + All florets pink of various shades, purple, less often dark red; peripheral florets not enlarged or somewhat enlarged and then tubular-infundibuliform, with corolla limb incised almost to base into lobes more or less equal in length; styles of middle florets short bifid at tip; involucre bracts at tip with long stiff spines or membranous and thinly coriaceous, cristate-ciliate, less often finely small-toothed, appendages decurrent on bracts, terminating in spine, cusp, or prickle 13.
13. Capitula enclosed by apical leaves; outer involucre bracts at tip with green, foliaceous appendages not decurrent on bracts, middle bracts with white, strongly recurved, long (10–22 mm), simple prickle; pappus as long as achene or slightly longer. Stem white, mostly strongly dichotomously branched from base, branches strongly divaricate; leaves undivided, spiny-toothed, sessile, broadly amplexicaul-cordate.
 22. Subgenus **Tetramorphaea** (DC.) Czer. (p. 575)
- + Capitula not enclosed by apical leaves; appendages of outer involucre bracts not foliaceous; pappus different in length or absent. Leaves pinnately lobed or bipinnately incised, sometimes undivided or entire, not spiny-toothed; cauline leaves sessile or petiolate, not decurrent on stem 14.
- 375 14. Tips of outer and middle involucre bracts with (3) 5–7 palmately divergent yellow spines, the middle spine much longer (10–30 mm) and thicker than others (3–5 mm long); pappus shorter than achenes or absent. Stem pale green, strongly divaricately branched from middle or below; leaves mostly pinnately incised, rarely leaves sessile..... 21. Subgenus **Calcitrapa** (Adans.) Hayek (p. 572)
- + Tips of outer and middle involucre bracts with membranous or thin-coriaceous, cristate-ciliate, occasionally finely serrate, appendages, which are decurrent on bracts and prolonged into spine, cusp or prickle at tip sometimes reduced to short spine 15.

15. Involucre 14–28 mm long and (9)11–28(35) mm in dia; achenes 3.5–6.0(6.5) mm long; pappus (3)4–9 mm long (in *C. stereophylla* Bess. 1.5–2.5 mm). Mostly perennial plants; stems few-branched or simple in upper part, together with leaves covered by short-papillose hairs mixed with crisped hairs and thin arachnoid tomentum, weakly scabrous, green; leaves (except upper) pinnately parted or lobed, with linear, oblong or broadly ovate segments and lobes, occasionally undivided or entire, petiolate (cf. also couplet 11)...
 14. Subgenus **Lopholoma** (Cass.) Dobroc. (p. 491)
- + Involucre 8–13(15) mm long and 2.5–8 (sometimes 10–13 mm) in dia; achenes 2.5–3.5(4.0) mm long; pappus 0.1–3.5(4.2) mm long or absent. Biennial or occasionally annual plants; stems mostly strongly branched from base or middle, together with leaves arachnoid hairy or arachnoid-tomentose and usually sharply scabrous; leaves (except uppermost) pinnately or bipinnately incised, with narrowly linear or linear segments; middle and upper cauline leaves sessile 15. Subgenus **Acrolophus** (Cass.) Dobroc. (p. 510)
16. Florets yellow, pale yellow or pale yellowish-pink; appendages of involucre bracts in form of prickles or membranous 17.
- + Florets pink of various shades, purple, blue, sky blue, sometimes whitish or white (albinos); appendages of involucre bracts always membranous 19.
17. Appendages of outer and middle involucre bracts coriaceous, with (3)5–7 palmately divergent small prickles almost equal in length, not decurrent on bracts. Stems prostrate, at tip ascending; leaves distinctly petiolate 18. Subgenus **Seridia** (Juss.) Czer. (p. 562)
- + Appendages of outer and middle involucre bracts membranous, more or less remotely cristate-ciliate or long-fimbriate, mostly decurrent on bracts; stems ascending, at base arcuately ascending or erect; leaves (except basal and lower cauline) sessile or almost sessile 18.
- 376 18. Florets yellow or pale yellowish-pink, peripheral florets not enlarged, staminodes not exerted from corolla tube; styles of central florets short-bifid at tip; pappus double, outer one consisting of bristles, inner of oblong or oblong-lanceolate, 2–3-times-wider scales; 1/2–2/3 as long as outer pappus bristles. Cauline leaves entire, almost sessile, basally strongly narrowed (Kopetdag)
 3. Subgenus **Czerniakovskaya** Czer. (p. 416)
- + Florets whitish-yellow, peripheral much larger, without staminodes; styles of central florets bifid to collar of hairs, with divergent branches; pappus double, consisting of bristles of almost identical structure, but inner ones 1/3–1/2 as long as outer pappus bristles. Cauline leaves entire, to lyrate pinnately incised, sessile, decur-

- rent on stem (Caucasus) (cf. also couplets 12 and 23)
 2. Subgenus **Cyanus** (Juss.) Hayek (*C. cheiranthifolia* Willd., from section *Protocyanus* Dobroc. (p. 385)
19. Achenes lacking pappus; appendages of involucre bracts large, rounded, slightly convex, lacerate, irregularly toothed or fimbriate-toothed, occasionally almost entire, not decurrent on bracts. Leaves entire, remotely toothed, often basal and lower cauline leaves sinuate-lobate (cf. also couplet 25)
 5. Subgenus **Jacea** (Juss.) Hayek (section *Jacea*) p. 437
- + Achenes with pappus 20.
20. Pappus 1.5–2 times as long as achenes or equal to it 21.
 + Pappus 1/5–1/2 as long as achene 22.
21. Plants with long rhizome. Involucre 15–20 mm in dia; appendages of involucre bracts strongly decurrent on bracts
 12. Subgenus **Pseudohyalea** (Tzvel.) Tzvel. (p. 484)
- + Plants with short rhizome. Involucre 7–14 mm in dia; appendages of involucre bracts almost not decurrent on bracts
 13. Subgenus **Hyalinella** (Tzvel.) Tzvel. (p. 485)
22. Appendages of involucre bracts decurrent on bracts 23.
 + Appendages of involucre bracts not decurrent on bracts 24.
23. Peripheral florets much enlarged; styles of central florets bifid to collar of hairs, with divergent branches; pappus double, consisting of serrate or serrate-ciliate bristles of almost identical structure, but inner pappus bristles 1/4–1/3 as long as outer bristles; appendages of involucre bracts strongly decurrent on bracts as border, together with border fimbriate or irregularly toothed (cf. also couplets 12 and 18) 2. Subgenus **Cyanus** (Juss.) Hayek (section *Protocyanus* Dobroc. (p. 385)
- 377 + Peripheral florets not enlarged but weakly broadened at corolla throat; styles of central florets short-bifid; pappus double, outer consisting of weakly scabrous, setose scales, inner of significantly broader, oblong, apically erose-ciliate scales, almost as long as outer pappus scales; appendages of involucre bracts decurrent on bracts, cristate-ciliate, acuminate or with short spine
 7. Subgenus **Amblyopogon** (DC.) Tzvel. (p. 470)
24. Pappus simple, consisting of short, comparatively readily shedding, scabrous, scale-like setae; peripheral florets with staminodes usually not exerted from corolla tube; styles of central florets apically short-bifid; appendages of involucre bracts fimbriate. Stems prostrate, assurgent or almost erect, mostly simple; leaves pinnately incised, lyrate, occasionally undivided
 4. Subgenus **Psephellus** (Cass.) Schmalh. (p. 418)
- + Pappus clearly double, persistent; peripheral florets lacking

- staminodes; styles of central florets bifid, with long branches 25.
25. Outer pappus consisting of finely setose bristles, inner of linear-lanceolate, smooth scales, conically converging at tips; appendages of involucre bracts fimbriate, toothed, or in part entire. Stems arising from axils of basal leaves, prostrate or ascending; basal leaves pinnately incised, cauline leaves pinnately parted or undivided 6. Subgenus **Heterolophus** (Cass.) Dobroc. (p. 460)
- + Pappus consisting of serrate bristles of identical structure, but inner pappus bristles $1/2$ – $2/3$ as long as outer; appendages of involucre bracts cristately dissected to filiform, mostly long-fimbriate, with subulate or caudate nonprickly tip. Stems arising from rhizome, usually erect; all leaves remotely toothed (cf. also couplet 19) 5. Subgenus **Jacea** (Juss.) Hayek (section *Leptanthus* (Neck DC.) (p. 437)

Subgenus 1. **Centaurea**.—*Centaureum* Cass. in Dict. Sc. nat. XLIV (1826) 39, non Gilib. (1781).—*Centaurea* sect. *Centaureum* (Cass.) DC. Prodr. VI (1837) 566.—*Bielzia* Schur, Enum. pl. Transsilv. (1866) 409.—*Centaurea* subgen. *Centaureum* (Cass.) Hayek, *Centaurea*-Art. Osterr.-Ung. (1901) 2.—Capitula medium- or rather large-sized, with many florets, solitary at tips of main stem and its branches. Involucre broadly-ovate to subglobose, glabrous, or subglabrous (with fine arachnoid tomentum on outer side of involucre bracts) 10–30 mm in dia; involucre bracts coriaceous, greenish, with 5–10 very weak but usually dark colored veins, gradually larger from semicircular and broadly ovate outer ones to oblong-ovate innermost, obtuse or roundish, lacking or with appendages more or less broad, membranous, semitransparent border (in innermost bracts, appendage often rounded or ovate), always entire, but usually more or less lacerate. All florets tubular, yellow, very rarely (in *C. jankae* Brandza) dark-red, 1.5–2 times as long as involucre, variable, central bisexual, peripheral not enlarged, sterile, sometimes with staminodes exerted from corolla tube. Stamen filament flattened and covered with papilliform hairs; appendages of anthers at tip gradually acuminate. Stigma short-bifid. Achenes 5.5–8.0 mm long, glabrous, more or less transversely rugose in upper part; pappus as long as achenes, slightly longer, or not less than $2/3$ as long, persistent, brownish or whitish, double, outer pappus consisting of several irregular rows of bristles flattened and scabrous on two sides, gradually longer from very short outer one to middle and inner ones; inner pappus as long as outer or shorter (sometimes longer or entirely reduced), consisting of 1 row of scale-like bristles broader in lower part, gradually tapered above, also scabrous and connate into ring at base. Perennials but usually not long-parenting herbs, lacking creeping

underground runners, with string-like root and erect, more or less branched stems. Leaves petiolate or sessile, sometimes short-decurrent on stem, pinnately divided or lobed, less often lyrate or undivided, usually glabrous, occasionally with scattered hairs or thin woolly tomentum, but always with more or less copious woolly tomentum in axils of basal leaves.

Type of subgenus: type of genus.

Twenty-four species of this subgenus are distributed in the ancient Mediterranean region, from the Pyrenean Peninsula and North Africa in the west to Altai and the western provinces of China in the east. Thirteen species are found in the USSR.

Subgenus *Centaurea* occupies a very distinct position in the genus and, on the basis of several characters (anther appendages gradually acuminate; achenes glabrous, transversely rugose in upper part; bristles of inner pappus gradually acuminate, and others), it might be considered as a separate genus. Species of this subgenus, except for a few closely related ecogeographical races, often occupy isolated insular ranges, indicating a considerable shrinking of the range of this subgenus, one of the most ancient of the genus.

- 379
1. Involucral bracts (except innermost) lacking appendages, rarely with very narrow (to 1 mm wide), membranous border 2.
 - + Involucral bracts with appendage more or less in form of wide membranous border 4.
 2. Leaves undivided, oblong-oval, sometimes with 1–2 pairs of strongly reduced lateral lobes at base 3. *C. alaica* Iljin
 - + Leaves pinnately divided or incised, or lyrate 3.
 3. Lower (sometimes also middle) cauline leaves with greatly enlarged terminal segment, much wider than lateral lobes. Inner pappus bristles often 1/2 as long as longest outer pappus bristle 2. *C. modesti* Fed.
 - + Terminal segment of leaves not larger than lateral (rarely in basal leaves more or less enlarged). Inner pappus bristle usually 1/5 as long as longest outer pappus bristle or less ... 1. *C. ruthenica* Lam.
 4. Plants entirely, or only in lower part, covered with sparse spreading hairs (southern European part of the USSR) 12. *C. talievii* Kleop.
 - + Plants glabrous or woolly-tomentose in lower part 5.
 5. Leaves undivided, cauline leaves almost always sessile, usually short-decurrent on stem 13. *C. turkestanica* Franch.
 - + Leaves pinnately divided or lobed or lyrate 6.
 6. Terminal segment of all or almost all leaves much broader and larger than lateral ones; lateral segments oblong 7.

- + Terminal segment of all or almost all leaves not larger than lateral ones; lateral segments usually narrower 9.
7. Terminal segment of all or almost all leaves basally attenuate into petiole (Karatau Mountains) 9. **C. phyllopoda** Iljin
- + Terminal segment of all or almost all leaves basally coalesced with nearest pair of lateral segments 8.
8. Almost all (except 1–2) scale-like bristles inner pappus 1/4–1/2 as long as longer outer pappus bristle (Kopetdag) 5. **C. androssovii** Iljin
- + Almost all (except a few) scale-like inner pappus bristles more or less as long as longest outer pappus bristles or slightly longer (Pamiro-Alai) 4. **C. gontscharovii** Iljin
9. Petiole (with rachis) of lower leaves more or less silky tomentose 10.
- + All leaves glabrous 12.
10. Involucre 20–30 mm in dia. (Southern Armenia) 6. **C. hajastana** Tzvel.
- 380 + Involucre 10–20 mm in dia 11.
11. Pappus 6.5–8.5 mm long, slightly shorter than achene (Caucasus)...
..... 11. **C. razdorskyi** Karjag.
- + Pappus 9–10 mm long, slightly longer than achene (Tien Shan)...
..... 10. **C. lasiopoda** M. Pop. and Kult.
12. Stems numerous, strongly branched; involucre 10–13 mm in dia (Karatau Mountains) 8. **C. kultiassovii** Iljin
- + Stems usually solitary, less branched; involucre 12–20 mm in dia
..... 7. **C. kasakorum** Iljin

Series 1. Ruthenicae Dobrocz. in Ukr. Bot. Zhurn. XIX, 1 (1962) 43, descr.; in Bot. Zhurn. Akad. Nauk URSR, VI, 2 (1949) 63, nomen.—Leaves entire or in part more or less pinnately divided or lobed, cauline leaves petiolate or sessile but not decurrent.

1. **C. ruthenica** Lam. Encycl. meth. I (1783) 663; MB. Fl. taur.-cauc. II, 342; DC. Prodr. VI, 566; Ldb. Fl. Ross. II, 2, 686; Boiss. Fl. or. III, 623; Schmalh. Fl. II, 120; Grossh. Fl. Kavk. IV, 212 and Opred. Rast. Kavk. 495; Kryl. Fl. Zap. Sib. XI, 2951.—**Centaurium ruthenicum** (Lam.) C. Koch in Linnaea, XXIV (1851) 417.— **Ic.:** Gmel. Fl. sibirica, II (1749) tab. 41; Taliev in Tr. Obshch. Isp. Prir. pri Khark. Univ. XXXIV (1900) Plate 2; Fedtsch. and Fler. Fl. Evrop. Ross. (1910) Fig. 1022; Syreistsch. Ill. Fl. Mosk. Gub. III (1910) 311; B. Fedtsch. in Tr. Bot. Sada Akad. Nauk SSSR, XL (1928) 110; Javorka and Csapody, Iconogr. Fl. Hung. (1933) 545, fig. 3894.— **Exs.:** Ed. Horti Bot. Petrop. No. 50; GRF No. 1620.

Perennial. Plants to 100–140 cm high, except stem base (with profuse woolly tomentum in axils of basal leaves) glabrous, green, sometimes weakly glaucescent; stems solitary or a few, erect, mostly branched in upper part or simple. Leaves pinnately divided, lower ones rather long-petiolate, others with lower pair of lateral segments approximate to their bases; lateral segments oblong to almost linear, 5–12 on each side, acuminate, cartilaginously serrate-toothed (sometimes weakly lobed), narrowed at base, but usually sessile; terminal segment identical to lateral ones, usually as broad or narrower, sometimes broader. Involucre 10–20 mm in dia and 15–23 mm long, glabrous; outer and middle involucre bracts lacking appendages, sometimes with very narrow (to 1 mm wide) membranous border, only innermost bracts with small, membranous, brownish appendage. Florets yellow. Achenes 6–8 mm long; pappus whitish or brownish, 4.5–6.0 mm long; scale-like inner pappus bristles usually strongly reduced (1/5 and less as long as longest outer pappus bristle). Flowering May to August.

Steppes, on stony slopes, outcrops of chalk and limestone; to mid-montane zone.—*European Part*: Volga-Kama (southern part), Middle Dnieper (eastern part), Volga-Don, Trans-Volga, Bessarabia, Black Sea Region, Lower Don, Lower Volga; *Caucasus*: Ciscaucasia, Southern Transcaucasia (Daralgez); *Western Siberia*: Upper Tobol (southern part), Irtysh (southern part), Altai; *Soviet Central Asia*: Aralo-Caspian Region (Ulutau Mountains), Lake Balkhash Region (northern and eastern parts), Dzhungaria-Tarbagatai, Tien Shan, Syr-Darya, Pamiro-Alai Region. *General distribution*: Central Europe (southeastern part), Balkans (northeastern part). Described from European part of USSR. Type in Paris.

Note. This widely but sporadically distributed species, apparently even in the more restricted circumscription accepted by us, is not entirely homogeneous and includes somewhat weakly separated ecogeographical races. Thus, possibly *S. ruthenica* var. *bipinnatifida* Trautv. (*Enum. pl. song.* II ([1866] 66) from the Ulutau Mountains is a separate ecogeographical race; it has very narrow, more or less pinnately lobed leaf segments. Morphologically less distinct plants with narrower linear leaf segments—*C. ruthenica* var. *genuina* f. *angustiloba* Korsh. *Tent. Fl. Ross. or.* (1898) 235; *C. ruthenica* var. *angustiloba* Taliev in *Tr. Obshch. Isp. Prir. pri Khark. Univ.* XXXIV (1900) 235—are sporadically found almost throughout the range of this species. Plants from Tien Shan and Pamiro-Alai have scale-like inner pappus bristles, often to half as long as the longest outer pappus bristle.

2. *C. modesti* Fed. in Bot. Zhurn. SSSR, XXXIII (1948) 37.—*C. ruthenica* Lam. var. *lyrata* Trautv. Enum. pl. song. II (1866) s66.—**lc.**: Fed. loc. cit. Plate IV.

Perennial. Plants to 100–120 cm high, glabrous except at stem base, greenish. Stems solitary or few, erect, usually with a few lateral branches. Leaves pinnately divided, lower ones rather long-petiolate, with much larger terminal segment and fewer lateral segments, others sessile; lateral segments oblong to almost linear, 3–8 on each side, acuminate, cartilaginously serrate-toothed, narrowed at base but usually sessile; terminal segment often larger and broader than lateral. Involucres 12–20 mm in dia, and 15–23 mm long, glabrous; outer and middle involucral bracts lacking appendages but with very narrow (to 1 mm wide) membranous border, innermost bracts, with small membranous appendages. Florets yellow. Achenes 6–7 mm long; pappus brownish-gray, 5–6 mm long; scale-like inner pappus bristles almost 1/2 as long as longest outer pappus bristles. Flowering June to July.

Stony slopes, mountain steppes, scrubs; to mid-montane zone.—*Soviet Central Asia*: Tien Shan, Syr-Darya, Pamiro-Alai Region (north-eastern part). Endemic. Described from Fergana Range. Type in Leningrad.

Note. It is possible that all plants of *C. ruthenica* from the Tien Shan and Pamiro-Alai Region should be referred to this species, which is quite weakly separated from *C. ruthenica*.

382 3. *C. alaica* Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VII, 3 (1937) 69.

Perennial. Plants to 80–100 cm high, glabrous, except at stem base, green. Stems solitary or a few, erect, usually with a few lateral branches. Leaves oblong-ovate, acute, cartilaginously toothed, gradually narrowed toward base, lower leaves quite long-petiolate, undivided, others very short-petiolate with winged petiole, or subsessile, also undivided or with a few, very small, lateral segments at base. Involucres 11–13 mm in dia and 15–18 mm long, glabrous; outer and middle involucral bracts lacking appendages, sometimes with very narrow (to 1 mm wide) membranous border, innermost bracts with small membranous appendage. Florets yellow. Achenes unknown. Flowering July to August.

Stony slopes; to mid-montane zone.—*Soviet Central Asia*: Pamiro-Alai Region (Alai Range). Endemic. Described from Alai Range. Type in Leningrad.

Note. The few known specimens of this species possibly are only extreme variants of the preceding species and do not constitute a distinct ecogeographical race.

4. **C. gontscharovii** Iljin in Izv. Tadz. Bazy Akad. Nauk SSSR, 1, 1 (1933) 70.

Perennial. Plants to 100–150 cm high, glabrous except at stem base, green. Stem solitary or few, erect, more or less branched. Leaves pinnately incised, lower ones quite long-petiolate, others short-petiolate or sessile; lateral segments of leaves oblong, 3–6 on each side, with short cusp, serrate-toothed, narrowed toward base, sessile or on very short winged petiole; terminal segments usually much broader and longer than lateral, coalescent at base with adjacent pairs of lateral segments. Involucres 19–25 mm in dia and 23–28 mm long, glabrous; outer and middle involucral bracts with appendages as membranous, semitransparent border, innermost bracts with much larger ovate or oblong, brownish, about 1 cm long appendages. Florets yellow. Achenes about 8–9 mm long; pappus brownish-gray, 8–9 mm long, scale-like inner pappus bristles usually slightly longer than shortest outer pappus bristle or as long. Flowering May to July.

Stony slopes, scrubs, to mid-montane zone.—*Soviet Central Asia*: Pamiro-Alai Region. Endemic. Described from Eastern Tadzhikistan (Khodzha-Dolon Mountains). Type in Leningrad.

5. **C. androssovii** Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VII, 3 (1937) 70.—*lc.*: Czer. in Fl. Turkm. VII (1960) Plate XLI.

383 Perennial. Plants to 100–150 cm high, glabrous except at stem base, green. Stems solitary or few, erect, more or less branched. Leaves pinnately divided, lower ones quite long-petiolate, others short-petiolate or sessile; lateral segments of leaves oblong, 3–9 on each side, with short cusp, serrate-toothed (sometimes only on one side of segment), usually narrowed at base, terminal segment usually much broader and longer than lateral ones, coalescent at base with adjacent pair of lateral segments. Involucre 20–28 mm in dia and 25–30 mm long, glabrous; outer and middle involucral bracts with appendages as membranous semitransparent border to 3 mm wide, innermost bract with broadly ovate or ovate appendages 5–8 mm long. Florets yellow. Achenes 8–10 mm long; pappus whitish or more or less brownish-gray, 8–10 mm long, inner pappus bristles (except 1–2 longest) 1/4–1/2 as long as longest outer pappus bristle. Flowering June to July.

Stony slopes, to mid-montane zone.—*Soviet Central Asia*: mountainous Turkmenia. Endemic. Described from Kopetdag (in region of Ashkhabad city). Type in Ashkhabad; isotype in Leningrad.

6. **C. hajastana** Tzvel. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX (1959) 411.—*C. ruthenica* auct. non Lam.: Bordz. in Vestn. Tifl. Bot. Sada, Nov. Ser. V (1931) 67.

Perennial. Plants to 100–120 cm high, glabrous except at stem base and lower leaves, green. Stems solitary or few, erect, usually with a few lateral branches. Leaves pinnately divided, lower ones quite long-petiolate, including rachis more or less woolly-tomentose, others short-petiolate or sessile; lateral segments of leaves oblong-linear or linear, 4–8 on each side, very gradually acuminate, remotely serrate, terminal segment identical to lateral ones, usually coalescent with adjacent pair of lateral segments. Involucres 20–30 mm in dia and 25–32 mm long, glabrous; outer and middle involucral bracts with appendages as membranous border 1–4 mm wide; innermost bracts with much larger, ovate or oblong, to 10 mm long appendages. Florets yellow. Achenes 8–10 mm long; pappus whitish or brownish-gray, 9–10 mm long; scale-like inner pappus bristle $1/4$ – $1/3$ as long as longest outer pappus bristle. Flowering June to August.

Stony slopes, steppes; in low-montane zone.—*Caucasus*: Southern Transcaucasia (south of Leninakan). Endemic. Described from Armenian SSR. Type in Yerevan.

7. *C. kasakorum* Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VII, 3 (1937) 66.

Perennial. Plants to 50–75 cm high, glabrous except at stem base, glaucescent-green. Stems solitary or few, erect, simple or with a few lateral branches. Leaves pinnately divided or lobed, basal and lower cauline leaves quite long-petiolate, others relatively few, with lower pair of lateral segments approximate to base; lateral segments oblong or oblong-ovate, less often narrower (to linear), 6–15 on each side, acuminate, cartilaginously serrate-toothed, narrowed at base, middle segments usually largest, terminal segment identical to lateral ones, usually as broad or narrower than laterals. Involucres 12–20 mm in dia and 17–23 mm long, glabrous; outer and middle involucral bracts with appendages as wide membranous border, innermost with large, oblong or ovate appendages. Florets yellow. Achenes about 6–8 mm long; pappus brownish-gray, 5–7 mm long, scale-like inner pappus bristles unequal, longest of them $1/2$ – $2/3$ as long as longest outer pappus bristle. Flowering May to July. (Plate XXII, Fig. 1).

Stony slopes, outcrops of chalk and limestone, to low-montane zone.—*European Part*: Trans-Volga, Lower Volga (northeastern part); *Western Siberia*: Upper Tobol (southern part); *Soviet Central Asia*: Aralo-Caspian Region (northern and eastern parts), Lake Balkhash Region (southern part), Dzhungaria-Tarbagatai, Tien Shan (eastern part). *General Distribution*: Dzhungaria-Kashgaria. Described from western Kazakhstan. Type in Leningrad.

Note. This species is distributed very sporadically, often seemingly alternating with *C. ruthenica*, with which, however, it is never found. The plants from the eastern and southern parts of the range have narrower (even linear) leaf segments, possibly constituting a separate ecogeographical race.

8. *C. kultiassovii* Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VII, 3 (1937) 68.

Perennial. Plants to 100–150 cm high, glabrous except at stem base, green. Stems very numerous, less often solitary, erect, strongly branched, with numerous capitula. Leaves pinnately divided, lower ones quite long-petiolate, early withering, others sessile or very short-petiolate; lateral leaf segments oblong or oblong-ovate, 3–6 on each side, with very short cartilaginous cusp, remotely toothed to almost entire, considerably narrowed or even short petiolate at base, terminal segment oblong-linear, usually narrower than laterals, narrowed at base but not petiolate. Involucres 10–13 mm in dia and 17–20 mm long, glabrous; outer and middle involucral bracts with appendages as very broad, often lacerate, membranous border, innermost bracts strongly elongated, with very narrow, oblong appendages. Florets yellow. Achenes 7–8 mm long; pappus 8–9 mm long, brownish grayish; scale-like inner pappus bristles usually slightly surpassing outer pappus bristles. Flowering June to August.

385 Stony slopes; to mid-montane zone.—*Soviet Central Asia*: Tien Shan (Karatau Mountains). Endemic. Described from Karatau Mountains. Type in Leningrad.

9. *C. phyllopoda* Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VII, 3 (1937) 67.

Perennial. Plants to 100 cm high, glabrous except at stem base, glaucous-green. Stems solitary or few, erect, more or less branched. Uppermost leaves often in part entire, others pinnately divided, leaves very long-petiolate, middle and upper leaves with lower pair of lateral segments approximate to base; lateral segments oblong, 1–5 on each side, acuminate, irregularly cartilaginously toothed, sometimes shallowly lobed, narrowed at base into short petiole or sessile; terminal segment much longer than lateral ones, always clearly petiolate. Involucres 10–15 mm in dia, glabrous; outer and middle involucral bracts with appendages as very broad, often lacerate, membranous border, innermost bracts with large, ovate or oblong appendages. Florets yellow. Achenes 7–8 mm long, with brownish-gray pappus almost as long as achenes. Flowering July to August.

Stony slopes, to mid-montane zone.—*Soviet Central Asia*: Tien Shan (Karatau Mountains). Endemic. Described from Karatau Mountains. Type in Leningrad.

10. **C. lasiopoda** M. Pop. and Kult. in Tr. Sredneaz. Gos. Univ. Ser. VIIIb, Bot. 3 (1928) 110; Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VII, 3, 71.—**Exs.**: H.F.A.M. No. 499.

Perennial. Plants to 60–80 cm high, glabrous except at stem base and lower leaves or subglabrous, green. Stems solitary or few, erect, more or less branched above middle. Leaves pinnately divided, lower ones quite long-petiolate, with midrib more or less woolly-tomentose, other leaves sessile or subsessile with lateral segments approximate to base; lateral segments of leaves linear or narrowly linear, quite numerous, acuminate, irregularly toothed or pinnately lobed, sessile, terminal segment identical to laterals. Involucre 12–15 mm in dia and 19–24 mm long; outer and middle involucre bracts usually covered with fine tomentum on outer side, with apical appendage as broad membranous border, innermost bracts with large, oblong appendages. Florets yellow. Achenes about 8 mm long; pappus 9–10 mm long, whitish or brownish; scale-like inner pappus bristles almost as long as longest outer pappus bristle. Flowering June to July.

Stony, especially gypsum slopes; up to mid-montane zone.—*Soviet Central Asia*: Tien Shan (western part). Endemic. Described from western Tien Shan (foothills of Karzhantau Range). Type in Tashkent; isotypes in Leningrad.

386 11. **C. razdorskyi** Karjag. in Addenda XXVII, 607; in Fl. Azerb. VIII (1961) 464, descr. ross.—**lc.**: Karjagin, op. cit. Plate 49.

Perennial. Plants to 80–100 cm high, glabrous, except at stem base and lower leaves, or subglabrous. Stems solitary or few, erect, usually with a few lateral branches. Leaves pinnately divided, lower leaves quite long-petiolate, including rachis more or less woolly-tomentose, others sessile or subsessile; lateral segments of leaves oblong-linear or linear, 5–12 on each side, acuminate, irregularly serrate or toothed, often more or less pinnately lobed, strongly narrowed at base but usually sessile; terminal segment identical to lateral ones. Involucre 10–20 mm in dia and 14–22 mm long, glabrous; outer and middle involucre bracts with appendages as very broad membranous border, innermost bracts with large, ovate or oblong appendage. Florets yellow. Achenes 7–9 mm long; pappus brownish-gray, 6.5–8.5 mm long; 1 scale-like inner pappus bristle usually much larger and slightly surpassing longest outer pappus bristle, others 1/6–1/4 as long as outer bristle, sometimes entirely reduced. Flowering June to July.

Clayey and stony slopes of low-montane zone.—*Caucasus*: Eastern Transcaucasia (southeast foothills of Main Caucasus Range). Endemic. Described from Azerbaïdzhan SSR (between Baku and Shemakha). Type in Baku.

12. *C. talievii* Kleop. in Vistn. Kiev. Bot. Sada, V–VI (1927) 87; Iljin in Fl. Yugo-Vost. VI (1936) 426; Dobrocz. in Vizn. Rosl. URSR, 578.—*C. ruthenica* Lam. var. *hispidula* Korsh. Tent. Fl. Ross. or. (1898) 235.—*C. ruthenica* Lam. var. *villosa* Taliev in Tr. Obshch. Isp. Prir. pri Khark. Univ. XXXIV (1900) 247.—*C. korshinskyi* Iljin in Izv. Bot. Sada, Akad. Nauk SSSR, XXX, 3–4 (1932) 354.—*lc.*: Iljin, op. cit. (1936) Fig. 710; Dobrocz. op. cit. Fig. 301.

Perennial. Plants to 80–100 cm high (sometimes to apex) more or less hairy in lower part with quite long spreading hairs, glabrous or subglabrous above, green. Stems solitary or few, erect, usually with a few lateral branches. Leaves pinnately divided, lower ones quite long-petiolate, others sessile or subsessile; lateral segments of leaves oblong-linear or linear, rather numerous, acuminate, irregularly serrate-toothed, often more or less pinnately lobed, narrowed at base, terminal segment identical to laterals. Involucres 12–14 mm in dia and 18–28 mm long, glabrous; outer and middle involucre bracts with appendages as broad membranous border, innermost with large (to 10 mm long) ovate or oblong appendage. Florets yellow. Achenes about 7–8 mm long; pappus 8–9 mm long, brownish-gray, scale-like inner pappus bristles 1/6–1/4 as long as longest outer pappus bristles. Flowering May to July.

Steppes, stony slopes; to low-montane zone.—*European Part*: Black Sea Region, Lower Don, Lower Volga, Trans-Volga, Crimea. Endemic. Described from Donetsk Region. Type in Kiev.

Series 2. Turkestanicae Tzvel.—Leaves all undivided, cauline leaves sessile, usually short-decurrent on stem.

13. *C. turkestanica* Franch. Pl. du Turkest. Mission Capus (1883) 103; Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VII, 3, 68.—*C. ugamica* Iljin in Bot. Zhurn. SSSR, XXVII (1942) 143.

Perennial. Plants to 100–120 cm high, glabrous, except at stem base, green, sometimes weakly glaucescent. Stems solitary or few, erect, more or less branched above middle. Leaves undivided, oblong to broadly ovate, with short cusp, often tiny serrate-toothed, lowermost leaves narrowed at base into winged petiole, others sessile, usually with base of lamina weakly decurrent on stem. Involucres 12–20 mm in dia and 17–25 mm long, glabrous; outer and middle involucre

bracts with appendages as broad membranous border, innermost bracts with large (to 8 mm long) ovate or oblong appendage. Florets yellow. Achenes about 7–8 mm long; pappus 8–9 mm long, brownish-gray; scale-like inner pappus bristles almost as long as longest outer pappus bristle. Flowering June to August.

Stony slopes; in low- and mid-montane zones.—*Soviet Central Asia*: Tien Shan (western part). Endemic. Described from western Tien Shan (area of Chirchik River). Type in Paris.

Note. It occupies a distinct position among the other species of our flora belonging to this subgenus. In this species we include *C. ugamica* Iljin, also described from the region of the Chirchik River. We did not observe substantial differences between this species and *C. turkestanica* in the original description.

Subgenus 2. Cyanus (Juss.) Hayek, *Centaurea*-Art. Österr. Ung. (1901) 4, 22 p. p.; Dobrocz. in Bot. Zhurn. Akad. Nauk URSR, VI, 2 (1949) 64, 68.—*Cyanus* Juss. Gen. pl. (1789) 174; S.F. Gray, Nat. Arrang. Brit. Pl. II (1821) 441.—*Cyanus* sect. *Cyanus* DC. in Ann. Mus. Paris, XVI (1810) 158.—*Centaurea* sect. *Cyanus* DC. Prodr. VI (1837) 578.—*Centaurea* sect. *Cyaneus* Ldb. Fl. Ross. II, 2 (1845) 698.—*Centaurea* subgen. *Centaurea* Schmalh. Fl. Yugo-Zap. Ross. (1886) 329 p. p. and Fl. II (1897) 120 p. p.—Capitula somewhat large-, medium-sized, or small, with many florets, at tips of stem and its lateral branches, solitary, occasionally in groups of 2–6, not many on plant, sometimes forming somewhat many-headed paniculate or almost corymbose inflorescence. Involucres oblong, ovate, or compressed-globose, 5–25 mm in dia, arachnoid-hairy to glabrous; involucre bracts coriaceous, greenish (yellowing when dry) with indistinct veins, ovate and triangular-ovate to lanceolately linear, innermost linear; appendages of involucre bracts membranous, not prickly, very long-decurrent on bracts as border, coriaceous upper part of bract triangular, semi-elliptical or semicircular, including border fimbriate or irregularly toothed. Florets variable, central bisexual, tubular, violet-lilac, violate-carmine, lilac-pink, pale yellowish, sometimes whitish or white (albinos), peripheral florets sterile, lacking staminodes and rudiment of style, tubular-infundibuliform, much larger, blue, sky-blue, pink, purple of varying shades, pale yellow, sometimes whitish or white, with (4)5–8(10)-fid corolla; stamen filaments flattened, covered with papilliform hairs; stigma bilobed to collar of hairs; its branches divergent. Achenes oblong, oblong-ellipsoidal, ellipsoidal, or ellipsoidal-obovate, 3–6.5 mm long, weakly undulate, usually with barbula of whitish hairs on edges of concave hilum; pappus long, as long as achenes or much shorter, ochreous or whitish, persistent, double,

outer pappus consisting of many rows of flat, serrate, or serrate-ciliate bristles, longer inward, inner pappus mostly 1/4–1/2 as long as outer, setaceous bristles very narrow; sometimes (in *C. depressa* MB.) comprising 1-rowed, quite broad, oblong-spatulate, scarcely toothed, spinescent or apically toothed scales, conically converging at tips. Perennial, biennial, or annual herbs, with erect, often ascending, simple or branched stems leafy to tip; leaves entire to lyrate-pinnately incised (usually except upper cauline), arachnoid-hairy, arachnoid-tomentose, sometimes subglabrous middle and upper cauline sessile, decurrent on stem or non-decurrent.

Type of subgenus: *C. cyanus* L.

1. Plants perennial (section *Protocyanus* Dobroc.) 2.
 + Plants annual and biennial (section *Cyanus*) 17.
2. Capitula 2–6 at tips of stem and its lateral branches; involucre 5–7(8) mm in dia; stems 5–15 cm high, mostly divaricately branched almost from base (Western Transcaucasia) 29. **C. woronowii** Bornm. ex Sosn.
 + Capitula solitary at tips of stem and its lateral branches; involucre (8) 10–25 mm in dia; stems usually taller, simple or less branched in upper part 3.
3. Fimbriae or teeth of appendages of involucre bracts black, sometimes blackish-reddish brown 4.
 389 + Fimbriae of appendages of involucre bracts silver-white or whitish 7.
4. Appendages of involucre bracts short-fimbriate; teeth [fimbriae] shorter than width of border. Rhizome long, creeping 5.
 + Appendages of involucre bracts short-fimbriate, fimbriae slightly longer than width of border 6.
5. Leaves quite thin, acuminate, greenish on both sides, weakly arachnoid-woolly; involucre 10–13(15) mm in dia (Carpathians) 14. **C. maramarosiensis** (Javorka) Czer.
 + Leaves more or less thick, long-acuminate, greenish above and weakly arachnoid-hairy, grayish beneath from persistent dense arachnoid tomentum (Carpathians) 15. **C. mollis** Waldst. and Kit.
6. Rhizome creeping, with rather numerous somewhat thin roots; stems few, 20–40 cm high, ascending, weakly arcuate (Western Transcaucasia) 16. **C. nigrifimbria** (C. Koch) Sosn.
 + Rhizome vertical or obliquely ascending, with few distinctly thick roots; stem solitary, 30–65(80) cm high, erect or ascending at base (Western Ukraine) 20. **C. ternopoliensis** Dobroc.
7. Appendages of involucre bracts short-fimbriate; whitish fimbriae slightly or twice as long as width of border (southern European part

- of USSR and Ciscaucasia) 8.
- + Appendages of involucre bracts long-fimbriate; fimbriae silver-white, 3–5 times as long as width of border (Transcaucasia and Crimea) 11.
8. Stem slightly covered at base with relatively weakly broadened bases of petioles of basal leaves; basal and lower cauline leaves withering early, strongly browning, more or less long-petiolate, others sessile, narrowly short- or long-decurrent on stem; pappus 1.0–1.5 mm long 21. *C. stricta* Waldst. and Kit.
- + Stem entirely covered at base with strongly broadened bases of petioles of basal leaves; basal and lower cauline leaves early withering, relatively weakly browning, short-petiolate, others sessile, somewhat broad- and long- (from leaf to leaf) decurrent on stem; pappus 1.2–3.0 mm long 9.
9. Stem scabrous, densely leafy; leaves grayish from dense arachnoid tomentum 10.
- + Stem well proportioned, sparsely leafy; leaves greenish-grayish, weakly arachnoid-hairy; involucre 18–20 mm long and 9–11 mm in dia; pappus 1.5–2.5 mm long 24. *C. angelescui* (Prod.) Czer.
- 390 10. Stem to 65 cm high, less branched, less often simple with wings to 3–3.5 mm wide; capitula 1–7(10); involucre 16–23 mm long and (8)10–15 mm in dia; pappus (1.5)2–3 mm long 22. *C. tanaitica* Klok.
- + Stem to 40 cm high, more or less strongly branched, with wings to 6–7 mm wide; capitula 3–18; involucre 15–17 mm long and 7–10 mm in dia; pappus 1.2–1.5 mm long 23. *C. czerkessica* Dobrocz. and Kotov.
11. Rhizome branched, with oblique or almost vertical roots; stems 1–3(5) on each rhizome branch, covered at base with blackish or purple-reddish-brown, strongly broadened bases of petioles of persistent basal leaves 12.
- + Rhizome creeping, short, with more or less numerous string-like roots; stem solitary, arising directly from rhizome, covered at base with pale-brown, mostly relatively weakly broadened bases of petioles or early-withering basal leaves 14.
12. Corolla of peripheral florets pale yellow 19. *C. cheiranthifolia* Willd. (including *C. ochroleuca* Willd.)
- + Corolla of peripheral florets purple or pinkish-purple, sometimes white or whitish (albinos) 13.
13. Involucre compressed-globose, (20)22–25(27) mm long and (18)20–25 mm in dia; appendages of outer and middle involucre bracts almost entirely overlapping bracts; corolla of peripheral florets 38–52 mm long 17. *C. fischeri* Willd.

- + Involucres ovoid or globose-ovoid, 18–22(25) mm long, and 12–15(18) mm in dia; appendages of outer and middle involucre bracts slightly overlapping bracts; corolla of peripheral florets 28–37(40) mm long 18. **C. willdenowii** Czer.
14. Plants gray from dense arachnoid tomentum; stems usually solitary, scabrous; corolla limb of peripheral florets 14–22 mm long, limb lobes mostly broader (Crimea; Anapa District) 25. **C. fuscimarginata** (C. Koch) Juz.
- + Plant usually greenish or greenish-gray, weakly arachnoid-hairy, sometimes subglabrous; stems few, more or less thin; corolla limb of peripheral florets 7–15(17) mm long, limb lobes narrow or somewhat narrow (Transcaucasia) 15.
15. Stem 15(25)–60 cm high; leaves entire, sometimes basal and lowermost cauline leaves remotely sinuate-toothed 16.
- + Stem 5–25(30) cm high; leaves deeply, lyrate, pinnately parted or sinuate-toothed, often upper cauline leaves undivided or entire; pappus 2–3 mm long 28. **C. schelkovnikovii** Sosn.
16. Involucres subglobose or ovate, (12)14–20 mm in dia; appendages of outer and middle involucre bracts more or less entirely overlapping bracts; corolla of peripheral florets 30–37(42) mm long, corolla limb broad, 11–15(17) mm long; pappus 1.5–3.0(3.5) mm long. Base of arachnoid hairs mostly strongly thickened 26. **C. huetii** Boiss.
- + Involucres oblong-ovate, occasionally ovate, (8)10–13(15) mm in dia; appendages of outer and middle involucre bracts partially overlapping bracts; corolla of peripheral florets 20–30 mm long, corolla limb narrow, 8–10(12) mm long; pappus 0.5–1.5 mm long. Bases of arachnoid hairs not thickened 27. **C. acmophylla** Boiss.
17. Involucres 9–13 mm in dia; achenes 5.0–5.5 mm long and 2.5–3.0 mm wide; pappus 6–8 mm long, inner pappus scaly; stem usually branched almost from base, scabrous 30. **C. depressa** MB.
- + Involucres 5–9 mm in dia; achenes 3.0–4.0(4.5) mm long and 1.5–1.8 mm wide; pappus 3.0–3.5 mm long; inner setose; stem usually branched from middle, well-proportioned 31. **C. cyanus** L.

Section 1. Protocyanus Dobrocz. in Ukr. Bot. Zhurn. XIX, 1 (1962) 43, descr.; in Bot. Zhurn. Akad. Nauk URSS, VI, 2 (1949) 64, 68, nomen.—Sec⁺ *Eucyanus* Hayek, *Centaurea*-Art. Österr.-Ung. (1901) 4, 61 p. p.—Corolla of peripheral florets blue, sky-blue, pink, purple of various shades, pale yellow, sometimes whitish or white (albinos), corolla limb more or less regular, tubular, infundibuliform, usually parted up to base; limb lobes acute, sometimes subacute, mostly narrow, almost equal. Perennial herbs; stems simple or with few branches

in upper part, sometimes branched from middle (except *C. woronowii* Bornm. ex Sosn.), solitary or few, arising from rhizome or its branches; cauline leaves mostly decurrent on stem.

Type of section: *C. montana* L.

The section comprises over 40 species distributed in central and southern Europe, northwestern Africa, Asia Minor, Lebanon, Iran, the Caucasus and the southern European part of the USSR. In the USSR, 16 species have been reported. In our flora only the representatives of the Balkans-Asia Minor group *Napuliferae* Hayek are absent.

Subsection 1. Montanae (Hayek) Stef. and Georg. in Spic. Bulg. Akad. Nauk, XLIV (1931) 145.—Sect. *Eucyanus C. Montanae* Hayek, *Centaurea*-Art. Osterr. Ung. (1901) 4, 64 p. p.—Appendages of involucre bracts partially overlapping bracts, irregularly toothed or short-fimbriate; teeth or fimbriae black or blackish-reddish-brown, shorter, as long as or slightly longer than width of blackish, usually broad border; corolla of peripheral florets sky-blue or blue (sometimes, in *C. nigrifimbria* (C. Koch) Sosn., purple). Rhizome creeping, more or less long or short, with string-like, usually few roots, lacking rosette of basal leaves; stems solitary, sometimes few, quite tall (to 70 cm high) or medium, usually simple, scabrous, erect or ascending; leaves strongly recurved, mostly thin, relatively broad to somewhat narrow, entire, sometimes lower most with 1–3 teeth or lobes on each side; basal leaves withering early; arachnoid hairs on plant strongly dilated at base (visible under lens!). Plants of forest and subalpine zones of central and southern Europe and Western Transcaucasia.

Type of subsection: type of section.

Series 1. Nigridentatae Czer.—Ser. *Eu-montanae* Dobrocz. in Bot. Zhurn. Akad. Nauk URSR, VI, 2 (1949) 64, 68, nomen.—Appendages of involucre bracts irregularly toothed; corolla of peripheral florets 5–6-fid; stem solitary, mostly erect, scabrous, to 70 cm high; cauline leaves short or long (in alien [non-Soviet] species), decurrent on stem.

We have rejected the name proposed by D.N. Dobroczajeva for the series on the basis of Article 69 of the “International Code of Botanical Nomenclature.”

Besides our species, the following European species belong to this series: *C. montana* L., *C. angustifolia* Mill. non Schrenk nec Fournier, and *C. pinnatifida* Schur.

14. *C. maramarosiensis* (Javorka) Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 395.—*C. mollis* f. *maramarosiensis* Javorka, Magyar Fl. (1925) 1170.—*C. mollis* f. *ramosa* Czako in

Javorka, *ibid.*—*C. montana* ssp. *mollis* var. *typica* f. *maramarosiensis* (Javorka) Dostal and var. *ramosa* (Czako) Dostal in *Acta Bot. Bohem.* X (1931) 69.—*C. mollis* auct. non Waldst. and Kit.: Kharkevich in *Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XIV (1951) 68; Igoshina in *Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XVII (1955) 515.

Perennial. Rhizome creeping, long, with few string-like roots. Stem solitary (30)50–70 cm high, erect, finely sulcate, simple, occasionally with a few branches in upper part; basally mostly lilac, weakly arachnoid-hairy throughout. Leaves broadly lanceolate or lanceolately elliptical, strongly narrowed toward base, attenuate, acuminate, entire or barely toothed, with remote, thin, sharp small teeth, greenish, on both sides weakly arachnoid-woolly, thin; basal and lower cauline leaves relatively small, short-petiolate, withering early and often falling in part, others short-decurrent on stem, middle cauline 10–16 cm long and (2.0)2.5–4.5 cm wide. Capitula solitary or few (to 7). Involucre oblong or oblong-ovate, 20–22 mm long and 10–13(15) mm in dia, glabrous; involucre bracts with more or less prominent veins, mostly lilac above; appendages of outer and middle bracts triangular, (3)4–5 mm longer than lower coriaceous part of bracts, irregularly toothed; teeth triangular and black, or teeth not as long as width of border; border broad, about 1.5 mm wide, blackish; appendages of inner bracts pale reddish-brown, narrower, short-fimbriate-toothed. Corolla of central florets violet-lilac, 17–18 mm long; of peripheral florets sky-blue or blue, 30–42 mm long; corolla tube of peripheral florets 17–23 mm long, limb 13–19 mm long, limb lobes linear or narrowly lanceolate-linear, acute. Achenes ellipsoidal, 5 mm long and 2.0–2.3 mm wide; pappus 1.2–2.0 mm long, inner pappus almost 1/3 as long as outer. Flowering June to August.

Spruce-beech and spruce forest belt, among thickets of *Alnaster viridis* (Chaix) Spach; at 600–1,700 m.—*European Part*: Upper Dniester (southern Carpathians). *General distribution*: Evidently grows in Romanian areas bordering Soviet Carpathians. Described from Marmarosh Mountains. Type in Budapest.

15. *C. mollis* Waldst. and Kit. in *Bess. Primit. fl. Galic. Austr.* II (1809) 207 p. p.; Waldst. and Kit. *Descr. et icon. pl. rar. Hung.* III (1812) 243; Hayek, *Centaurea-Art. Österr.-Ung.* (1901) 73 p. p.; Szaf. Kulcz. *Pawl. Rosl. Polskie*, 654 p. p.; Popov, *Ocherk Rast. i Fl. Karpat.* 253; Dobroc. in *Vizn. Rosl. URSR*, 580 p. p.; Stank. and Tal. *Opred. Vyssh. Rast. ed. 2*, 415 p. p.—*C. montana* α. *cyanea* DC. *Prodr.* VI (1837) 578 p. p.—*C. montana* ssp. *mollis* (Waldst. and Kit.) Gugler in *Ann. hist.-nat. Mus. Nat. Hung.* VI (1908) 104, 110 p. p.—*l.c.*: Waldst. and Kit. *op. cit.* tab. 219 (color.); Javorka and Csapody, *Iconogr. fl.*

Hung. (1933) 548, fig. 3921.—**Exs.:** Woloszcz. Fl. polon. exs. No. 842; Domin and Krajina. Fl. Cechosl. exs. No. 198; Fl. exs. reip. Bohem.-Slov. No. 884.

Perennial. Rhizome creeping, long, with a few string-like roots. Stem solitary, 30–50 cm high, erect or weakly ascending at base, simple, covered with very thin arachnoid-hairy tomentum, subglabrous below. Leaves lanceolately elliptical or broadly lanceolate, narrowed toward base, acuminate, entire, somewhat thick, greenish and weakly arachnoid-hairy above, grayish beneath from dense, more or less fluffy, persistent, arachnoid-tomentum; basal and lower cauline leaves quite small, short-petiolate, withering early and often falling in part, others
394 short-decurrent on stem, middle cauline leaves 7.5–11.0 cm long and 2.0–3.2 cm wide. Capitula solitary. Involucre ovoid, 20–22 mm long and (13)15–18 mm in dia, scarcely arachnoid-fluffy or subglabrous involucre bracts usually lilac above; appendages of outer and middle bracts broadly triangular, surpassing lower coriaceous part of bract by 3–4 mm, irregularly toothed; teeth triangular, black, shorter than width of border; border, about 1.5 mm wide, blackish; appendages of inner bracts pale reddish-brown, narrower, fimbriate-toothed. Corolla of central florets violet-lilac, 17–18 mm long, of peripheral florets sky-blue or blue, 30–37 mm long; corolla tube of peripheral florets 18–25 mm long, limb 12–15 mm, limb lobes linear or narrowly lanceolate-linear, acuminate. Achenes ellipsoidal, 5.0–5.5 mm long and about 2.5 mm wide; pappus 1.0–1.5 mm long, inner pappus shorter than outer one. Flowering June to August.

Meadows and on stony debris in subalpine zone.—*European Part:* Upper Dniester (Carpathians, Svidovets Massif and northward). *General distribution:* Central Europe (Eastern and Western Carpathians). Described from Western Carpathians. Type in Budapest.

Series 2. Nigrifimbriae Czer.—Subsect. *Variegatae* Stef. and Georg. in Spic. Bulg. Akad. Nauk, XLIV (1931) 145 p. min. p.—Appendages of involucre bracts short-fimbriate; corolla of peripheral florets (5)6–9 fid; stems few, ascending, mostly weakly arcuate, more or less scabrous, to 40(60) cm high; cauline leaves long-decurrent on stem.

A monotypic series.

16. *C. nigrifimbria* (C. Koch) Sosn. in Vestn. Tifl. Bot. Sada, Nov. Ser. 2 (1926) 77; Stef. and Georg. in Spic. Bulg. Akad. Nauk, XLIV, 153, 154 p. p.; Grossh. Fl. Kavk. IV, 214; Oprod. Rast. Kavk. 497; Kolak. Fl. Abkhazii, IV, 286.—*C. montana* β . *nigrofimbria* C. Koch in Linnaea, XXIV (1851) 426.—*C. montana* α . *cyanea* auct. p. p. non DC.: Ldb. Fl. Ross. II, 2 (1945) 699.—*C. axillaris* α . *cyanea*

Boiss. Fl. or. III (1875) 636 and auct. al. fl. Cauc. p. p.—*C. montana* auct. non L.: Somm. and Lev. in Tr. Peterb. Bot. Sada, XVI (1900) 284.—*C. fischeri* auct. non Willd.: Stef. and Georg. op. cit. 152 p. min. p.—*C. atrata* ssp. *nigrifimbria* (C. Koch) Dostal in Preslia, X (1931) 60.—**Exs.:** Pl. or. exs. No. 324; Pl. Abchaz. exs. No. 588.

Perennial. Rhizome creeping, short, with numerous string-like roots. Stems few, 20–40(60) cm high, ascending, more or less arcuate or almost erect, simple, sometimes with a few branches in upper part, weakly arachnoid-hairy throughout. Leaves oblong-lanceolate, to narrowly lanceolate, acuminate, terminating into short, thin cusp, entire, greenish or greenish-gray, arachnoid-hairy, sometimes gray or finely
 395 arachnoid-tomentose; lower cauline leaves short-petiolate, withering early, others usually more or less broad and long (varying from leaf to leaf) decurrent on stem, forming 3–6 mm wide wings at place of attachment of lamina, middle cauline (5)6–10 cm long and (1)1.5–3 (occasionally up to 4.5) cm wide. Capitula mostly solitary. Involucre ovate or oblong-ovate, 15–20 mm long and (8)10–15 mm in dia, subglabrous; appendages of outer and middle involucre bracts broadly triangular or semielliptical, above coriaceous part of bract short-fimbriate, fimbriate lanceolate, blackish, sometimes reddish-brown, fimbriae as long as or slightly surpassing width of border; border narrow or somewhat broad, 1.0–1.5 mm, blackish; appendages of inner bracts blackish or pale reddish-brown, narrow, with short fimbriae. Corolla of central florets violet-carmine, 17–18 mm long, of peripheral florets blue, very rarely purple (var. *purpurea* Sosn.) or whitish (albinos), (30)35–40 mm long; limb lobes of peripheral florets linear or lanceolate-linear acuminate or acute. Achenes ellipsoidal-obovate, 4.5–4.8 mm long and 2.0–2.3 mm wide; pappus 0.8–1.0 mm long, inner 1/2 as long as outer. Flowering June to August. (Plate XXIII, Fig. 1).

Subalpine meadows; at 1,800–2,600(2,800) m.—*Caucasus:* Eastern Transcaucasia (Southern Ossetia), Western Transcaucasia. *General distribution:* Asia Minor (northeastern part). Described from Khemshin in Asia Minor. Type in Berlin.

Note. D.I. Sosnowsky (op. cit.) quite rightly related this species to *C. montana* L. s. l., considering it a semi-endemic Caucasian race. Later Stefanoff and Georgieff (loc. cit.), without adequate justification, on the same basis, placed *C. nigrifimbria* (C. Koch) Sosn. in their aggregate subsection *Variegatae* Stef. and Georg. Their attempt to broaden the circumscription of the latter (see the synonymy of *C. nigrifimbria* (C. Koch) Sosn. and *C. huetii* Boiss. cannot be considered successful.

Despite the fact that, in a region dominated by colchicum influence, the range of *C. nigrifimbria* (C. Koch) Sosn. overlaps the ranges

of *C. fischeri* Willd. s. str., *C. cheiranthifolia* Willd. s. l., and *C. willdenowii* Czer., which belong to the separate subsection *Fischerianae* Czer., *C. nigrifimbria* does not hybridize with them.

Subsection 2. Fischerianae Czer. in Addenda XXVII, 608.—Sect. *Eucyanus* c *Montanae* Hayek, Centaurea-Art. Österr.-Ung. (1901) 4, 64 p. p.—Subsect. *Variegatae* Stef. and Georg. in Spic. Bulg. Akad. Nauk, XLIV (1931) 145 p. p.—Subsect. *Infrasulares* Stef. and Georg. Ibid., 146 p. p.—Appendages of involucre bracts entirely or partially overlapping bracts below, long-fimbriate; fimbriae silver-white or white, twice or more as long as width of black or blackish-reddish-brown, wide to narrow border; corolla of peripheral florets lilac-pink, purple of various shades or pale yellow, sometimes whitish or white (albinos). Root oblique or almost vertical, longer, arising from nonstoloniferous, mostly branched rhizome, lacking string-like roots. Rhizome branches obliquely ascending, short or more or less long, rather thin, terminating into rosette of leaves and ventrolateral flowering stems. Stems 1–3(5) on each branch of rhizome, short and medium, simple or with few branches compressed above, mostly scabrous, ascending, arcuate, almost prostrate sometimes in lower part, less often erect, entirely covered at base with blackish or purple-reddish-brown strongly thickened bases of petioles of normally developed basal leaves persisting up to flowering; leaves upward spreading, dense, lyrate pinnately incised to entire; plants arachnoid-hairy, hairs usually strongly thickened at base (under hand lens!). Plants of subalpine, alpine, less often middle forest zones of mountains of Caucasus, Asia Minor, northern Iran (Elbrus Range), and south of Balkan Peninsula.

Type of subsection: *C. fischeri* Willd. s. str.

The species forming this subsection constitute a single phylogenetic series, which does not require a special name. Besides the Caucasian species, we include here *C. reuteriana* Boiss. (Caria and Phrygia in Asia Minor) *C. langigera* DC. (Cappadocia in Asia Minor), *C. elbrusensis* Boiss. and Buhse (Elbrus Range in northern Iran), *C. baldaccii* Deg. (Crete Island), and *C. pindicola* Griseb. (south Balkan Peninsula).

17. *C. fischeri* Willd. Enum. pl. hort. Berol. Suppl (1813) 61; Hort. Berol. XCVII; Grossh. Opred. rast. Kavk. 498 p. p.—*C. axillaris* auct. fl. cauc. p. p. non Willd.—*C. montana* β . *purpurascens* DC. Prodr. VI (1837) 579 p. p.; Ldb. Fl. Ross. II, 2, 699 p. p.—*C. axillaris* β . *albofimbria* C. Koch in Linnaea, XXIV (1851) 426.—*C. axillaris* α . *cyanea* Boiss. Fl. or. III (1875) 636 p. p.—*C. fischeri* ssp. *purpurea* Sosn. in Vestn. Tifl. Bot. Sada, Nov. Ser. 2 (1926) 85 p. p.—*C. fischeri*

var. *purpurea* (Sosn.) Grossh. Fl. Kavk. IV (1934) 214 p. p.; Sosn. in Fl. Gruzii, VIII, 571.—**lc.**: Willd. Hort. Berol. (1816) XCVII.

Perennial. Whole plant more or less gray from thinly arachnoid-tomentose, sometimes greenish-gray or almost greenish, arachnoid-woolly; base of arachnoid hairs usually noticeably thickened (under lens!). Stems 1–2(3) from each branched rhizome, 20–40(50) cm high, scabrous, ascending, arcuate or, in lower part, almost prostrate, simple, less often sparingly branched with 1–2 branches. Leaves lanceolate, oblong-lanceolate, or oblong-obovate, short-acuminate to obtuse, entire to deeply sinuately pinnatifid, with leaf rosette; basal and lower cauline leaves petiolate, other sessile, broad (especially at point of attachment of lamina) and somewhat long or long-decurrent (from leaf to leaf) on stem; middle cauline leaves (6)7–13 cm long and (0.7)1–3 cm wide. Capitula 1–2(3). Involucres slightly compressed, globose, (20)22–25(27) mm long and (18)20–25 mm in dia; mostly glabrous; appendages of outer and middle involucral bracts semicircular or semielliptical above coriaceous part of bracts, (4)5–7 mm surpassing it, almost entirely overlapping bract, long-fimbriate, fimbriae silver white, 1.5–3.0 mm long, wider part up to 2.5 mm (including colored part of fimbria), blackish-reddish-brown; appendages of inner bracts pale brown or whitish-brownish in upper, smaller, fimbriate. Corolla of central florets violet-lilac, lilac-pink, sometimes whitish, 18–23 mm long, of peripheral florets purple, pinkish-purple, less often whitish, 5–7(8)-parted, 38–52 mm long; corolla tube of peripheral florets 20–25 mm long, limb 18–27 mm long, limb lobes linear to oblong-lanceolate, to 2.5(2.7) mm wide, subacute or acuminate. Achenes ellipsoidal or oblong-ellipsoidal, 5–6 mm long and 2.3–3.0 mm wide; pappus 1–3(3.3) mm long, inner pappus 1/4–1/2 as long as outer one. Flowering June to August.

Subalpine and alpine meadows.—*Caucasus*: Eastern Transcaucasia (Lesser Caucasus), Western Transcaucasia (Lesser Caucasus), Southern Transcaucasia (absent in southern part of area). Endemic. Described from Caucasus. Type in Berlin.

Note. We consider this species in its original, narrow, circumscription, referring to it the plants from the Lesser Caucasus with large, compressed, globose involucres, wide borders of the involucral bracts, and very large (to 52 mm long) purple, peripheral florets. The plants with purple florets growing in the Greater Caucasus and in the eastern part of the Lesser Caucasus are described below as a distinct race of *C. willdenowii* Czer. However, even after separating the latter, *C. fischeri* Willd. s. str. remains a fairly polymorphic species, probably consisting of several small, local races. Further study is necessary on more material, especially in nature.

C. fischeri Willd. s. str. hybridizes with *C. huetii* Boiss. (= *C. atrata* auct. fl. Cauc. non Willd.). Hybrids of these two species with blue peripheral florets were referred by D.I. Sosnowsky to the race *C. fischeri* ssp. *cyanea* Sosn. (*Vestn. Tifl. Bot. Sada, Nov. Ser.* 2 [1926] 84). A careful examination of the specimens of this blue-flowered race described by the author himself and those cited in the original description, convinced us that besides obvious hybrids of *C. fischeri* Willd. s. str. × *C. huetii* Boiss., we are dealing here with wrongly identified specimens of other already well known species (*C. huetii* Boiss., *C. fischeri* Willd. s. str., and *C. willdenowii* Czer.). Thus, according to our data, in the Caucasus we do not have a race separate from the *C. fischeri* Willd. s. l., complex, with blue peripheral florets. Comparatively rare are the hybrids of *C. fischeri* Willd. s. str. × *C. cheiranthifolia* Willd. s. l. (including *C. ochroleuca* Willd.). The latter situation apparently can be explained by the fact that both of the above-noted species often do not grow together.

- 398 18. ***C. willdenowii*** Czer. in Addenda, XXVII, 608.—*C. montana* var. *purpurascens* auct. non DC.: Trautv. in Tr. Peterb. Bot. Sada, IV (1876) 156, V, 2 (1878) 447, VII, 2 (1881) 472.—*C. fischeri* ssp. *cyanea* Sosn. in Vestn. Tifl. Bot. Sada, Nov. Ser. 2 (1926) 84 p. min. p.—*C. fischeri* ssp. *purpurea* Sosn. Ibid. 85 p. p.—*C. fischeri* var. *purpurea* (Sosn.) Grossh. Fl. Kavk. IV (1934) 214 p. p.—*C. cheiranthifolia* var. *purpurea* Sosn. in Fl. Gruzii, VIII (1952) 572.—**Ic.**: Sosn. in Fl. Gruzii, VIII (1952) Plate 421.

Perennial. Plant greenish-gray, covered with arachnoid-hairy or arachnoid-woolly pubescence, less often gray or greenish from thin arachnoid tomentum; bases of arachnoid hairs more or less strongly thickened (under hand lens!). Stems 1–3(5) on each branched rhizome, (8)15–35 cm high, more or less scabrous, sometimes relatively slender, ascending, arcuate, sometimes almost erect, usually simple. Leaves lanceolate, oblong-lanceolate, occasionally linearly lanceolate, or oblong-obovate, short-acuminate or obtuse, entire to deeply sinuately pinnatifid, with leaf rosette; basal and lower cauline leaves petiolate, others sessile, somewhat broad (especially at point of attachment of lamina) or more or less narrow and short-decurrent on stem; middle cauline leaves 4–10(15) cm long and 0.4–2.5(3.5) mm wide. Capitula mostly solitary. Involucres ovate or globose-ovate, 18–22(25) mm long and 12–15(18) mm in dia, mostly glabrous; appendages of outer and middle involucral bracts semicircular or deltoid above coriaceous part, 3–5 mm surpassing it, partially overlapping bract, long-fimbriate; fimbriae silver-white, 1.5–2.5 mm long, 1.5–1.7 mm wide (including colored part), black or blackish-reddish-brown; appendages of inner bracts

pale brown or whitish-brownish in upper part, smaller, fimbriate. Corolla of central florets violet-lilac or lilac-pink, sometimes white or whitish, 15–19 mm long, of peripheral florets purple or pinkish-purple, occasionally white or whitish, 6–8-fid, 28–37(40) mm long; corolla tube of peripheral florets 13–20 mm long, limb 14–17(20) mm long, limb lobes lanceolate-linear to linear, mostly acute. Achenes ellipsoidal, 4.5–5 mm long and 2.3–2.5 mm wide; pappus 2–3 mm long, inner pappus 1/4 as long as outer one. Flowering June to August.

Subalpine and alpine meadows, at 2,700 m.—*Caucasus*: Ciscaucasia, Dagestan, Eastern Transcaucasia, Southern Transcaucasia. Endemic. Described from Kabardino-Balkar ASSR (Khyzni, near mouth of Tuyala River). Type in Leningrad.

Note. It differs from *C. fischeri* Willd. s. str. by having smaller, ovoid or globose-ovoid involucre, narrower fimbria, smaller florets, and leaves that are short-decurrent on the stem. In Asia Minor (Kars 399 Region), *C. willdenowii* Czer. is replaced by a very similar, but apparently entirely separate and still undescribed, race with purple florets. Sometimes hybrids between *C. willdenowii* Czer. and *C. cheiranthifolia* Willd. s. l. are also found.

19. *C. cheiranthifolia* Willd. Phytogr. I (1794) 12; Sp. pl. III, 3, 2289; MB. Fl. taur.-cauc. III, 588; Grossh. Fl. Kavk. IV, 214; Sosn. in Fl. Gruzii, VIII, 572, excl. var.—*C. ochroleuca* Gldenst. reise. I (1787) 426, 429, nomen; Willd. Sp. pl. III, 3 (1803) 2289, descr.; MB. op. cit. II, 344, III, 588.—*C. caucasica* MB. ex Willd. Sp. pl. III, 3 (1803) 2289, pro syn.—*C. leucantha* Adams in Web. and Mohr. Beitr. Naturk. I (1805) 74.—*C. chlorantha* Adams ex Ldb. Fl. Ross. II, 2 (1845) 699, pro syn.—*C. montana* γ . *albida* DC. and δ . *citrina* DC. Prodr. VI (1837) 579 p. p.; Ldb. op. cit. 699 p. p.—*C. axillaris* β . *ochroleuca* (Willd.) Boiss. Fl. or. III (1875) 636 p. p. and auct. omn. fl. Cauc.—*C. montana* β . *axillaris* f. *ochroleuca* (Willd.) Schmalh. Fl. II (1897) 126.—*C. ochroleuca* f. *genuina* Gugler and f. *cheiranthifolia* (Willd.) Gugler in Ann. Hist.-nat. Mus. Nat. Hung. VI (1908) 246.—*C. fischeri* ssp. *ochroleuca* (Willd.) Sosn. in Vestn. Tifl. Bot. Sada, Nov. Ser. 2 (1926) 85, excl. specim. nonnull.—*C. fischeri* var. *ochroleuca* (Willd.) Grossh. Fl. Kavk. IV (1934) 214; Kolak. Fl. Abkhazii, IV, 286; Sosn. in Fl. Gruzii, VIII, 571.—*C. fischeri* ssp. *cheiranthifolia* (Willd.) Sosn. in Vestn. Tifl. Bot. Sada, Nov. Ser. 2 (1926) 86.— **Ic.**: Willd. Phytogr. I (1794) tab. VII, 2; MB. Cent. pl. rar. Ross. med. I (1810) tab. XLIV; Sims in Bot. Mag. XXIX (1809) tab. 1175.— **Exs.**: Fl. cauc. exs. No. 150; Hayek, Cent. exs. crit. fasc. II, No. 51.

Perennial. Whole plant gray or grayish from arachnoid tomentum, often greenish-gray, relatively weakly arachnoid-hairy or arachnoid-

woolly pubescent, bases of arachnoid hairs mostly strongly thickened (under hand lens!). Stems 1–3 from each branched rhizome, (7)10–45 cm high, usually scabrous, ascending, arcuate or arcuately ascending, at base, simple of branched above, sometimes from middle. Leaves lanceolate, oblong-, less often elliptical-lanceolate or oblong-oblan-
 ceolate, short-acuminate to subobtusate, entire to lyrate pinnately incised, with leaf rosette; basal and lower cauline leaves petiolate, others sessile, more or less broad (especially at the point of attachment of lamina) and long- or short-decurrent on stem; middle cauline leaves 5.0–13.0(14.5) cm long and (0.7)1.0–4.5 cm wide (sometimes rosulate leaves to 21 cm long and to 6–7 cm wide). Capitula 1–3(5). Involucres subglobose or globose-ovate, 20–25 cm long and 15–25 cm in dia, glabrous, appendages of outer and middle involucral bracts semicircular or broadly deltoid above coriaceous part, 4–7 mm surpassing it, usually partially overlapping bract, long-fimbriate; fimbriae silver-white, to 3 mm long; border broad or narrow, black or blackish-reddish-
 400 brown; appendages of inner bracts brownish in upper part, smaller with much shorter fimbriae. Corolla of central florets pale yellowish, 18–23 mm long, of peripheral florets pale yellow, 5–9(10)-fid, (30)35–50(60) mm long; corolla tube of peripheral florets (14)17–24(27) mm long, limb (13)15–29(33) mm long, limb lobes narrowly lanceolate to linear, acuminate or subacute. Achenes oblong-ellipsoidal or oblong, 5.0–6.5 mm long and 2.0–2.8 mm wide; pappus (1.5)2.0–3.2 mm long, inner pappus 1/4–1/3 as long as outer one. Flowering June to August.

Subalpine and alpine meadows, on slopes; to 2,700 m.—*Caucasus*: Ciscaucasia (westward to Belaya River basin), Dagestan, Eastern, Western, and Southern Transcaucasia. *General distribution*: Armenia and Kurdistan. Described from Armenia. Type in Berlin.

Note. According to Willdenow's original description, *C. cheiranthifolia* Willd. s. str. differs from *C. ochroleuca* Willd. s. str. by the denser pubescence of the entire plant and the leaves that are incised (not undivided). However, despite a study of extensive material, I could not find any regularity whatsoever in the distribution of these species. Nevertheless, in the circumscription accepted here, *C. cheiranthifolia* Willd. s. l. is a highly polymorphic species; it possibly splits into several small, local races, which differ from each other by having combinations of characters different from Willdenow's species. These could be differentiated only in nature.

Subsection 3. Stricticaules Czer. in Addenda XXVII, 609.—Sect. *Eucyanus* c) *Montanae* Hayek; *Centaurea*.-Art. Österr.-Ung. (1901) 4, 64 p. min. p.—Subsect. *Variiegatae* Stef. and Georg. in Spic. Bulg. Akad. Nauk, XLIV (1931) 145 p. p.—Appendages of involucral bracts

overlapping bracts below them, fimbriate; fimbriae whitish to black, slightly or twice as long as width of black or blackish-reddish-brown, very narrow border. Corolla of peripheral florets blue or sky-blue. Rhizome vertical, very short, nonstoloniferous, with few string-like roots, lacking rosette of leaves; stem usually solitary, medium or tall (to 80 cm) with few branches compressed above, occasionally simple, somewhat well-proportioned, erect, sometimes weakly ascending at base. Leaves upward spreading, very dense, narrow, entire, often basal and lower cauline with 1–3 teeth or lobes on each side, bases of arachnoid-hairs on plant strongly thickened, occasionally unthickened (under hand lens!). Plants of forest steppes and steppe plains, foothills and lower mountain zone, growing in central and southern Europe and the southern European part of the USSR.

Type of subsection: *C. stricta* Waldst. and Kit.

The European species *C. triumfettii* All. s. str. (= *C. axillaris* Willd. s. str.), treated by us as the separate series *Triumfettianae* Czer., brings subsection *Stricticaules* Czer. closer to the preceding subsection.

- 401 *Series 1. Strictae* Dobrocz. in Ukr. Bot. Zhurn. XIX, 1 (1962) 43, descr.; in Bot. Zhurn. Akad. Nauk URSS, VI, 2 (1949) 64, 68, nomen.—Stem in lower part brownish-lilac-purple or brown, at base slightly covered with somewhat weakly enlarged bases of petioles of basal leaves; basal and lower cauline leaves withering early, strongly browning, more or less long-petiolate, others sessile, narrow, short- or long-decurrent on stem. Pappus of achenes 1.0–1.5 mm long.

Besides our two species, this series included *C. pseudoaxillaris* Stef. and Georg. (northern Thracia in Bulgaria), *C. sokolensis* (Pawl.) Czer. comb. nova (*C. axillaris* var. *sokolensis* Pawl. in Kosmos (1930) 70) (Central Europe), and, perhaps, *C. novakii* Dostal. s. str. (Rhodope in Bulgaria).

20. *C. ternopoliensis* Dobrocz. in Bot. Zhurn. Akad. Nauk URSS, VI, 2 (1949) 71, descr. latina, IV, 3–4 (1948) 76, descr. ucrainica; in Vizn. Rosl. URSS, 581; Stank. and Tal. Opred. Vyssh. Rast., ed. 2, 415.—*C. axillaris* var. *stricta* Pawl. in Szaf. Kulcz. Pawl. Rosl. Polskie (1924) 655.—? *C. mollis* auct. non Waldst. and Kit.: Szaf. Kulcz. Pawl. Ibid., 654 p. min. p.

Perennial. Rhizome obliquely ascending or vertical, with more or less distinctly and almost uniformly thick string-like roots. Stem solitary, 30–65(80) cm high, scabrous, erect or weakly arcuately ascending at base, simple or branched above, with 1–3 short branches, somewhat sparsely leafy in lower part, densely above, right up to capitula, grayish-arachnoid-tomentose; base of arachnoid-hairs usually not thick-

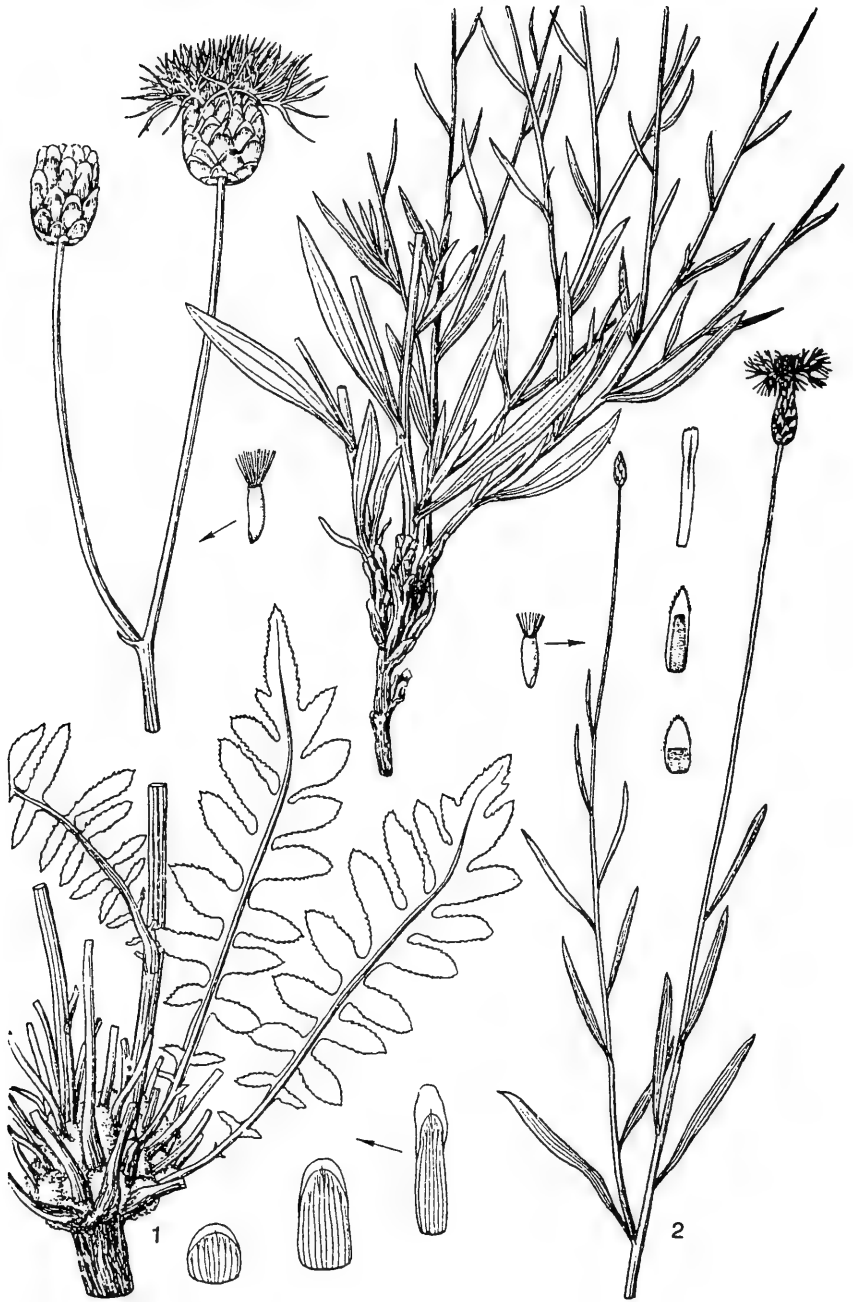
ened (under hand lens!). Leaves lanceolate, acuminate, entire, sometimes partly sinuate-toothed or lobate, with 1–3 triangular teeth or lobes on each side, greenish-gray, with floccose-arachnoid-hairy pubescence; basal and lower cauline leaves long-petiolate, others sessile, short- or more or less long-decurrent on stem, with 2–3 mm wide wings at point of attachment of lamina; middle cauline leaves 8–10(12) cm long, 1–2 cm wide. Capitula 1–4. Involucre ovate or oblong-ovate, 18–22 mm long and 10–15 mm in dia, weakly arachnoid-fluffy; involucre bracts lilac above; appendages of outer and middle involucre bracts deltoid above coriaceous part, (3)4–5 mm surpassing it, fimbriate, fimbriae black or blackish-reddish-brown, scarcely or almost twice as long as width of narrow, about 1 mm-wide, black border; appendages of inner bracts blackish or pale reddish-brown, narrower, short-fimbriate. Corolla of central florets pinkish-lilac, 15–17 mm long, of peripheral florets lilac, 4–6(8)-fid, 30–35 mm long; corolla tube of peripheral florets 18–19 mm long, limb 12–16 mm long, limb lobes narrow lanceolate-linear or linear; acute. Achenes ellipsoid or ellipsoid-obovate, 4.5–5.0 mm long and 2.0–2.3 mm wide; pappus 1.0–1.5 mm long, inner pappus half as long as outer one. Flowering June to August.

Edges of oak forests, on stony slopes among shrubs.—*European Part*: Middle Dnieper (extreme western part), Upper Dniester (eastern part). Endemic. Described from vicinity of Berezhany (Ternopol Region). Type in Leningrad.

Note. It differs from the next species by having black fimbriae on the appendages of the involucre bracts, somewhat thicker roots, and a less well-proportioned stem.

21. *C. stricta* Waldst. and Kit. Desr. et icon. pl. rar. Hung. II (1805) 194; Dobrocz. in Vizn. Rosl. URSR, 581; Stank. and Tal. Opred. Vyssh. Rast. ed. 2, 415.—*C. mollis* auct. non Waldst. and Kit.: Bess. Primit. fl. Galic. Austr. II (1809) 207 p. min. p.; Szaf. Kulcz. Pawl. Rosl. Polskie, 654 p. p.—*C. montana* α . *cyanea* DC. Prodr. VI (1837) 578 p. p.; Ldb. Fl. Ross. II, 2, 699 p. p.—*C. montana* β . *axillaris* Schmalh. Fl. II (1897) 125 p. p.—*C. axillaris* auct. fl. ucrain. p. p. non Willd. (incl. var. *volhynica* Pawl.).—*C. variegata* auct. p. p. non Lam.: Stank. and Tal. Opred. Vyssh. Rast. (1949) 673.—**lc.**: Waldst. and Kit. loc. cit. tab. 178 (color.); Javorka and Csapody, Iconogr. fl. Hung. (1933) 548, fig. 3927a.—**Exs.**: Degen, Pl. Hung. exs. sine numero: Domin and Krajina, Fl. Cechosl. exs. No. 292; Baenitz. Herb. Europe. sine numero.

Perennial. Whole plant greenish gray or gray, covered with appressed arachnoid hairs or thin tomentum; base of arachnoid hairs on



plant not or weakly thickened (under hand lens!). Rhizome vertical or weakly ascending, with somewhat thin string-like roots. Stem solitary, 25–65 cm high, rather well-proportioned, erect or at base weakly ascending, branched above, with 1–2(3) short branches, occasionally simple, sparsely leafy in lower part, densely above to capitula. Leaves narrowly lanceolate, acuminate or acute, entire, often partly with 1–2 remote triangular teeth or lobes; basal and lower cauline leaves long-petiolate, others sessile, narrow and short- or long-decurrent on stem; middle cauline leaves (5)7–12 cm long and (0.5)0.7–2.0 cm wide. Capitula 1–3(4). Involucre ovate or oblong-ovate, 18–23 mm long and 10–15 mm in dia, arachnoid-hairy; involucre bracts usually lilac in upper part; appendages of outer and middle involucre bracts triangular or almost semicircular, above coriaceous part 3–5 mm surpassing it, fimbriate; fimbriae whitish, usually twice as long width of border, 1.2–2.5 mm long; border narrow, to 1 mm, dark- or blackish-reddish brown; appendages of inner bracts pale reddish-brown with somewhat shorter fimbriae. Corolla of central florets pinkish-lilac; 17–18 mm long, of peripheral florets blue or sky-blue, 16–22(28) mm long, corolla limb 12–15 mm long, limb lobes narrowly lanceolate-linear or linear. Achenes ellipsoid or ellipsoid-obovate, 4–5 mm long and 2.0–3.0(3.2) mm wide; pappus 1.0–1.5 mm long, inner pappus distinctly shorter than outer one. Flowering second half of May to July.

Forest edges, among shrubs, in dry meadows.—*European Part*: Upper Dniester, Middle Dniester (extreme western part). *General distribution*: Central Europe, Balkans (northern part). Described from northeastern Hungary. Type in Budapest.

Series 2. Alatae Dobrocz. in Ukr. Bot. Zhurn. XIX, 1 (1962) 43, descr.; in Bot. Zhurn. Akad. Nauk URSR, VI, 2 (1949) 64, 68, nomen.—Stems greenish or slightly brownish in lower part, entirely covered at base with whitish or whitish-brownish strongly enlarged bases of petioles of basal leaves; basal and lower cauline leaves withering early, but relatively weakly browned, short-petiolate, others sessile, somewhat broad and long-decurrent (from leaf to leaf) on stem. Pappus of achenes 1.2–3 mm long.

The three species described below belong to this series.

22. *C. tanaitica* Klok. in Nauk. Zap. KDU, VII, 6 (1948) 81; Grossh. Opređ. Rast. Kavk. 497 p. p.; Dobrocz. in Vozn. Rosl. URSR, 581; Stank. and Tal. Opređ. Vyssh. Rast. ed. 2, 415.—*C. montana* α . *cyanea* auct. non DC.: Ldb. Fl. Ross. II, 2, (1845) 699 p. min. p.; Brzhezitsk. and Nagorn. Stavr. Fl. (1913) 31.—*C. montana* β . *axillaris* Schmalh. Fl. II (1897) 125 p. p.—*C. axillaris* auct. fl. ucrain. (p. p.),

tanait. et ciscauc. non Willd.—*C. stricta* auct. p. p. non Waldst. and Kit.; Sosn. in Vestn. Tifl. Bot. Sada, Nov. Ser. 2 (1926) 79; Grossh. Fl. Kavk. IV, 214.—*C. triumfettii* ssp. *variegata* var. *fuscomarginata* (C. Koch) Dostal in Preslia, X (1931) 63 p. p. quad exs. GRF No. 68.—*C. variegata* auct. p. p. non Lam.: Stank. and Tal. Opred. Vyssh. Rast. (1949) 673.—Exs.: GRF No. 68 (sub *C. montana* var. *axillari* Willd.).

Perennial. Whole plant gray from very dense, soft appressed or scarcely floccose-arachnoid tomentum, sometimes greenish-gray, arachnoid-woolly; bases of hairs strongly thickened (under hand lens!). Rhizome vertical, with slightly thick, string-like roots. Stem solitary, occasionally 2–3, (20)30–65 cm high, scabrous, erect, with few tufts in upper third, sometimes branched almost from middle, less often simple, somewhat densely leafy throughout, covered at base with whitish or whitish-brownish strongly enlarged bases of petioles of basal leaves.

405 Leaves lanceolate to oblong-lanceolate or oblong-ob lanceolate, acuminate to subobtusate, entire, occasionally partly with 1–2 remote, triangular teeth or lobes on each side; basal and lower cauline leaves short-petiolate, others sessile, mostly broad and long-decurrent (from leaf to leaf) on stem, forming up to 3–3.5 mm-wide wings at point of attachment of lamina, with long, yellowish or reddish-brown cusp, often bearing 1–2(4) fimbriae on each side; middle cauline leaves (5)7–12(16) cm long and 0.8–2.0 cm wide. Capitula 1–7(10). Involucres oblong-ovate or ovate, 16–23 mm long and (8)10–15 mm in dia, initially arachnoid-hairy, later partly glabrous; appendages of outer and middle involucre bracts deltoid above coriaceous part, (2)3–4.5 mm surpassing it, short-fimbriate; fimbriae whitish or reddish-brown, scarcely or twice as long as width of border, (1)1.2–2 mm long; border narrow, to 1 mm wide, dark reddish-brown, blackish, sometimes whitish; appendages of inner bracts pale reddish-brown with shorter fimbriae. Corolla of central florets violet-lilac or pinkish-lilac, 16–18 mm long, of peripheral florets blue or sky-blue, (4)5–6-fid, 26–32(34) mm long; corolla tube of peripheral florets 17–22 mm long, limb 9–12(14) mm long, limb lobes narrowly lanceolate-linear or linear, acuminate. Achenes ellipsoid or oblong-ellipsoid, 4.5–5.0 mm long, and 2.0–2.2 mm wide; pappus (1.5)2.0–3.0 mm long, inner pappus not distinctly separated from outer one. Flowering second half of May to July.

Steppes.—*European Part*: Black Sea Region (extreme east), Lower Don; *Caucasus*: ciscaucasia (northwestern part). Endemic. Described from Lugansk Region (Novo-Aleksandrovska stud farm). Type in Kiev.

Note. The plant with the name *C. axillaris* Boiss., reported from the Voronezh Region (Majevski, *Fl. ed.* 8 [1954] 611), probably belongs to this species.

23. *C. czerkessica* Dobrocz. and Kotov in Ukr. Bot. Zhurn. XIX, 1 (1962) 41.—*lc.*: Dobrocz. and Kotov, *ibid.*

Perennial. Whole plant grayish-arachnoid-tomentose. Rhizome short, 6–12 mm wide, usually branched above, with numerous, long (to 25–30 cm) roots, to 1.5 mm wide. Stems solitary or 2–3, 12–40 cm high, erect, branched above, finely ribbed, grayish from dense appressed pubescence, distinctly thickened below capitula toward end of flowering. Leaves narrowly or broadly lanceolate, with prominent midrib, appressed-tomentose-hairy on both sides; basal leaves 8–12, (3)6–18 cm long and (0.5)1–2.8 cm wide, narrowed at base into broad petiole 1.2 cm long, lanceolately acuminate; lower and middle cauline leaves 5.0–12.5 cm long and 0.7–2.2 cm wide, with thin entire tip 1–
406 2 mm long; upper leaves reduced, 1.5–4.0 cm long and 0.2–1.0 cm wide, usually with lanceolate, apical appendages 3–5 mm long and 1–3 mm wide, entire or fimbriate, very similar to appendages of involucre bracts; all cauline leaves sessile, decurrent on stem, resulting in entirely broad-winged stem, wings in lower and middle part of stem 3–7 mm wide, in upper part 2–6 mm. Capitula solitary at tips of stem and its lateral branches, (3)6–18 on each plant. Involucres ovate, 15–17 mm and 7–10 mm in dia, scatteredly pubescent; outer involucre bracts broadly triangular, 3–5 mm long and 5–7 mm wide, middle ones oblong-lanceolate, 7–13 mm long and 4–5 mm wide, inner ones lanceolate, 15–17 mm long and 2–4 mm wide; appendages of outer and middle bracts decurrent on bracts almost to base, forming blackish or brown, undivided border 0.5–1.5 mm wide and light-brownish, mostly white-bordered regular fimbriae; about 1.5–3.5(5) mm long; appendages of inner bracts 3–5 mm long, decurrent only on tips of bracts, light brown, short-fimbriate or toothed. Central florets pink-purple, 10–18 mm long, much longer than involucre, with thin whitish tube 6–10 mm long; peripheral florets blue or sky-blue, much larger, (15)25–36 mm long, with narrow yellowish tube (10)15–22 mm long and linear, acuminate, lobes 1–2 mm wide. Achenes oblong, 4.0–5.5 mm long and 2.2–2.5 mm wide, scatteredly pubescent; pappus 1.2–1.5 mm long, brown. Flowering May to July.

Steppe slopes and forest edges.—*Caucasus*: Western Transcaucasia (Anapa and Crimea districts of Krasnodar Territory), ?Ciscaucasia (northwestern part). Endemic. Described from Anapa District (Natukhaev forest farm), Krasnodar Territory. Type and paratype in Kiev.

Note. We have not seen the specimens of this species. According to D.N. Dobrocz. and M.I. Kotov, it differs from *C. tanaitica* Klok. by having shorter and more strongly branched stems, stem wings almost twice as wide, more numerous capitula, and smaller involucre.

24. *C. angelescui* (Prod.) Czer. comb. nova.—*C. stricta* var. *angelescui* Grint. in schedis.—*C. stricta* ssp. *angelescui* Prod. in Bull. Acad. agronom. Cluj. Memorii 1 (1930) (Centaureae Roman.); Fl. Roman. ed. 2, I, 2 (1932) 1055.

Perennial. Rhizome vertical, with weakly thickened string-like roots. Stem solitary, 50–60 cm high, somewhat well-proportioned, erect, simple or branched in upper third, with 1–2 long branches, sparsely leafy to tip. Leaves greenish-grayish, covered with appressed arachnoid-hairs or grayish in upper part (including upper cauline leaves) from thin tomentum, covered at base with whitish-brownish, strongly enlarged bases of petioles of basal leaves; bases of arachnoid hairs on plant strongly thickened (underhand lens!). Leaves narrowly lanceolate or lanceolately linear, gradually acuminate, entire; basal and lower cauline leaves short-petiolate, sometimes weakly hairy on margin, others sessile, relatively broadly and long decurrent (from leaf to leaf) on stem; middle cauline leaves 5–11 cm long and 0.5–1(1.5) cm wide; upper cauline leaves greatly reduced, with quite long, thin, yellowish cusp, usually with membranous, very short, border on each side. Capitula 1–3. Involucres oblong-ovate; involucre bracts lilac in upper part; appendages of outer and middle involucre bracts narrowly triangular, above coriaceous part, 2–3 mm surpassing it, short-fimbriate; fimbriae white, much longer than width of border, 1.0–1.3(1.5) mm long; border extremely narrow, inconspicuous, light reddish-brown or blackish reddish-brown; appendages of inner bracts pale reddish-brown, short-fimbriate. Corolla of central florets violet-lilac, about 20 mm long, of peripheral florets blue, 5–7 fid, 28–32 mm long; corolla tube of peripheral florets, 15–17 mm long, limb 12–15 mm long, limb lobes linear, acuminate. Achenes oblong-ellipsoid, 5 mm long and about 1.8 mm wide; pappus 1.5–2.5 mm long, inner pappus very slightly shorter than outer one. Flowering June to August.

Low thin oak (*Quercus pubescens* Willd.) forests.—*European Part*: Bessarabia (Moldavian SSR, Vulkaneshty District, Peleniya area, west of village Gavanos). *General distribution*: Central Europe (southeastern part of Romania). Described from Romania. Type in Cluj; isotypes in Leningrad and Kishinev.

Note. It differs from the very similar *C. tanaitica* Klok. by having weaker pubescence on the entire plant, a sparsely leafy stem, a narrower involucre, smaller appendages of the involucre bracts, shorter fimbriae on the appendages of the involucre bracts, very narrow, inconspicuous borders, and a well-marked range.

Subsection 4. Variegatae Stef. and Georg. in Spic. Bulg. Akad. Nauk, XLIV (1931) 145 p. p.—Sect. *Eucyanus* c) *Montanae* Hayek,

Centaurea-Art. Österr. Ung. (1901) 4, 64 p. min.—Subsect. *Subepapposae* Stef. and Georg. op. cit. 146 p. p.—Subsect. *Infrarosulares* Stef. and Georg. op. cit. 146 p. min. p.—Appendages of involucre bracts entirely or partially overlapping bracts below, long-fimbriate; fimbriae silver-white (except in *C. woronowii* Bornm. ex Sosn.), 3–5 times as long as width of black or blackish-reddish-brown, narrow border. Corolla of peripheral florets blue, sky-blue, lilac-pink or pink, less often lilac-purple. Rhizome creeping or ascending, usually branched, reduced, with or without short underground runners, with more or less numerous string-like roots, bearing nonflowering leafy
 408 branches or rosettes of leaves, sometimes, without it; stems usually few, short or medium in height (to 30, sometimes 60 cm), simple, occasionally with few branches above (except in species of series *Woronowianae* Czer.) arcuately ascending, less often erect. Leaves upward spreading, somewhat dense, mostly narrow, entire to lyrate pinnatifid, basal leaves withering early; arachnoid hairs of plants usually not thickened at base (underhand lens!). Plants of middle and subalpine zones of mountains of Transcaucasia, Crimea, Iran, Asia Minor, Lebanon, Southern Europe and northwestern Africa (Morocco).

Type of subsection: *C. variegata* Lam.

Series 1. Seusanae Czer.—Capitula medium or large; fimbriae on appendages of involucre bracts silver-white, border black or blackish-reddish-brown, usually conspicuous; limb lobes of corolla of peripheral florets narrowly lanceolate to linear. Rhizomes with more or less slender roots; stems simple or with few branches above, rarely almost from middle, densely branched, branches few.

Besides one Crimean and three Transcaucasian species, this series includes *C. variegata* Lam. s. str. (= *C. seusana* Chaix) (Morocco, southwestern Europe eastward to Italy inclusively), *C. cana* Sibth. and Smith (Asia Minor, Lebanon), *C. matthiolifolia* Boiss. (southwestern Asia Minor), *C. pichleri* Boiss. (northwestern Asia Minor, Greece) and *C. epirota* Halacsy (southern Albania and Central Macedonia).

25. *C. fuscimarginata* (C. Koch) Juz. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIV (1951) 41.—*C. montana*, *axillaris* and *variegata* auct. fl. taur.—*C. axillaris* γ . *fuscimarginata* C. Koch in Linnaea, XXIV (1851) 426.—*C. seusana* ssp. *fuscimarginata* (C. Koch) Sosn. in Vestn. Tifl. Bot. Sada, Nov. Ser. 2 (1925) 80, “*fuscovariiegata*”.—*C. seusana* var. *fuscimarginata* (C. Koch) Sosn. ibid. 95, 96, and 97.—*C. triumfettii* ssp. *variegata* var. *euxina* Stef. and Georg. in Spic. Bulg. Akad. Nauk, XLIV (1931) 162 p. p. quad pl. taur.—*C. triumfettii* ssp. *variegata* var. *fuscimarginata* (C. Koch)

Dostal in Preslia, X (1931) 63 p. p.—*C. triumfettii* ssp. *variegata* var. *cana* auct.: Dostal, *ibid.* 63 p. p. quoad exs. GRF No. 882.—*C. nigrofimbriata* (lapsu) Juz. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIII (1950) 296, non *C. nigrifimbria* (C. Koch) Sosn.—*C. fuscovariiegata* (lapsu) Stank. in Stank. and Tal. Opred. Vyssh. Rast. ed. 2 (1957) 415.—**Exs.**: GRF No. 882.

409 Perennial. Whole plant gray from more or less densely appressed arachnoid tomentum, base of arachnoid hairs of plant not thickened (underhand lens!). Rhizome creeping, short, thin, 1.2–3 mm thick, with fewer roots, usually not bearing rosette of leaves. Stem mostly solitary, 8–30(40) cm high, scabrous, arcuate, ascending or almost erect, simple, sometimes branched from middle or upper part, with 1–2 branches, covered at base with pale brown, strongly enlarged bases of petioles of basal leaves. Basal and lowermost cauline leaves oblong, oblong-oblancoate, mostly subobtusate, entire to lyrate divided, short-petiolate, withering early, relatively weakly browning, others narrowly lanceolate, less often lanceolately linear, acuminate, with small cusp, mostly entire, sessile, narrow and usually short-decurrent on stem; middle cauline leaves 5–10(13) cm long and 0.4–1.5(2.5) cm wide. Capitula 1–3. Involucres ovate, 18–22(24) mm long and (10)12–15(18) mm in dia, subglabrous; appendages of outer and middle involucre bracts usually semicircular, above coriaceous part, (3)4–6 mm surpassing it, long-fimbriate, fimbriae silver-white, much longer than width of border, to 2.5–3.5 mm long; border narrow, to 1 mm, dark- or blackish to reddish-brown, sometimes light reddish-brown; appendages of inner bracts semielliptical, pale reddish-brown or reddish-brown, with shorter, mostly whitish fimbria at tip. Corolla of central florets lilac-pink, occasionally whitish (albinos), 5–8-fid, (30)35–40(45) mm long, corolla tube of peripheral florets 16–23 mm long, limb 14–22 mm long, limb lobes wide, to 3(4) mm, narrowly oblong, narrowly lanceolate or lanceolately linear, subobtusate to acuminate. Achenes ellipsoid, or ellipsoid-obovate, 4.5–5.0 mm long, and 2.2–2.8 mm wide; pappus 1–2 mm long, inner pappus almost 1/3 as long as outer one. Flowering June to August.

Stony places, talus in subalpine zone, sometimes in forest edges and glades close to the upper limit of forest.—*European Part*: Crimea (mountainous part); *Caucasus*: Western Transcaucasia (Anapa District, Natukhaev Forest Farm). Endemic. Described from Crimea. Type in Berlin.

Note. It differs from the similar *C. variegata* Lam. s. str. by having larger capitula, larger peripheral florets, scabrous stems, which are covered at the base with strongly expanded bases of the petioles of the

radical leaves, wider in the middle and much longer, decurrent cauline leaves and a well demarcated range.

Apparently, a distinct race grows in southeastern Bulgaria and eastern Phrygia (Turkey), which is related to *C. fuscimarginata* (C. Koch) Juz. and is described by Stefanoff and Georgieff (loc. cit.) under the name *C. triumfettii* ssp. *variegata* var. *euxina* Stef. and Georg. To their variety, they referred the plant from Crimea (Yaila, 13.VII.1914, I. Titov). Not having at our disposal the Balkan plants of this variety, we cannot decide about their identity with our Crimean race.

In 1958, *C. fuscimarginata* (C. Koch) Juz. was collected by M. Kotov and T. Omelchuk from the Anapa District (Natukhaev Forest Farm) of Krasnodar Territory.

- 410 26. *C. huetii* Boiss. Diagn. pl. or. ser. II, 3 (1856) 69; Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX, 486.—*C. axillaris* γ. *atrata* Boiss. Fl. or. III (1875) 636 p. p. non *C. triumfettii* ssp. *axillaris* var. *atrata* Stef. and Georg.—*C. montana* var. *cyanea* auct. non DC.: Trautv. in Tr. Peterb. Bot. Sada, IV (1876) 382.—*C. atrata* auct. non Willd.: Sosn. in Vestn. Tifl. Bot. Sada, Nov. Ser. 2 (1926) 87, excl. syn. nonnull.; in Fl. Gruzii, VIII, 572; Grossh. Fl. Kavk. IV, 215; Opred. Rast. Kavk. 498.—*C. fischeri* ssp. *cyanea* Sosn. in Vestn. Tifl. Bot. Sada, Nov. Ser. 2 (1926) 84 p. p.; Grossh. Fl. Kavk. IV, 214 p. p. pro var.—*C. atrata* ssp. *eu-atrata* Dostal in Preslia, X (1931) 61 p. p. excl. syn. Willd. and var. *zangezura* (Grossh.) Dostal.—*C. nigrofimbria* auct. p. p. non Sosn.: Stef. and Georg. in Spic. Bulg. Akad. Nauk, XLIV (1931) 154.—*C. acmophylla* auct. p. p. non Boiss.: Karjagin in Fl. Azerb. VIII (1961) 469.—**Exs.:** Hayek, Cent. exs. crit. fasc. II, No. 52.

Perennial. Whole plant greenish or greenish-gray, covered with appressed arachnoid-hairy pubescence, sometimes subglabrous; base of arachnoid hairs of plants mostly strongly thickened (underhand lens!). Rhizome creeping, short, slender, 2–5(8) mm thick, with fewer string-like roots, not bearing rosette of leaves. Stems usually several, 50–60 cm high, somewhat well proportioned, erect or at base weakly ascending, simple or branched in upper third, occasionally from, middle, with 1–3(5) branches. Leaves oblong and oblong-lanceolate to lanceolately linear, subobtusate or acuminate, entire; basal and lowermost cauline leaves short-petiolate, withering early, others sessile, narrow and smaller, very long-decurrent on stem; upper cauline leaves very greatly shortened. Capitula 1–3. Involucres subglobose or ovate, 18–22 mm long and (12)14–20 mm in dia, basally very weakly arachnoid-pubescent, glabrous above; appendages of outer and middle involucral bracts

semicircular or semielliptical above coriaceous part, (3)4–6 mm surpassing it, mostly entirely overlapping bracts below, long-fimbriate, fimbriae silver-white, much longer than width of border, to 3–3.5 mm long; border narrow, black or blackish to reddish-brown; appendages of inner bracts much smaller, light reddish-brown, often whitish in upper part with shorter fimbriae. Corolla of central florets violet-lilac or lilac-pink, 16–20 mm long, of peripheral florets blue or lilac-blue, sometimes lilac-pink or whitish 5–6(8)-fid, 30–37(42) mm long; corolla tube of peripheral florets 17–23(28) mm long, limb broad 11–15(17) mm long, limb lobes narrowly lanceolate or lanceolately linear, mostly acuminate, 1.0–2.5 mm wide. Achenes oblong-ellipsoid or almost ellipsoid, 4.5–5.0 mm long and 1.8–2.3 mm wide; pappus 1.5–3.0(3.3) mm long, inner pappus 1/3 as long as outer one. Flowering June to August. (Plate XXIII. Fig. 2).

411 Subalpine meadows, forest edges and herb slopes, near upper limit of forest; at 1,600–2,700 m.—*Caucasus*: Eastern Transcaucasia (Trialeti Range and southward), Southern Transcaucasia. *General distribution*: Armenia and Kurdistan, Asia Minor (northeastern part). Described from Turkish Armenia (Tekh-Dag Mountain). Type in Geneva.

Note. We are compelled to reject the name *C. atrata* Willd. for this species, which has persisted in the literature on the flora of the Caucasus, because the plant in question has characters not agreeing with Willdenow's description. He described the plant from Armenia (possibly Turkish), as characterized by having a low growth (7.5–17.5 cm high), narrowly lanceolate, remotely toothed, sessile, nondecurent, greenish, glabrous leaves that are woolly only along margin, blackish appendages of the involucre bracts with snow-white teeth (apparently fimbria), and sky-blue florets. Plants with such a combination of morphological characters are not found in the Caucasus. Hence, we use the undisputably authentic name—*C. heurtii* Boiss.—for this species.

27. ***C. acmophylla*** Boiss. Diagn. pl. or. ser. II, 3 (1856) 68; Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 487; Karjagin in Fl. Azerb. VIII, 469 p. p.—*C. axillaris* δ . *cana* (Sibth. and Smith) Boiss. Fl. or. III (1875) 636 p. p.—*C. axillaris* auct. non Willd.: Lomakin in Tr. Tifl. Bot. Sada, I (1895) 58, excl. syn.—*C. zangezura* Grossh. in Vestn. Tifl. Bot. Sada, Nov. Ser. 2 (1926) 89; Opred. Rast. Kavk. 498.—*C. fischeri* ssp. *cyanea* Sosn. in Vestn. Tifl. Bot. Sada, Nov. Ser. 2 (1926) 84 p. min. p.; Grossh. Fl. Kavk. IV, 214 p. min. p. pro var.—*C. triumfettii* ssp. *variegata* var. *cana* (Sibth. and Smith) Stef. and Georg. in Spic. Bulg. Akad. Nauk, XLIV (1931) 163 p. min.

p.—*C. atrata* ssp. *eu-atrata* var. *zangezura* (Grossh.) Dostal in Preslia, X (1931) 61.—**Exs.**: Aucher-Eloy, Herb. d'Orient. No. 4841; Kotschy, Pl. Pers. bor. 1846, No. 318.

Perennial. Whole plant greenish-gray, covered with appressed arachnoid-hairy pubescence, sometimes gray from thin tomentum; base of arachnoid hairs thickened (underhand lens!). Rhizome creeping, branched, somewhat thin, to 5 mm, with relatively numerous string-like roots, often bearing leafy nonflowering shoots or rosettes of leaves. Stems few, (15)25–30 cm high, suppressed, somewhat well proportioned, erect or arcuately ascending, simple. Leaves narrowly oblong-lanceolate to lanceolately linear, subobtuse or acuminate, entire; basal and lowermost cauline leaves short-petiolate, sometimes sinuate-toothed with 2–3 teeth on each side, withering, early, others sessile, narrow and long-decurrent on stem. Capitula solitary. Involucre oblong-ovate or ovate, 15–20 mm long and (8)10–13(15) mm wide, glabrous; appendages of outer and middle involucre bracts semielliptical above coriaceous part, 3–4(5) mm surpassing it, partially overlapping bracts below, long-fimbriate, fimbriae silver-white, longer than width of border, to 2.5 mm long; border narrow, black or blackish-reddish-brown; appendages of inner involucre bracts smaller, light reddish-brown, with shorter fimbriae. Corolla of central florets violet-lilac or lilac-pink, 13–17 mm long, of peripheral florets blue or lilac-blue, less often violet-lilac or lilac-pink, (4)5–6-fid, 20–30 mm long; corolla tube of peripheral florets 12–22 mm long, limb 8–10(12) mm long, limb lobes narrow, mostly to 1 mm wide, narrowly linear, acute. Achenes ellipsoid-obovoid or oblong-ellipsoid, 3.25–4.50 mm long and 1.3–1.8 mm wide, pappus 0.5–1.5 mm long inner pappus 1/2 as long or slightly shorter than outer one. Flowering June to August.

Thin forests, forest glades and edges, among shrubs, herb slopes, in mid-montane zone.—*Caucasus*: Southern Transcaucasia (Zangezur Range and eastern part of Aiotsdorj Range), Talysh (Kyz-yurty Mountain). *General distribution*: Iran-Afghanistan (north). Described from northwestern Iran. Type in Geneva; isotypes and paratypes (Demavend Mountains in northern Iran) in Leningrad.

Note. It is very similar to *C. huetii* Boiss., from which it differs by having narrower, mostly oblong-ovoid involucre, less distinct appendages of the involucre bracts, usually not overlapping the coriaceous part of the bracts, smaller peripheral florets, a narrower corolla limb, smaller achenes, a shorter pappus, low growth, arachnoid hairs without an expanded base, a distinct range, and a low-altitude distribution.

Forms with intermediate characters are found at the contact of the ranges of *C. acmophylla* Boiss. and *C. huetii* Boiss.

28. *C. schelkovnikovii* Sosn. in Tr. Azerb. Otdel. Zakavsk. Fil. Akad. Nauk SSSR, I (1933) 47; Grossh. Opred. Rast. Kavk. 498.

Perennial. Whole plant greenish-gray, covered with appressed arachnoid-hairy pubescence, sometimes gray from thin tomentum; base of arachnoid hairs of plant not expanded (underhand lens!). Rhizome creeping or ascending, strongly reduced, branched, more or less thick, to 10 mm, with fewer string-like roots, bearing leafy vegetative branches or rosettes of leaves. Stems 1–3, 5–20(30) mm high, approximate, more or less well proportioned, somewhat arcuate, simple or branched above with 1–2 branches. Leaves oblong-oblancoolate to oblong-lanceolate and lanceolately linear, subobtuse or acuminate, deeply lyrate-pinnatifid or remotely sinuate-toothed; basal and lower cauline leaves long-petiolate, withering early, others sessile, narrow and short-decurrent on stem, sometimes nondecurrent. Capitula 1–2(3). Involucres ovate or oblong-ovate, 18–20 mm long and (10)12–15 mm in dia; glabrous; appendages of outer and middle involucre bracts semicircular above coriaceous part, 3–4(5) mm surpassing it, almost entirely overlapping bracts below, long fimbriate, fimbriae silver-white, much longer than width of border, to 3 mm long; border narrow, black or blackish-reddish-brown; appendages of inner bracts much narrower, light reddish-brown, often whitish in upper part, with very slightly shorter fimbria. Corolla of central florets violet-lilac, 14–16 mm long, of peripheral florets blue, lilac-blue or sky-blue, sometimes violet-lilac or pinkish-lilac, (4)5–6-fid, 20–33 mm long; corolla tube of peripheral florets 13–21 mm long, limb 7–13 mm long, somewhat narrow, limb lobes linear or narrow lanceolately linear. Achenes oblong-ellipsoid, 4.5–5.5 mm long and 2.0–2.3 mm wide; pappus 2–3 mm long, inner pappus 1/2 as long as outer. Flowering June to July.

Stony subalpine grassy patches.—*Caucasus*: Southern Transcaucasia (southern part of western slope of the Zangezur Range). Endemic. Described from vicinity of Ordubad (Shikh-Yurdy Mountain). Type in Tbilisi; isotype in Yerevan; topotype in Leningrad.

Series 2. Woronowianae Czer.—Capitula small, 2–6 aggregated at tips of stem and its lateral branches; fimbriae on appendages of involucre bracts whitish-brownish, less often whitish; border brownish or black (*C. serebrowskyi* Sosn.), inconspicuous; corolla lobes of peripheral florets narrowly linear or almost filiform-linear. Rhizome with quite thick roots; stem divaricately branched almost from base or somewhat above.

Besides our species, we include here *C. serebrowskyi* Sosn. (Trabzon Province in Turkey).

29. *C. woronowii* Bornm. ex Sosn. in Vestn. Tifl. Bot. Sada, Nov. Ser. 2 (1926) 91; in Fl. Gruzii, VIII, 575; Grossh. Fl. Kavk. IV, 213; Oprod. Rast. Kavk. 497.—*C. triumfettii* var. *pleiocephala* Bornm. in Vestn. Tifl. Bot. Sada, 32 (1914) 6.—*C. triumfettii* ssp. *variegata* var. *cana* f. *pleiocephala* (Bornm.) Stef. and Georg. in Spic. Bulg. Akad. Nauk, XLIV (1931) 163.—*C. woronowii* ssp. *eu-woronowii* Dostal in Preslia, X (1931) 67.

414 Perennial. Whole plant gray from dense appressed arachnoid-hairy tomentum; base of arachnoid hairs of plant very slightly expanded (underhand lens!). Rhizome ascending or almost vertical, simple or with fewer branches, short, more or less thick, 5–10 mm, with numerous, thick, long roots, not bearing rosettes of leaves. Stems mostly solitary, 5–15 cm high, divaricately branched almost from base or slightly below middle, scabrous. Leaves elliptical-lobate to oblong, obtuse, lyrate-pinnately incised or divided, sometimes in part (mostly upper cauline) entire and even undivided, lateral lobes subelliptical, oblong or broadly triangular, obtuse or subobtuse, 1–4(5) on each side; terminal lobes much larger than lateral ones, almost circular, roundish-ovate or broadly elliptical, mostly scarcely toothed; lower and middle cauline leaves narrowed into winged petioles, upper ones sessile, not decurrent on stem, relatively less shortened, subtending capitula. Capitula usually aggregated in 2–6, at tips of stem and lateral branches. Involucre oblong, 12–15 mm long and 5–7(8) mm in dia, glabrous; appendages of outer and middle involucre bracts 1.5–2.5(3.0) mm, longer than coriaceous part of bract, slightly overlapping bract below, fimbriate; fimbriae whitish-brownish, 0.7–2.0 mm long; border brownish, inconspicuous; appendages of inner bracts smaller, brownish, occasionally brown, short-fimbriate. Corolla of central florets lilac-purple, 14–15 mm long, of peripheral florets lilac-purple, 5-fid, 22–26 mm long; corolla tube of peripheral florets 15–17 mm long, limb 7–9 mm long, narrow, limb lobes narrowly linear or almost filiformly linear, acute. Achenes ellipsoid-obovate or ellipsoidal, 4 mm long and 2.0–2.2 mm wide; pappus 0.5–0.8 mm long, inner pappus 1/2 as long as outer one. Flowering July.

Stony talus and dry clayey slopes; in mid-montane zone.—*Caucasus*: Western Transcaucasia (Abastumani). *General distribution*: Asia Minor (former Artvin District). Described from former Artvin District. Type in Tbilisi.

Section 2. Cyanus.—Sect. *Eucyanus* Hayek, *Centaurea*-Art. Österr.-Ung. (1901) 4, 64 p. p.; Dobroc. in Bot. Zhurn. Akad. Nauk URSR, VI, 2 (1949) 64, 68.—Corolla of peripheral florets blue, sky-blue, or bluish-violet, less often purple, pink, lilac-pink, whitish, or

white (albinos) corolla limb obliquely tubular-infundibuliform, lobed to 1/3–1/2, lobes subobtuse or acute, less often acuminate, mostly somewhat broad, unequal (2–4 lobes shorter). Annual or biennial herbs; stems, more or less strongly branched from base or middle; cauline leaves not decurrent on stem, sessile or weakly auriculate.

Type of section: type of subgenus.

This section includes seven species. Two species are found in the USSR.

Subsection. 1. Depressae Stef. and Georg. in Spic. Bulg. Akad. Nauk XLIV (1931) 146.—Sect. *Eucyanus* a) *Segetales* Hayek, *Centaurea*-Art. Österr.-Ung. (1901) 4, 61 p. p.—Involucres glabrous; appendages of involucral bracts more or less long-fimbriate, with lanceolate fimbriae; pappus longer than achenes, outer pappus setose, inner one-rowed rather thick, oblong, scarcely toothed above, setose or toothed scales. Annual herbs; stems mostly branched from base, scabrous; cauline leaves oblong-obovate to oblong-ob lanceolate, less often lanceolately linear, usually obtuse to subobtuse, densely arachnoid-hairy or arachnoid-tomentose on both sides.

Type of subsection: *C. depressa* MB.

Series 1. Anatolicae Czer.—Achenes somewhat large (5.0–5.6 mm long and 2.5–3.0 mm wide), apically truncate, weakly compressed, with pappus.

A monotypic series.

30. *C. depressa* MB. Fl. taur.-cauc. II (1808) 346; DC. Prodr. VI, 578; Ldb. Fl. Ross. II, 2, 698; Boiss. Fl. or. III, 635; Schmalh. Fl. II, 125; Fedtsch. and Fler. Fl. Evrop. Ross. 1027; O. and B. Fedtsch. Perech. Rast. Turk. IV, 270, excl. syn.; Grossh. Fl. Kavk. IV, 209; Opred. Rast. Kavk. 495; Nevski in Sorn. Rast. SSSR, IV, 297; Stank. and Tal Opred. Vyssh. Rast., ed. 2, 415; Czer. in Fl. Turkm. VII, 268; Karjagin in Fl. Azerb. VIII, 466.—*C. anatolica* Griseb. Spicil. II (1844) 234.—*C. pygmaea* Adams ex Ldb. loc. cit. pro syn.—*C. coerulea* Willd. ex Ldb. loc. cit. pro syn.— **Ic.:** Fedtsch. and Fler. op. cit. Fig. 1039; Karjagin, op. cit. Plate L.— **Exs.:** Hayek, Cent. exs. crit. fasc. I, No. 4 and fasc. II, No. 55; Bornm. Pl. Anat. or. No. 2726; It. pers.-turc. 1892–1893, No. 4074; Kotschy. Pl. Pers. austr. No. 302; Sintenis, It. transcasp.-pers. 1900–1901, No. 700.

Perennial. Whole plant gray from somewhat dense, appressed, arachnoid-hairy tomentum; bases of arachnoid hairs of plant not expanded (underhand lens!). Stems solitary, (10)20–60 cm high, scabrous, erect, branched almost from base or slightly above, sometimes

from middle, with upward spreading, simple or less branched, scabrous branches. Basal and lower cauline leaves oblong, oblong-ob lanceolate, less often oblong-obovate, obtuse or subacute, entire or remotely small-toothed, sometimes lyrate pinnatifid, short-petiolate, others oblong to lanceolately linear, usually subacute or acute, terminating into small cusp, mostly entire, sessile; middle cauline leaves 2.5–6.0(7.5) cm long and 0.5–1.2(2.0) cm wide. Capitula aggregated in paniculate or almost corymbose inflorescence. Involucre ovate, (13)15–17 mm long and 9–13 mm in dia, glabrous; appendages of outer and middle involucral bracts roundish-triangular above coriaceous part, usually partially covering bract below, fimbriate, with triangular dark- or blackish-red-dish brown spot in center, fimbriae silver-white, lanceolate, more or less somewhat long; appendages of inner bracts smaller, brownish, short-fimbriate. Corolla of central florets lilac pink, of peripheral florets blue or bluish-violet, 5–8-fid, limb lobes of peripheral florets oblong-ovate, linear-ovate, or lanceolate. Achenes ellipsoid-obovoid, 5.0–5.5 mm long and 2.5–2.8(3.0) mm wide; pappus 6–8 mm long, inner pappus 1/3 as long as outer one, of 20–23-scales. Flowering (second half of April) May to August.

Crop fields, old fields and weedy places; to mid-montane zone.—*European Part*: Crimea; *Caucasus*: Ciscaucasia (eastern part), Dagestan, Eastern Transcaucasia, Western (South), and Southern Transcaucasia, Talysh; *Soviet Central Asia*: mountainous Turkmenia, Amu-Darya (village of Kagan), Kyzyl-Kum, Pamiro-Alai, Syr-Darya, Tien Shan (western part). *General distribution*: Dzhungaria-Kashgaria (Kuldzha), Tibet (western part), Indo-Himalayas (northwestern part of India), Iran, Armenia and Kurdistan, Balkans-Asia Minor, western (Sicily, introduced), and eastern Mediterranean. Described from Georgia. Type in Leningrad.

Note. So far, *C. depressa* MB. is reliably known from the Balkan Peninsula, southern Bulgaria, and western Thrace. It has been reported from Egypt (Ali Ibrahim Ramis, 1929). Undoubtedly, *C. depressa* MB. is an introduced plant in all the above regions. *C. depressa* MB. is relatively close to *C. cyanoides* Berggr. and Wahlb. (Lebanon, Israel, western part of Jordan, Cyprus Island, ?Syria), *C. pinardii* Boiss. (Caria and Phrygia in Asia Minor, Greece—introduced), and *C. mentiens* Czer. (Greece), which constitute a distinct natural phylogenetic series *Cyanoides* Czer.

Economic Importance. It is a weed in crop fields and a melliferous plant.

Subsection 2. Cyaneae Stef. and Georg. in Spic. Bulg. Akad. Nauk XLIV (1931) 147.—Sect. *Eucyanus* a) *Segetales* Hayek, Centaurea-

Art. Österr.-Ung. (1901) 4, 61 p. p.—Subsect. *Intermediae* Stef. and Georg. in Spic. Bulg. Akad. Nauk, XLIV (1931) 146.—Involucres more or less arachnoid-hairy-pubescent; appendages of involucre bracts short-fimbriate or toothed, with triangular-lanceolate fimbriae or narrow triangular teeth; pappus almost as long as achene or very slightly shorter, outer pappus bristly, inner with narrower bristles. Annual and biennial herbs; stem usually branched from middle or slightly lower, thin; cauline leaves lanceolately linear to narrowly linear, slightly prickly arachnoid-hairy above, finely arachnoid tomentose beneath.

Type of subsection: type of subgenus and section.

31. *C. cyanus* L. Sp. pl. (1753) 911; DC. Prodr. VI, 578; Ldb. Fl. Ross. II, 2, 698; Boiss. Fl. or. III, 634; Schmalh. Fl. II, 125; Fedtsch. and Fler. Fl. Evrop. Ross. 1026; Syreitsch. Ill. Fl. Mosk. Gub. III, 315; O. and B. Fedtsch. Perech. Rast. Turk. IV, 270; Koroleva in Tr. po Prikl. Bot., Gen. and Sel. XXII, 5 (1929–1930) 637; in Sorn. Rast. SSSR, IV, 294; Kom. and Alis. Opred. Rast. Dalnevost. Kr. II, 1086; Grossh. Fl. Kavk. IV, 208; Opred. Rast. Kavk. 495; Iljin in Fl. Yugo-Vost. VI, 431; Majeovski, Fl. ed. 8, 611; Kryl. Fl. Zap. Sib. XI, 2957; Dobroc. in Vozn. Rosl. URSR, 580; Stank. and Tal. Opred. Vyssh. Rast. ed. 2, 415; Karavaev, Konsp. Fl. Yakutii, 176; Kolak. Fl. Abkhazii, IV, 287; Czer. in Fl. Turkm. VII, 268; Kajagin in Fl. Azerb. VIII, 466.—*C. segetalis* Salisb. Prodr. (1796) 207.—*C. pulchra* DC. loc. cit.—*C. umbrosa* Huet ex Reut. Cat. grain. Jard. bot. Genev. (1856) 4.—*C. hortorum* pau. Not. bot. fl. Espan. I (1887) 12.—*C. cyanocephala* Vel. Fl. Bulg. (1891) 309.—*Cyanus segetum* Hill. Veg. Syst. IV (1762) 29; Dostal, Klič. (1958) 736.—*C. arvensis* Moench. Meth. (1794) 561.—*C. vulgaris* Delarb. Fl. Auv. ed. 2 (1800) 203, n. v.: Presl. Fl. Čech. (1819) 179; S.F. Gray, Nat. Arrang. Brit. Pl. II, 441.—*Jacea segetum* (Hill) Lam. Fl. Fr. II (1778) 54.—**lc.**: Hill, op. cit. pl. 26, fig. 3 (mala); Fedtsch. and Fler. op. cit. Fig. 1037, 1038; Syreitsch. loc. cit. Bonnier. Fl. Compl. III. France, Suisse et Belg. VI (1923) pl. 331; fig. 1609 (color.); Hegi Ill. Fl. VI, 2 (1929) Taf. 273, Fig. 1 (color.); Javorka and Csapody Inconogr. Fl. Hung. (1933) 549, Fig. 3938; Koroleva in Sorn. Rast. SSSR, IV (1935) figs. 479 and 480; Dostal, op. cit. tab. 279. fig. 2479.—**Exs.**: GRF No. 771; Pl. Finl. exs. No. 994; Fl. polon. exs. No. 960; Herb. Fl. Ingr. No. 337; Fl. Bohem. et Morav. exs. No. 1098; Degen, Pl. Hung. exs. sine numero; Hayek, Cent. exs. crit. fasc. II, No. 56; Fl. stir. exs. No. 592; Fl. Gall. et Germ. exs. No. 265; Todaro, Fl. Sic. exs. No. 425; Bornm. Lydiae et Cariae pl. exs. No. 9684.

Annual or biennial. Stem mostly solitary, (15)25–60(100) cm high, thin, erect, branched from middle or slightly lower, sometimes almost from base, with upward spreading, simple or less branched, thin, rather

long branches, sometimes simple, floccose-arachnoid-hairy-pubescent; base of arachnoid hairs of plant not expanded (underhand lens!). Basal and lower cauline leaves (often partly middle also) oblong-ob lanceolate, or almost lanceolate, usually subobtusate, from entire and remotely toothed to lyrate divided, with 1–3 oblong-lanceolate, lanceolately linear, or linear, entire lateral segments on each side and much larger oblong-ob lanceolate, almost lanceolate, or oblong-elliptical mostly small-toothed terminal segment, more or less long-petiolate, withering early, others lanceolately linear to narrowly linear, acuminate, usually entire, sessile; middle cauline leaves 3–12(15) cm long and 0.1–0.8(1.2) cm wide, all weakly arachnoid-hairy above sometimes on both sides to subglabrous, usually grayish arachnoid-tomentose beneath. Capitula in paniculate or almost corymbose inflorescence. Involucre ovate or almost oblong, 12–15 mm long and 5–9 mm in dia, weakly arachnoid-hairy; appendages of outer and middle involucre bracts triangular above coriaceous part, slightly covering bract below, short-fimbriate or fimbriate-toothed; fimbriae or teeth white, silver-white, less often (in middle bracts) brownish or blackish-brown, triangularly lanceolate or narrowly triangular, short; appendages of inner bracts narrow, light brownish or brownish, small-toothed. Corolla of central florets bluish violet or violet-lilac, of peripheral florets blue or sky-blue, 5–8-fid, sometimes lilac-pink, pink, whitish or white; limb lobes of peripheral florets lanceolate-ovate or lanceolate. Achenes ellipsoid-obovoid, 3.0–4.0(4.5) mm long and 1.5–1.8 mm wide; pappus 3.0–3.5 mm long, inner pappus 1/3 as long as outer one, comprising narrower bristles. Flowering May to October.

Crops fields, fallows, abandoned fields and weedy places.—*European part*: all regions, except extreme North, almost completely disappearing to the south and southeast (in Crimea rather common); *Caucasus*: Ciscaucasia, Dagestan Eastern and Western Transcaucasia, Talysh; *Western Siberia*: Ob Region (south), Upper Tobol, Irtysh, Altai (vicinity of Kurai); *Eastern Siberia*: Yenisei (vicinity of Noginsk), Angara-Sayans, Dauria, Lena-kolyma (Central Yakutia); *Far East*: Ussuri, Zeya-Bureya, Kama; *Soviet Central Asia*: Lake Balkhash Region, Tien Shan, Pamiro-Alai Region, mountainous Turkmenia. *General distribution*: Europe, Asia Minor (western part), Iran, northwestern India, North America. Described from Europe. Type in London.

Economic Importance. It is a good honey-producing and medicinal plant; its peripheral florets are used for an infusion as a diuretic; cayaneus water is used for washing the eyes. It contains Vitamin C. Its seeds contain up to 28% fatty oil, a blue dye is obtained from its flower. A weed of crop fields.

Subgenus 3. Czerniakovskya Czer. in Addenda XXVII, 609.—
 Capitula medium, with many florets, solitary at tips of stem and its lateral branches, in lax corymbose or almost corymbose inflorescence; involucre ovate, oval or oblong-ovate, 8–15 mm in dia, weakly arachnoid-hairy or subglabrous; involucre bracts coriaceous, greenish (yellowing upon dry), more or less distinctly striate above, roundish-ovate and ovate outer ones to oblong-lanceolate and oblong-linear inner ones; appendages of outer and middle bracts membranous, decurrent on bracts (to middle or 1/3 length) or not with occasional cilia triangular or lanceolately triangular, with small flexible or rather stiff apical bristle, more or less coarsely pectinate-ciliate; appendages of inner bracts membranous, fimbriate-ciliate or irregularly toothed. All florets tubular, yellow or pale yellowish pink, heterogeneous, central bisexual, peripheral sterile, with 5 whitish straminodes included in corolla tube, not enlarged, with 5–6(7)-fid corolla; stamen filaments flattened, papillate; stigma short-bilobed. Achenes oblong-ellipsoid, 7–8 mm long, initially scatteredly hairy, lateral glabrous; pappus as long as achenes or 1/2 as long, weakly ochreous, persistent, double, outer one consisting of several rows of flat serrate bristles, longer from outer to inner, inner pappus 1/2–2/3 as long as outer, 1-rowed, consisting of (10)12–
 419 15, oblong or oblong-lanceolate, serrate-scabrous, stiff, scales, 2–3 times as wide as inner. Perennial herbs with erect or ascending, less branched or simple stem, leafy to tip and usually entire, tomentose or arachnoid-hairy, subsessile leaves, not decurrent on stem.

Type of subgenus: *C. kopetdaghensis* Iljin.

The subgenus includes the two species described below.

1. Plants gray, appressedly tomentose. Involucres 10–15 mm in dia; appendages of involucre bracts decurrent on bracts, almost monochromatic, blackish-reddish-brown; pappus 7–8 mm long 18. *C. iljinii* Czer
- + Plants grayish-green; spiny-arachnoid-hairy. Involucres 8–10(12) mm in dia; appendages of involucre bracts not decurrent on bracts, blackish-reddish-brown or reddish-brown in middle, whitish on margin. Pappus 3–4 mm long 33. *C. kopetdaghensis* Iljin

32. *C. iljinii* Czerniak. in Fedde, Repert. XXVII (1930) 285; Czer. in Fl. Turkm. VII, 265.—**lc.**: Czer. op. cit., Plate XLII, Fig. 2.

Perennial. Whole plant gray, appressedly tomentose. Stems very numerous, 10–25 cm high, ascending from base, somewhat arcuate, finely sulcate, weakly thickened below capitula, simple. Leaves oblong-elliptical, oblong, or oblong-lanceolate, acute, subacute, less often subobtuse, often terminating in very small, dark cusp, entire; basal

and lower cauline leaves short-petiolate, sometimes partly remotely small-toothed, others sessile, basally strongly attenuate. Capitula solitary at stem tip. Involucre ovate, 15–18 mm long and 10–15 mm in dia, weakly arachnoid-hairy; appendages of outer and middle involucre bracts decurrent on bracts (to middle or 1/3 length), scatteredly short hairy above (under a hand lens!), broadly triangular, with small, flexible, bristle at tip, almost monochromatic, blackish-reddish-brown, paler on margin, pectinate-ciliate, cilia of appendages as long as, often slightly longer than diameter of its central axis; appendages of inner bracts narrowly triangular or oblong-lanceolate, fimbriate-ciliate or irregularly toothed. Florets pale yellowish-pink. Achenes 7–8 mm long and 3.0–3.7 mm wide; pappus 7–8 mm long, inner pappus of 10–12 oblong lanceolate scales. Flowering May to June.

Steppe slopes of middle mountain zone.—*Soviet Central Asia*: mountainous Turkmenia (Kopetdag Range). Endemic. Described from Kopetdag (villages of Nukhur and Tumanovskii). Type and paratype in Leningrad.

- 420 33. *C. kopetdaghensis* Iljin in *Izv. Bot. Sada Akad. Nauk SSSR*, XXX, 3–4 (1932) 359; *Czer. in Fl. Turkm.* VII, 266.—*lc.*: *Czer. ibid.*, Plate XLII, Fig. 1.

Perennial. Whole plant grayish-green, floccose-arachnoid-hairy, later partly (mostly in upper part) glabrous. Stems usually rather numerous, 25–40 cm high, erect or weakly arcuately ascending, finely sulcate, weakly thickened below capitula, less branched or simple. Leaves oblong-lanceolate or oblong, sometimes oblong-elliptical, acute or subacute, mostly entire; basal and lower cauline leaves short-petiolate, others sessile, strongly narrowed toward base. Capitula solitary at tips of stem and its lateral branches. Involucre ovate or oblong-ovate, 18–20 mm long and 8–10(12) mm in dia, weakly arachnoid-hairy only at base, glabrous above; appendages of outer and middle involucre bracts not decurrent on bracts, glabrous (under a hand lens!), triangular or lanceolate-triangular, with small, quite stiff, bristle at tip, blackish-reddish-brown to reddish-brown in middle, whitish along margin, cristate-ciliate, cilia of appendages mostly slightly shorter than diameter of its central axis; appendages of inner bracts elliptical or oblong-elliptical, fimbriate-ciliate or unevenly toothed. Florets yellow. Achenes 7–8 mm long and 3.2–4.0 mm wide; pappus 3–4 mm long; inner pappus of 12–15 oblong scales. Flowering June.

Juniper forests of mid-montane zone.—*Soviet Central Asia*: mountainous Turkmenia (Kopetdag Range). Endemic. Described from Kopetdag (Tagarou Range near village of Arvaz). Type and isotype in Leningrad.

Subgenus 4. Psephellus (Cass.) Schmalh. Fl. II (1897) 118.—*Psephellus* Cass. in Dict. Sc. nat. XLIII (1826) 488; emend. Sosn. in Grossh. Fl. Kavk. IV (1934) 198; Sosn. in Zam. po Sist. i Geogr. Rast. Tbil. 14 (1948) 5.—*Centaurea* sect. *Psephellus* (Cass.) DC. Prodr. VI (1837) 575 p. p.; O. Hoffm. in Pflanzenfam. IV, 5 (1893) 329 p. p.—Capitula medium-sized or fairly large, usually solitary at tips of stem and its lateral branches. Involucre ovate, ovate-cylindrical, or subglobose; involucre bracts coriaceous, with quite large, membranous, fimbriate appendages, not decurrent on bracts. Florets tubular, pink or purple, variable, central bisexual, peripheral sterile, with whitish staminodes usually included in corolla tube, mostly enlarged and then tubular-infundibuliform; stigma short-bilobed. Achenes oblong or obovate, scatteredly hairy, smooth; pappus consisting of several rows of short scabrous, readily falling, scale-like bristles, gradually longer from outer to inner, sometimes bristles of inner row much shorter.

421 Perennial herbs with ascending, prostrate, or erect, mostly simple stem and pinnately incised, lyrate, less often entire leaves.

Type of subgenus: *C. dealbata* Willd.

Apparently, no less than 35 species, distributed mostly within the Caucasus, belong to this subgenus. Only a small number of species grows in the bordering parts of Asia Minor and Iran.

Economic Importance. Many species deserve to be introduced into cultivation as ornamental flowering plants.

1. Appendages of involucre bracts (not including fimbriae) lanceolate or triangularly lanceolate, usually not overlapping each other 2.
- + Appendages of involucre bracts (not including fimbriae) wide, broadly ovate or almost round, imbricate, so that coriaceous part of bract entirely covered by appendage (Sect. *Psephellus*) 19.
2. Leaves lyrate, with terminal segment much larger than laterals, or entire (Sect. *Hypoleucae* (Sosn.) Sosn. 3.
- + Leaves differently pinnate; terminal segment slightly larger or almost as large as laterals (Sect. *Leucophyllae* (Sosn.) Sosn. 10.
3. Stem subglabrous; all leaves linear, remotely small-toothed, basal leaves very long-petiolate 37. **C. holophylla** Socz. and Lipat.
- + Stem more or less densely tomentose; leaves lyrate, sometimes partly entire 4.
4. Involucre ovate-cylindrical; appendages of involucre bracts small, oblong-lanceolate, blackish, with long, lighter fimbriae 40. **C. troitzkyi** (Sosn.) Sosn.
- + Involucre hemispherical; appendages of involucre bracts larger 5.

5. Basal leaves with cordate base 38. **C. barbeyi** (Alb.) Sosn.
 + Basal leaves with more or less round base 6.
6. Leaves bright green above; finely appressed setose 7.
 + Leaves green or grayish-green above, more or less densely arachnoid-hairy 8.
7. Stem 10–30 cm high; basal leaves mostly undivided or entire, cauline leaves reduced, almost pinnate 34. **C. albovii** Sosn.
 + Stem 30–40 cm high; basal leaves usually lyrate-pinnately parted, sometimes entire, remotely and irregularly small-toothed; cauline leaves usually undivided ovate 36. **C. circassica** (Alb.) Sosn.
- 422 8. Basal and lower cauline leaves undivided or lyrate; terminal segment roundish and with small obtuse cusp, lateral segments 1 pair on each side, small, ovate round. Appendages of involucre bracts blackish 39. **C. pauciloba** Trautv.
 + Basal and lower cauline leaves usually lyrate; terminal segment acuminate. Appendages of involucre bracts brownish 9.
9. Lateral segments usually 2–3 pairs on each side, on short rachis. Involucre bracts more or less densely woolly-pubescent
 41. **C. ciscaucasia** Sosn.
 + Lateral segments usually 1 pair, sessile. Involucre bracts glabrous 35. **C. abchasica** (Alb.) Sosn.
10. Basal leaves with large, oblong-ovate, acute terminal segments and 2 pairs of smaller lateral segments 42. **C. maleevii** (Sosn.) Sosn.
 + Basal leaves pinnately divided or almost bipinnatifid; terminal segment usually almost equaling lateral ones 11.
12. Stem as long as leaves or slightly longer. Appendages of involucre bracts lanceolate-ovate, dark brown with whitish fimbriae, imbricate 45. **C. declinata** MB.
 + Leaves more or less considerably longer than stem, if occasionally as long, then combination of characters different 13.
13. Low, high-mountain [alpine] plants with prostrate or ascending stems, usually to 15 cm high 14.
 + Plants usually tall, with upright, occasionally stems ascending at base, typical of lower [mountain] zones 16.
14. Basal leaves oblong-lanceolate, entire, and lyrate-pinnately incised on same plant. Appendages of involucre bracts dorsally blackish-brown, fimbriate, fimbriae white, longer than width of appendage 49. **C. edmondi** Sosn.
 + Basal leaves pinnately incised and lyrate-pinnately incised. Appendages of involucre bracts with wide, brown stripe along spine, fimbriate, fimbriae white, not longer than width of appendage ...
 15.

15. Leaves green above, somewhat arachnoid-hairy pubescent. Capitula small; involucre 1 cm in dia 50. **C. hymenolepis** Trautv.
- 423 + Leaves grayish above, somewhat arachnoid-hairy pubescent. Capitula large; involucre 1.5–2.0 cm in dia 51. **C. schistosa** Sosn.
16. Leaves ovate, entire, sinuate-pinnately divided or almost lyrate on same plant 46. **C. maris-nigri** Sosn.
- + All leaves pinnately divided 17.
17. Leaves dark green above, scatteredly pubescent with fine appressed hairs. Capitula large; involucre 2–3 cm in dia 47. **C. tuapsensis** Sosn.
- + Leaves greenish or grayish-green above, more or less densely arachnoid hairy pubescent. Capitula smaller; involucre to 1.5 cm in dia 18.
18. Leaves white-tomentose beneath. Appendages of involucre bracts lanceolate, pale yellowish or slightly brownish 43. **C. leucophylla** MB.
- + Leaves bluish-gray-tomentose. Appendages of involucre bracts oblong-lanceolate, brownish 44. **C. kolakovskiyi** Sosn.
19. Basal leaves pinnate; lateral segments sometimes with few, more or less large, teeth or lobes at base, sometimes leaves undivided ... 20.
- + Basal (sometimes also middle cauline) leaves more or less distinctly bipinnatifid; lateral segments more or less deeply pinnatifid 24.
20. Capitula large; involucre 4 cm in dia. Stem upright. 52. **C. dealbata** Willd.
- + Capitula much smaller; involucre to 3 cm in dia. Stem prostrate, ascending, or arcuately ascending 21.
21. Appendages of involucre bracts mostly whitish. Stem prostrate 55. **C. taochia** (Sosn.) Sosn.
- + Appendages of involucre bracts brownish or yellowish 22.
22. Capitula rather large; involucre hemispherical, 2.5–3.0 cm in dia. Leaves scatteredly spiny-hairy above, grayish-tomentose beneath 54. **C. zuvandica** (Sosn.) Sosn.
- + Capitula smaller; involucre ovate or broadly cylindrical, to 2 cm in dia 23.
23. Leaves lyrate pinnately parted or lyrate. Appendages of involucre bracts with brownish fimbriae 53. **C. exurgens** Sosn.
- + Leaves pinnately divided. Appendages of involucre bracts with white fimbriae 56. **C. zangezuri** (Sosn.) Sosn.
24. Stems well proportioned, 25–65 cm high, erect, less often ascending 25.
- + Stems short, to 25 cm high, prostrate or ascending 29.
- 424 25. Lateral segments of basal leaves narrowly lanceolate, pinnatifid to

- short linear-lanceolate lobes...60. **C. somchetica** (Sosn.) Sosn.
- + Lateral segments of basal leaves broader, lanceolate or broadly lanceolate 26.
26. Leaf segments divided into ovate lobes 59. **C. pambakensis** (Sosn.) Sosn.
- + Leaf segments divided into narrower ovate-oblong or lanceolate lobes 27.
27. Leaves white-tomentose beneath. Appendages of involucre bracts whitish or yellowish, dorsally brown, with white fimbriae 61. **C. colchica** (Sosn.) Sosn.
- + Leaves yellowish or grayish-tomentose beneath 28.
28. Lateral segments of basal leaves ovate. Capitula medium-sized; involucre 1.5–2.0 cm in dia; appendages of involucre bracts pale, dorsally brownish 58. **C. karabaghensis** (Sosn.) Sosn.
- + Lateral segments of basal leaves lanceolate. Capitula larger; involucre to 3 cm in dia; appendages of involucre bracts yellowish-brown, dorsally with dark spot 57. **C. sevanensis** Sosn.
29. Basal leaves usually shorter than stem. Involucre hemispherical; appendages of involucre bracts brown, dorsally with dark reddish-brown spot and lighter fimbriae, usually twice as long as width of appendages 62. **C. carthalinica** (Sosn.) Sosn.
- + Basal leaves usually almost as long as stem. Appendages of involucre bracts pale, light-stramineous, with whitish fimbriae as long as width of appendage or slightly longer 63. **C. meskhetica** Sosn.

Section 1. Hypoleucae (Sosn.) Sosn. comb. nova.—*Psephellus* sect. *Hypoleuci* Sosn. in Zam. po Sist. i Geogr. Rast. Tbil. 14 (1948) 5.—Capitula medium- or large-sized; appendages of involucre bracts lanceolate or oblong-lanceolate, relatively narrow, mostly not covering coriaceous part of bracts. Leaves lyrate, with terminal segment of leaf much longer than lateral ones, or entire.

Type of section: *C. hypoleuca* DC.

34. **C. albovii** Sosn. nom. nov.—*Psephellus hypoleucus* var. *adjaricus* Alb. Prodr. Fl. Colch. (1895) 147; Lipsky, Fl. Kavk. 363; Sosn. in Grossh. Fl. Kavk. IV, 201 and in Zam. po Sist. i Geogr. Rast. Tbil. 14, 6.—*P. adjaricus* (Alb.) Grossh. Oprod. Rast. Kavk. (1949) 491; Sosn. in Fl. Gruzii, VIII, 537, non *Centaurea adjarica* Alb. in Bull. Herb. Boiss. II (1894) 639.

425 Perennial. Stem 10–30 cm high, simple, tomentose. Leaves bright green above, appressedly pubescent with setaceous hairs, densely white-tomentose beneath; basal leaves mostly undivided or entire, less often lyrate or almost pinnate; upper cauline leaves reduced, almost pinnate. Capitula large. Involucre 2 cm in dia; appendages of involucre bracts

blackish-brown, fimbriate, fimbriae much lighter, ciliate, longer than width of appendage. Florets pink, peripheral ones enlarged. Flowering July to August.

Alpine zone, in meadows.—*Caucasus*: Western Transcaucasia (Adzharia). Endemic. Described from Khino Mountain. Type in Leningrad; isotype in Geneva.

35. *C. abchasica* (Alb. Sosn. comb. nova.—*Psephellus abchasicus* Alb. in Tr. Odessk. Obshch. Sadov, (1891) 105; Kolak. Fl. Abkhazii, IV, 280; Sosn. in Fl. Gruzii, VIII, 538.—*P. heterophyllus* β . *abchasicus* (Alb.) Alb. in Bull. Herb. Boiss. I (1893) 262; Prodr. Fl. Colch. (1895) 147; Lipsky, Fl. Kavk. 363; Sosn. in Grossh. Fl. Kavk. IV, 201 and in Zam. po Sist. i Geogr. Rast. Tbil. 14, 6.—*P. hypoleucus* auct. p. p. non Boiss.: Grossh. Oprod. Rast. Kavk. (1949) 491.—*Exs.*: GRF No. 3250.

Perennial. Stems 10–20(30) cm high, simple or weakly branched from base, more or less densely floccose-tomentose. Leaves green above, arachnoid-hairy, somewhat scabrous, densely white-tomentose beneath; basal leaves mostly lyrate with large, ovate, basally round or obliquely divided terminal lobe, and usually one pair of very small ovate lateral lobes; lower cauline leaves ovate, petiolate, upper ones ovate-oblong, subsessile, acute. Capitula large. Involucre 2 cm in dia; appendages of involucre bracts brown, fimbriate, fimbriae much lighter, ciliate, longer than width of appendage. Florets pink, peripheral ones enlarged. Flowering July to August.

Stony and rubbly places in alpine zone, on limestones.—*Caucasus*: Western Transcaucasia (Abkhazia). Endemic. Described from Ryukha Range. Type in Tbilisi; isotype probably in Geneva.

36. *C. circassica* (Alb.) Sosn. comb. nova.—*Psephellus hypoleucus* var. *circassicus* Alb. Prodr. Fl. Colch. (1895) 147; Lipsky, Fl. Kavk. 363; Sosn. in Grossh. Fl. Kavk. IV, 201 and in Zam. po Sist. i Geogr. Rast. Tbil. 14, 6.—*P. hypoleucus* auct. p. p. non Boiss.: Grossh. Oprod. Rast. Kavk. (1949) 491.

Perennial. Stems 30–45 cm high, simple, not densely arachnoid-hairy-pubescent. Leaves green above, finely appressed-setose, more or less densely grayish-tomentose beneath; basal leaves usually lyrate-pinnately divided, less often undivided, terminal lobe large, ovate, more or less rounded or somewhat obliquely divided at base, obtuse and roundish at tip, remotely and irregularly small-toothed; lateral lobes one pair, very small, ovate, on short rachis; cauline leaves usually undivided, lower ones petiolate, upper ones subsessile. Capitula large.

Involucre 2.5 cm in dia; appendages of involucre bracts brown,

fimbriate, fimbriae lighter, ciliate, longer than width of appendage. Florets bright pink, peripheral enlarged. Flowering July to August.

Stony places in alpine zone.—*Caucasus*: Western Transcaucasia (northern). Endemic. Described from Pshigvar Mountain. Type in Tbilisi.

37. **C. holophylla** Socz. and Lipat. in Addenda XXVII, 610.—*Psephellus holophyllus* Socz. and Lipat. in Refer. Nauchn.-Issl. Rabot. Akad. Nauk SSSR, na 1945, Otd. Bibl. Nauk (1947) 9, absque diagn.; Sosn. in Zam. po Sist. i Geogr. Rast. Tbil. 14, 6, nomen and in Fl. Gruzii, VIII, 538, descr. georgica; Grossh. Opred. Rast. Kavk. 492, absque diagn.; Kolak. Fl. Abkhazii, IV, 28, descr. rossica.

Perennial. Stem erect, 30–60 cm high, 1.5 times as long as basal leaves, subglabrous, finely white-arachnoid-hairy below capitula. Leaves green above, finely white-tomentose beneath, like basal, cauline leaves undivided, with tiny, remote, acute teeth, oblong-ovate with cordate base, and acuminate; basal leaves large, 10–15(20) cm long and 4.5 cm wide, long-petiolate, petioles 10–20(30) cm long; cauline leaves somewhat reduced, very short-petiolate, terminal leaf with cuneate base, short-petiolate, subtending capitulum. Capitula solitary. Involucre ovate, 2.5 cm in dia; appendages of involucral bracts imbricate, triangular-lanceolate, dark brown, with 1 dark vein at base almost black, transparent along margin, with long light-brown fimbriae. Florets violet, peripheral ones enlarged. Flowering July to September.

Herb layer of pine forests.—*Caucasus*: Ciscaucasia, Western Transcaucasia (northern). Endemic. Described from basin of Kyafara River (Kyzylchuk pine forest). Type in Leningrad.

38. **C. barbeyi** (Alb.) Sosn. comb. nova.—*Psephellus barbeyi* Alb. in Bull. Herb. Boiss. I (1893) 247; Prodr. Fl. Colch. 148; Lipsky, Fl. Kavk. 363; Sosn. in Grossh. Fl. Kavk. IV, 200; in Zam. po Sist. in Geogr. Rast. Tbil. 14, 5; in Fl. Gruzii, VIII, 537; Grossh. Opred. Rast. Kavk. 491; Kolak. in Fl. Abkhazii, IV, 279.—*lc.*: Kolak, *Ibid.* Plate XXVIII.—*Exs.*: Pl. or. exs. No. 400.

Perennial. Stem rising laterally from basal rosette, simple, more or less densely floccose-tomentose. Basal leaves long-petiolate, large, with petiole to 30 cm long, greenish and scatteredly arachnoid-hairy pubescent above, densely white-tomentose beneath, some of them undivided, ovate or ovate-oblong, with cordate base and short acuminate or obtuse tip, sinuate-toothed, partly lyrate; terminal lobe like undivided leaf, lateral lobes 1–2 pairs, very small, ovate, petiolate; cauline leaves many, small, ovate, lower petiolate, upper ones sessile. Capitula large. Involucre 2–2.5 cm in dia, hemispherical, sometimes with

approximate bracteal leaf; appendages of involucre bracts brownish, deeply fimbriate. Florets pink, peripheral ones less enlarged. Flowering May to July.

Low-montane zone, in crevices of limestone rocks, on rubbly places.—*Caucasus*: Western Transcaucasia (northern). Endemic. Described from Abkhazia (Psyrtskha). Type in Leningrad; isotypes in Tbilisi and Geneva.

39. **C. pauciloba** Trautv. in Tr. Peterb. Bot. Sada II (1873) 474.—*Psephellus paucilobus* (Trautv.) Boiss. Fl. or. III (1875) 609; Lipsky, Fl. Kavk. 363; Sosn. in Grossh. Fl. Kavk. IV, 199 and in Zam. po Sist. in Geogr. Rast. Tbil. 14, 10; Grossh. Oprod. Rast. Kavk. 491.

Perennial. Stem rising laterally from basal rosette, short, 5–20 cm high, ascending, more or less densely arachnoid-hairy. Leaves green and scatteredly arachnoid-hairy above, more or less densely grayish-tomentose beneath; basal and lower cauline leaves on quite long petioles, undivided, and ovate or lyrate; terminal lobe large, ovate-elliptical, round with small obtuse cusp and more or less round or obliquely truncate base; lateral lobes 1 pair, very small, ovate-round; cauline leaves few, ovate, weakly acuminate, lower petiolate; bracteal leaf sessile, approximate to capitulum. Capitula large. Involucre globose, 2 cm in dia; involucre bracts weakly woolly; appendages of involucre bracts lanceolate, blackish, long-fimbriate; fimbriae brown, longer than width of appendage. Florets purple, peripheral ones enlarged. Flowering July to August.

Meadows of alpine zone.—*Caucasus*: Dagestan. Endemic. Described from Dagestan (between Kurakh and Kro). Type in Leningrad.

40. **C. troitzkyi** (Sosn.) Sosn. comb. nova.—*Psephellus Troitzkyi* Sosn. in Grossh. Fl. Kavk. IV (1934) 200; Sosn. in Zam. po Sist. i Georg. Rast. Tbil. 14, 6 and in Fl. Gruzii, VIII, 539; Grossh. Oprod. Rast. Kavk. 491.

Perennial. Stems ascending, short, 16–25 cm high, simple. Leaves green and spiny above, grayish-tomentose beneath; basal leaves long-petiolate, mostly lyrate with 3 lobes; terminal lobe oblong-triangular or oblong-ovate; basally cordate or more or less rounded, sinuate-toothed, lateral lobes in 1–2 pairs, strongly reduced, obtuse or elliptical, acuminate; cauline leaves strongly reduced, less divided, ovate, all petiolate. Capitula solitary. Involucre obovate-cylindrical, 1.0–1.5 cm in dia; appendages of involucre bracts not imbricate, small, oblong-lanceolate, blackish, with yellowish or brownish fimbriae longer than width of appendages. Florets purple, peripheral ones enlarged. Flowering August.

Mountain slopes.—*Caucasus*: Ciscaucasia. Endemic. Described from Karachaev District (gorge of Mukhur River). Type in Tbilisi.

41. *C. ciscaucasica* Sosn. in Addenda XXVII, 610.

Perennial. Stem 20–30 cm high, densely arachnoid-hairy-tomentose, usually simple, occasionally somewhat branched. Leaves green and sparsely arachnoid-hairy above, more or less densely white-tomentose beneath; basal leaves short-petiolate, lyrate-pinnately divided; terminal lobe large, ovate with more or less cuneate or roundish base, acuminate, remotely and indistinctly small-toothed; lateral lobes 2–3 pairs, smaller, ovate, on very short rachis; cauline leaves few, usually undivided, ovate, lower ones petiolate, upper ones sessile. Capitula large. Involucre subglobose, 2 cm in dia; involucre bracts more or less densely woolly; appendages of involucre bracts not imbricate, lanceolate, blackish-brown, with yellowish or whitish fimbriae longer than width of appendages. Florets pink, peripheral ones large. Flowering May to June.

Herb slopes.—*Caucasus*: Ciscaucasia (Kislovodsk). Endemic. Described from Kislovodsk. Type in Leningrad.

Section 2. Leucophyllae (Sosn.) Sosn. comb. nova.—*Psephellus* sect. *Leucophylli* Sosn. in Zam. po Sist. i Geogr. Rast. Tbil. 14 (1948) 7.—Capitula mostly small- or medium-sized; appendages of involucre bracts oblong, lanceolate, or oblong-lanceolate, more or less narrow, mostly not covering coriaceous part of involucre bracts. Leaves differently divided, terminal segment less longer or not all longer than laterals.

Type of section: *C. leucophylla* MB.

42. *C. maleevii* (Sosn.) Sosn. comb. nova.—*Psephellus maleevii* Sosn. in Zam. po Sist. i Geogr. Rast. Tbil. 14 (1948) 8; Grossh. Opred. Rast. Kavk. 491.—*P. troitzkii* Maleev ex Sosn. op. cit. pro syn. non Sosn. (1934).

Perennial. Basal leaves lyrate-pinnately divided, dark green and more or less appressedly pubescent above, grayish-tomentose beneath, densely grayish-floccose when young, with petioles to 9 cm long; terminal lobe oblong-ovate, acute, basally cordate, petiolate, remotely small-toothed, teeth short-cuspidate; lateral lobes 2–3 pairs, petiolate, to 8–9 cm long, white-woolly; cauline leaves abruptly reduced, with undivided, ovate-lanceolate, lamina 2–5 cm long, subacute, finely-toothed, or cauline leaves 3-lobed with very large terminal lobe to 12 cm long; gradually progressing to lanceolate or ovate-lanceolate upper leaves. Capitula on long leafless peduncles. Involucre oblong-ovate,

1.5 cm in dia; appendages of involucre bracts imbricate, oblong-lanceolate, brownish, white-fimbriate; peripheral florets enlarged.

Stony places.—*Caucasus*: Ciscaucasia. Endemic. Described from Krasnodar Territory (vicinity of village of Temnoleskaya). Type and isotype in Leningrad.

43. *C. leucophylla* MB. Fl. taur.-cauc. III (1819) 591; Spreng. Syst. veg. 3, 398; DC. Prodr. VI, 582; Ldb. Fl. Ross. II, 2, 696; Schmalh. Fl. II, 119 p. p.—*C. cineraris* var. *caucasica* Stev. in Mém. Soc. Nat. Mosc. IV (1812–1813) 65.—*C. dealbata* auct. p. p. non Willd.: MB. op. cit. II (1808) 349.—*Psephellus leucophyllus* (MB.) C.A.M. Verzeichn. (1831) 66; C. Koch in Linnaea, XXIV, 438 p. p. quoad pl. e Ciscaucasia; Boiss. Fl. or. III, 608 p. p. quoad pl. e Pjatigorsk; Lipsky. Fl. Kavk. 363 p. p.; Sosn. in Grossh. Fl. Kavk. IV, 200 and in Zam. po Sist. i Geogr. Rast. Tbil. 14, 10; Grossh. Opred. Rast. Kavk. 492; Stank. and Tal. Opred. Vyssh. Rast. ed. 1, 671.—*P. dealbatus* var. *leucophyllus* (MB.) Gugler in Ann. hist.-nat. Mus. Nat. Hung. VI (1908) 243.

Perennial. Stem rising from ascending base, upright, 10–30 cm high, tomentose. Basal and lower cauline leaves oblong, pinnately parted, green and arachnoid-hairy above, white tomentose beneath; segments oblong, upper ones decurrent on rachis and coalescing, undivided or lyrate; upper cauline leaves lyrate. Capitula medium-sized. Involucre oblong-ovate, 8–13 mm in dia; appendages of involucre bracts lanceolate, pale, yellowish to brownish, with whitish, quite long fimbriate. Florets pink, peripheral ones less enlarged. Flowering June to July.

Stony places, in steppes.—*European Part*: Crimea; *Caucasus*: Ciscaucasia (western and central). Described from Pyatigorsk. Type in Leningrad.

44. *C. kolakovskiyi* Sosn. in Addenda XXVII, 611.—*Psephellus kolakovskiyi* Sosn. in Kolak. Fl. Abkhazii, IV (1949) 280, descr. rossica; Sosn. in Fl. Gruzii, VII, 540, descr. georgica.—*P. leucophyllus* auct. non MB.: Alb. Prodr. Fl. Colch. (1895) 147 p. p. quoad pl. ex Abchazia.—*lc.*: Sosn. loc. cit. (1952) Fig. 417.

Perennial. Stems 15–35 cm high, simple. Leaves grayish above from appressed arachnoid hairs, glaucous and grayish-tomentose beneath; basal leaves with petioles to 25 cm long, ovate-oblong, pinnately parted, terminal lobe almost not enlarged, ovate-oblong, 6–14 cm long, undivided or sometimes with one or two lobes at base, remotely small-toothed, subacute, at base more or less rounded;

430 petiolate or coalesced with lateral lobes; lateral lobes 3–8 pairs, gradually reducing toward leaf base, ovate or more or less elliptical, subobtuse, with roundish base, upper lobes sometimes coalesced with each other, lower ones petiolate; cauline leaves abruptly reduced, few, upper simple, oblong, lanceolate. Capitula medium-sized. Involucre 1.5 cm in dia; appendages of involucre bracts oblong-lanceolate, brownish, finely pubescent, with whitish fimbriae. Florets pink, peripheral ones slightly enlarged. Flowering July to August.

Rubbly, dry, limestone slopes, in alpine zone.—*Caucasus*: Western Transcaucasia (Abkhazia). Described from Abkhazia (Gagra Range, Ats-Khun Pasture). Type in Tbilisi.

45. *C. declinata* MB. Fl. taur.-cauc. III (1819) 590 p. p. quoad pl. taur.—*C. cineraria* auct. non L.: Pall. in Nova Acta Acad. Sc. X (1797) 58; MB. op. cit. II (1808) 347, excl. syn.—*C. cineraria* var. *taurica* Stev. in Mém. Soc. Nat. Mosc. IV (1812–1813) 65.—*Psephellus declinatus* (MB.) C. Koch in Linnaea, XXIV (1851) 438 p. p. quoad pl. taur. and in Nym. Consp. (1878–1882) 418; Sosn. in Grossh. Fl. Kavk. IV, 200 and in Zam. po Sist. i Geogr. Rast. Tbil. 14 (1948) 10; Grossh. Opred. Rast. Kavk. 491; Stank. and Tal. Opred. Vyssh. rast. ed. 1, 671.—*P. leucophyllus* β . *declinatus* (MB.) Boiss. Fl. or. III (1875) 609 p. p. quoad pl. taur.; Schmalh. Fl. II, 118; Lipsky, Fl. Kavk. 363; Zelen. Mat. Fl. Kryma, 352.—*P. leucophyllus* auct. non MB.; Alb. Prodr. Fl. Colch. (1895) 147 p. p. quoad pl. e Novoross.—*Exs.*: Dörfler, Herb. norm. No. 451; Herb. Fl. cauc. No. 300 (*P. declinatus* var. *albus* N. Busch).

Perennial. Plants (5)9–25 cm high. Rhizome bearing rosette of leaves and procumbent or ascending, grayish-appressed-hairy; peduncle as long as leaves or slightly longer, terminating in single capitulum. Lower leaves oblong, pinnately incised, grayish-green above from profuse pubescence of quite long, soft hairs, white-tomentose beneath, leaf segments oblong-ovate or elliptical, obtuse, with short cartilaginous cusp, undivided, sometimes more or less deeply lobed at base into 1–2 lobes, undivided or remotely small-toothed; cauline leaves less numerous, gradually reduced, uppermost often sometimes approximate with capitula. Capitula medium-sized. Involucres ovate, 12–15 mm wide; appendages of involucre bracts lanceolate-ovate, dark brown, imbricate, with quite long, pale or whitish fimbriae. Florets pink, sometimes white (var. *alba* (N. Busch) Sosn.), peripheral florets not so large. Flowering April to May.

Rocky and stony places; less often in pine forests.—*European Part*: Crimea; *Caucasus*: Ciscaucasia (northwestern part), Western

Transcaucasia (northwestern part). Described from Crimea (Demerzhi "Yaila"*). Type in Leningrad.

- 431 **Note.** The species described by D.I. Sosnowsky (*in Zam. po Sist. i Geogr. Rast. Tbil.*, 14 [1948] 7), from the Lesser Balkans Range on the left bank of the Malaya Laba River, under the name *Psephellus buschiorum* Sosn., but not included by him, for some unknown reason, in his treatment of the subgenus *Psephellus* (Cass.) Schmalh., is, apparently, similar to *C. declinata* MB. (Editor).

46. **C. maris-nigri** Sosn. nom. nov.—*Psephellus leucophyllus* auct. p. p. non C.A.M.: C. Koch in Linnaea, XXIV (1851) 438.—*P. heterophyllus* Boiss. and Huet in Boiss. Diagn. ser. II, 3 (1856) 65; Boiss. Fl. or. III, 609; Sosn. in Grossh. Fl. Kavk. IV, 199 and in Zam. po Sist. i Geogr. Rast. Tbil. 14, 10; Grossh. Opred. Rast. Kavk. 491, non *Centaurea heterophylla* Willd. Sp. pl. III, 3 (1803) 2314.

Perennial. Stem up to 25 cm high, arachnoid-hairy-tomentose, arising from ascending base, erect. Leaves green and arachnoid-hairy above, grayish-tomentose beneath; basal leaves on same plant undivided, ovate or sinuately-pinnately divided, almost lyrate; cauline leaves short-petiolate, like basal, oblong-elliptical to oblong-ovate. Capitula medium-sized. Involucre hemispherical, to 15 mm in dia; appendages of involucre bracts oblong-triangular or lanceolate, dorsally dark brown, with long white fimbriae. Florets pink, peripheral ones slightly larger. Flowering May.

Lower zone, on limestones.—*Caucasus*: Western Transcaucasia (Tuapse District). *General distribution*: Asia Minor (Samsun-Trabzon). Described from Trabzon. Type in Geneva.

47. **C. tuapsensis** Sosn. nom. nov.—*Psephellus woronowii* Sosn. in Grossh. Fl. Kavk. IV (1934) 199; Sosn. in Zam. po Sist. i Geogr. Rast. Tbil. 14 (1948) 8; Grossh. Opred. Rast. Kavk. 492, non *Centaurea woronowii* Bornm. ex Sosn. in Vestn. Tifl. Bot. Sada, Nov. Ser. 2 (1926) 91.—*P. euxinus* Sosn. *ibid.* (1948) pro syn.

Perennial. Stem erect, to 46 cm high, simple or almost divaricately branched from middle, with upward-spreading branches, more or less arachnoid-hairy. Leaves above dark green, scatteredly pubescent with thin appressed hairs, white-tomentose beneath; basal leaves pinnately divided with more or less similar segments, lateral segments pinnatifid into almost undivided lobes, sometimes lobed at base, upper cauline leaves abruptly reduced, pinnate with somewhat larger terminal segment, coalesced with lateral lobes, uppermost leaves simple,

*A summer pasture—Translator.

cuspidate. Capitula solitary, large. Involucre ovate, 2–3 cm in dia; appendages of involucre bracts lanceolate, brownish, fimbriate; fimbriae white, longer than width of appendage. Florets pink; peripheral florets large. Flowering July.

Mountain herb slopes.—*Caucasus*: Western Transcaucasia (northern). Endemic. Described from Tuapse District (Dva Brata Mountain). Type in Tbilisi.

- 432 48. *C. salviifolia* (Boiss.) Sosn. comb. nova.—*Psephellus salviaefolius* Boiss. Fl. or. III (1875) 609; Lipsky, Fl. Kavk. 363; Sosn. in Grossh. Fl. Kavk. IV, 199; in Zam. po Sist. i Geogr. Rast. Tbil. 14, 10; in Fl. Gruzii, VIII, 540; Grossh. Oprod. Rast. Kavk. 491.—*P. leucophyllus* var. *bipinnatus* Somm. and Lev. in Tr. Peterb. Bot. Sada, XVI (1900) 275, and f. *salviaefolius* Somm. and Lev. ibid. p. p. excl. syn.

Perennial. Stems low, 7–20 cm high, ascending, laterally arising from leaf rosette, scatteredly hairy or more or less densely woolly-pubescent. Basal leaves ovate-oblong, 6.5–12 cm long, bipinnate or almost pinnately incised, with 4–6 pairs of segments, segments appressed arachnoid-hairy above, grayish, more or less densely grayish or white-tomentose beneath, quite long-petiolate; terminal segment sometimes much larger than others, broadly elliptical or ovate, obtuse or acuminate, sometimes coalesced at base with lateral segments, irregularly coarsely toothed; teeth with cartilaginous cusp; lateral segments mostly almost round or roundish elliptical, pinnatifid, less often undivided; cauline leaves abruptly reduced, lyrate, with more or less oblong terminal segment and 1–2 pairs of small lateral segments, sessile, uppermost simple, linear, subulate, or scaly. Capitula medium-sized. Involucre 1.5 cm in dia, ovate, more or less densely arachnoid-hairy, involucre bracts with short-triangular, brownish, membranous, deeply fimbriate appendage; fimbriae longer than width of appendage. Florets pink, peripheral florets large. Flowering June to August.

Alpine Meadows.—*Caucasus*: Ciscaucasia, Dagestan. Endemic. Described from northern Ossetia (Tsei Glacier). Type (or isotype) in Leningrad.

49. *C. edmondi* Sosn. nom. nov.—*Psephellus hymenolepis* var. *boissieri* Sosn. in Grossh. Fl. Kavk. IV (1934) 198.—*P. boissieri* (Sosn.) Sosn. in Zam. po Sist. i Geogr. Rast. Tbil. 14 (1948) 11, non *Centaurea boissieri* DC. Prodr. VII (1838) 303.

Perennial. Plants short, with ascending, grayish-tomentose stems 10–12 cm high, with rosette of basal leaves. Basal leaves to 15 cm long, either undivided, oblong-lanceolate or lyrate pinnately incised,

oblanceolate oblong; terminal segment oblong-lanceolate, slightly larger than lateral ones; lateral segments 2–4 pairs, elliptical or ovate-elliptical, rounded at tip, gradually reduced toward leaf base, all segments dark green above, more or less arachnoid-hairy when young, later subglabrous, snow-white-tomentose beneath; cauline leaves abruptly reduced, pinnately parted or undivided, uppermost narrowly lanceolate, subsessile. Capitula solitary. Involucre ovate, about 10 mm in dia; involucre bracts with oblong-ovate, dorsally blackish-brown, fimbriate appendage, fimbriae white, longer than width of appendage; appendages of inner bracts almost ovate, with shorter fimbriae, all not imbricate. Florets pink, peripheral florets almost not enlarged. Flowering May.

Dry mountain slopes.—*Caucasus*: Dagestan. Endemic. Described from Dagestan (vicinity of village of Gimri) Shukhi-Meer Mountain). Type in Tbilisi; Isotypes in Leningrad.

Note. D.I. Sosnowsky (*Fl. Gruzii*, VIII [1952] 539) reports this species for Georgia.

50. **C. hymenolepis** Trautv. in Tr. Peterb. Bot. Sada, III (1875) 272, IV (1876) 156, V (1878) 447, VII (1881) 472, VIII (1883) 493.—*Psephellus hymenolepis* (Trautv.) Boiss. Fl. or. Suppl. (1888) 312; Lipsky, Fl. Kavk. 363; Sosn. in Grossh. Fl. Kavk. IV, 198 and in Zam. po Sist. in Geogr. Rast. Tbil. 14, 11; Grossh. Opred. Rast. Kavk. 491; Sofieva in Fl. Azerb. VIII, 444 p. p.

Perennial. Stems ascending, 5–15 cm high, arachnoid-tomentose, leafy throughout. Leaves green and arachnoid-hairy above, white-tomentose beneath; basal leaves bipinnately incised, cauline leaves pinnately divided, segments elliptical or almost round; terminal leaf approximate with capitulum. Capitula small. Involucre 1 cm in dia; appendages of involucre bracts transparent, white-membranous, with brown midrib and brownish dorsal spot, fimbriate; fimbriae white, slightly shorter than width of appendage. Florets pink, peripheral ones enlarged. Flowering July to August.

Talus, in alpine zone.—*Caucasus*: Dagestan, Eastern Transcaucasia. Endemic. Described from Dagestan (between villages of Kurakh and Kro). Type in Leningrad.

51. **C. schistosa** Sosn. in Addenda XXVII, 611.—*Psephellus schistosus* Karajag. ex Sosn. in Zam. po Sist. i Geogr. Rast. Tbil. 14 (1948) 11, nomen.—*P. hymenolepis* auct. p. p. non Boiss.: Sofieva in Fl. Azerb. VIII (1961) 444.

Perennial. Stems ascending, (7)10–15(30) cm high, simple or weakly branched, arachnoid-woolly, leafy almost to capitula. Leaves

weakly arachnoid-woolly above, white-tomentose beneath; basal leaves pinnately incised or lyrate pinnately incised with large, elliptical or ovate, undivided or lobate terminal segment and smaller ovate or oblong-elliptical, decurrent, lateral segments; some basal leaves sometimes undivided, elliptical; cauline leaves weakly reduced, pinnately incised, segments short, oblong or elliptical, undivided or weakly incised, obtuse, with short cusp. Capitula medium-sized. Involucres 15–20 mm in dia; appendages of involucral bracts ovate-oblong, white-membranous, transparent with more or less wide, reddish-brown, dorsal band, fimbriate; fimbriae white, as long as width of appendage or very slightly shorter, sometimes appendages almost entirely white; appendages of innermost bracts triangular, weakly incised, with reddish-brown spot, less often almost white. Florets purple, peripheral florets enlarged. Flowering May.

Stony alluvium.—*Caucasus*: Eastern Transcaucasia (Azerbaijan SSR). Endemic. Described from former Divichi District (gorge of Istisu River). Type in Leningrad; isotype in Baku.

Section 3. Psephellus.—*Psephellus* auct. *Dealbati* Sosn. in Zam. po Sist. i Geogr. Rast. Tbil. 14 (1948) 12.—Capitula mostly large- or medium-sized; appendages of involucral bracts broad, ovate, broadly ovate, or almost round, imbricate always entirely covering coriaceous part of bracts. Leaves variously pinnate, occasionally undivided.

Type of section: type of subgenus.

52. *C. dealbata* Willd. Sp. pl. III, 3 (1803) 2295; MB. Fl. taur-cauc. II, 349 p. p.; DC. Prodr. VI, 576 p. p.; Ldb. Fl. Ross. II, 2, 695 p. p.; Schmalh. Fl. II, 119 p. p.—*Psephellus calocephalus* Cass. in Dict. Sc. nat. XLIII (1825) 488; C.A.M. Verzeichn. 66.—*P. dealbatus* (Willd.) Boiss. Fl. or. III (1875) 608 p. p.; Lipsky, Fl. Kavk. 363 p. p.; Gugler in Ann. hist.-nat. Mus. Nat. Hung. VI, 242 p. p.; Sosn. in Grossh. Fl. Kavk. IV, 202; in Zam. po Sist. i Geogr. Rast. Tbil. 14, 13; in Fl. Gruzii, VIII, 543; Grossh. Oprod. Rast. Kavk. 492; Sofieva in Fl. Azerb. VIII, 445.—*P. kacheticus* Rehm. ex Boiss. Fl. or. III (1875) 608; Lipsky, op. cit. 363.—*lc.*: MB. Cent. pl. rar. II, 1 (1832) tab. 53 (sub *C. dealbata*); Dachy, Kaukasus, III (1907) tab. XXI, fig. B (sub *Psephello kachetico* var. *erecto* Somm. and Lev.).

Perennial. Stem to 60 cm high, upright, branched, sparsely leafy. Leaves green and very finely pubescent above, whitish- or grayish-tomentose beneath; basal and lower cauline leaves long-petiolate, pinnately incised, segments large, oval, acuminate, sometimes with 1–3 teeth at base or weakly lobate; upper cauline leaves gradually reduced, sessile; sometimes basal and lower cauline leaves lyrate with large

terminal segment 6–12 cm long, and 2 much smaller lateral segments, sometimes all leaves undivided, ovate-oval. Capitula large, with approximate bracteal leaf. Involucres ovate-globose, to 4 cm in dia; scarious appendages of involucre bracts pale or reddish-brownish, finely pubescent, ovate-round in middle bracts, deeply fimbriate; fimbriae as long as width of appendages or longer. Florets bright pink, peripheral florets strongly enlarged. Flowering June to August.

Lower alpine meadows.—*Caucasus*: Ciscaucasia, Dagestan, Eastern Transcaucasia (region of “Glavnyi” [Main] Range), Western Transcaucasia. Endemic. Described from Georgia. Type in Berlin.

Note. Two varieties are recognized: var. *lyrophylla* (C. Koch) Sosn. (*Psephellus dealbata* β. *lyrophylla* C. Koch in *Linnaea* XXIV [1851] 438) with lyrate basal and lower cauline leaves and var. *kachetica* (Rehm. ex Boiss.) Sosn. (*Psephellus kacheticus* Rehm. ex Boiss. *Fl. or.* III [1875] 608) with entire leaves.

53. **C. exurgens** Sosn. nom. nov.—*Psephellus daghestanicus* Sosn. in Grossh. *Fl. Kavk.* IV (1934) 202; Sosn. in *Zam. po Sist. i Geogr. Rast. Tbil.* 14, 15; Grossh. *Opred. Rast. Kavk.* 492; Sofieva in *Fl. Azerb.* VIII, 446, non *Centaurea daghestanica* (Lipsky) Czer.

Perennial. Stem ascending, 20–45 cm high, usually almost dichotomously branched from middle or above, less often simple. Leaves green above, with scattered spiny hairs, grayish- or yellowish-tomentose beneath; basal leaves sometimes to 24 cm long, lyrate-pinnately divided or lyrate; terminal segment ovate-lanceolate, lateral ones broadly ovate, undivided or weakly lobed at base; all obtuse, mostly with small cusp; cauline leaves gradually reduced with smaller and narrower undivided or incised at base, or toothed segments. Capitula solitary at tips of stem and branches. Involucre broadly cylindrical, 1.5–2.0 cm in dia; appendages of involucre bracts brownish, with long fimbriae. Florets purple, peripheral florets enlarged. Flowering June to July.

Lower alpine meadows.—*Caucasus*: Dagestan, eastern Transcaucasia. Endemic. Described from Dagestan (village of Gunib). Type in Tbilisi.

54. **C. zuvandica** (Sosn.) Sosn. comb. nova.—*Psephellus zuvandicus* Sosn. in *Zam. po Sist. i Geogr. Rast. Tbil.* 14 (1948) 17; Sofieva in *Fl. Azerb.* VIII, 446.—*P. hyrcanus* Sosn. ex Grossh. *Opred. Rast. Kavk.* (1949) 492, absque diagn.

Perennial. Stem simple, to 35 cm high, arcuately ascending, more or less shaggy [hairy]. Leaves green above, with scattered spiny hairs, grayish-tomentose beneath; basal leaves pinnate, with almost equal, ovate or obovate segments, with several lobes or large teeth in lower

part, gradually reducing toward leaf base; lower and middle cauline leaves like basal but with narrower, often undivided segments; leaves surrounding capitula entirely, lanceolate, with 1–2 teeth. Capitula rather large. Involucres subglobose, 2.5–3.0 cm in dia; appendages of involucre bracts broadly ovate, brownish, fimbriate; fimbriae white, longer than width of appendage. Florets violet, peripheral ones less enlarged. Flowering June.

Dry mountain slopes.—*Caucasus*: Talysh. Endemic. Described from Talysh (near village of Perembel). Type in Tbilisi; isotype in Leningrad.

55. *C. taochia* (Sosn.) Sosn. comb. nova.—*Psephellus taochius* Sosn. in Grossh. Fl. Kavk. IV (1934) 202; Sosn. in Zam. po Sist. i Geogr. Rast. Tbil., 14, 16.

Perennial. Stems prostrate, to 22 cm high, more or less shaggy [hairy], almost dichotomously branched from middle or in upper part, with erect branches. Leaves dark green above, weakly arachnoid-hairy, snow-white-tomentose beneath; basal leaves to 20 cm long, oblong-436 obovate, pinnate; terminal segment more or less longer than lateral ones, ovate, undivided or lobed at base; lateral segments undivided or lobed at base; all lobes subobtusely, gradually reduced toward leaf base, upper lobes often decurrent on broad-winged rachis; cauline leaves gradually reduced, pinnately divided, lyrate, with few lateral segments or undivided, on longer petioles. Capitula quite large. Involucres 2.0–2.5 cm in dia, hemispherical; involucre bracts chiefly with white, at tip brownish, almost round, fimbriate appendages; fimbriae as long as width of appendages or slightly longer. Peripheral florets somewhat enlarged. Flowering August.

Dry stony slopes.—*Caucasus*: Occurrence in southern Transcaucasia probable. *General distribution*: Armenia and Kurdistan. Described from former Olty District of Kars Region (between settlements of Olor and Kyakh). Type in Tbilisi.

56. *C. zangezuri* (Sosn.) Sosn. comb. nova.—*Psephellus zangezuri* Sosn. in Zam. po Sist. i Geogr. Rast. Tbil. 14 (1948) 17; Grossh. Oprod. Rast. Kavk. 493.

Perennial. Stem prostrate or ascending, 12–15 cm high. Leaves dark green, with appressed spiny hairs in upper part, snow-white-tomentose beneath; basal leaves to 7 cm long, short-petiolate, oblong-spatulate, with terminal segment not larger than others, obovate, undivided or lobed, lobes coalesced with rachis; lateral segments gradually reducing toward leaf base, upper segments obovate, lower ones almost round, undivided or lobed, sometimes more or less irregularly serrate;

middle cauline leaves gradually reduced, with fewer lateral segments; uppermost leaves undivided, lanceolate, with short cusp. Capitula surrounded by uppermost leaves. Involucres 1.0–1.5 cm in dia, ovate; appendages of involucral bracts almost round, dorsally brownish, with white fimbriae, slightly longer than width of appendages. Florets purple, peripheral florets slightly enlarged. Flowering August.

Stony places, among tragacanth.—*Caucasus*: Southern Transcaucasia. Endemic. Described from Zangezour (village of Tatev). Type in Yerevan.

57. *C. sevanensis* Sosn. nom. nov.—*Psephellus transcausicus* Sosn. in Grossh. Fl. Kavk. IV (1934) 204; Sosn. in Zam. po Sist. i Geogr. Rast. Tbil. 14, 14 and in Fl. Gruzii, VIII, 544; Grossh. Opred. Rast. Kavk. 493; Sofieva in Fl. Azerb. VIII, 445, non *Centaurea transcaucasica* Sosn. ex Grossh. Fl. Kavk. IV (1934) 212.

437 Perennial. Stem ascending or arcuately ascending from base. Leaves long-petiolate, green, with scattered spiny hairs above, grayish- or yellowish-tomentose beneath; basal leaves pinnately incised, segments lanceolate, divided into lanceolate-oblong, subobtusate, sometimes cuspidate lobes, sometimes basal leaves simple pinnate, with segments having one or many teeth (var. *indentata* (Sosn.) Sosn.); cauline leaves pinnate, sometimes almost lyrate, their lateral lobes lanceolate, subobtusate; uppermost leaves often undivided, lanceolate or linearly lanceolate, sometimes with few teeth at base. Capitula solitary, rather large, at base surrounded by apical leaves. Involucre hemispherical, to 3 cm wide; appendages of involucral bracts almost round or obovate-oblong, yellowish-brown, dorsally with much darker spot, fimbriate; fimbriae white, longer than appendages. Florets purple, peripheral ones strongly enlarged. Flowering August.

Stony slopes.—*Caucasus*: Southern Transcaucasia. Endemic. Described from vicinity of Lake Sevan (village of Zagalu). Type in Tbilisi.

58. *C. karabaghensis* (Sosn.) Sosn. comb. nova.—*Psephellus karabaghensis* Sosn. in Grossh. Fl. Kavk. IV, (1934) 202; Sosn. in Zam. po Sist. i Geogr. Rast. Tbil. 14, 18; Grossh. Opred. Rast. Kavk. 492; Sofieva in Fl. Azerb. VIII, 448.

Perennial. Stem ascending, almost dichotomously branched below, with upright branches, pale arachnoid-hairy, 30–35 cm high. Leaves green above, sparsely pubescent, grayish-tomentose beneath; basal leaves oblong, pinnately divided, segments ovate, in turn pinnatifid, reduced toward leaf base, lowermost segments ovate, undivided, all segments weakly decurrent on rachis; middle cauline leaves pinnate, with segments having 1–2 teeth at base; uppermost leaves strongly

reduced, lyrate, undivided or many-toothed, lanceolate, surrounding capitulum. Capitula medium-sized. Involucres ovate-cylindrical, 1.5–2.0 cm in dia; appendages of involucre bracts broadly ovate, pale, dorsally brownish, fimbriate; fimbriae white, as long as width of appendage or slightly longer. Florets pale purple, peripheral enlarged. Flowering June to August.

Dry stony slopes.—*Caucasus*: Southern Transcaucasia. Endemic. Described from Karabakh (vicinity of Stepanakert, Mukhteken Mountain). Type in Tbilisi; isotypes in Leningrad.

59. **C. pambakensis** (Sosn.) Sosn. comb. nova.—*Psephellus pambakensis* Sosn. in Grossh. Fl. Kavk. IV (1934) 203; Sosn. in Zam. po Sist. i Geogr. Rast. Tbil. 14, 20; Grossh. Oprod. Rast. Kavk. 493.

Perennial. Stem upright, to 45 cm high, branched from middle with erect, adpressed branches. Leaves dark green above, snow-white-tomentose beneath; basal leaves to 28 cm long, long-petiolate, ovate-oblong; segments lanceolate, lobed with ovate, subobtusate or acuminate, finely toothed, coalescing lobes; middle cauline leaves pinnately incised with narrowly linear segments; uppermost leaves lyrate with linear-lanceolate terminal segment and few, short, linear lateral segments. Capitula small. Involucres to 1 cm in dia, cylindrical; appendages of involucre bracts ovate, pale brown. Florets pink, peripheral ones enlarged. Flowering June.

Scrub, dry herb slopes of low-montane zone, on rocks.—*Caucasus*: Eastern Transcaucasia. Endemic. Described from gorge of Debet River (near Sanain railroad station). Type in Tbilisi.

60. **C. somechetica** (Sosn.) Sosn. comb. nova.—*Psephellus somecheticus* Sosn. in Grossh. Fl. Kavk. IV (1934) 204; Sosn. in Zam. po Sist. i Geogr. Rast. Tbil. 14, 21 and in Fl. Gruzii, VIII, 545; Grossh. Oprod. Rast. Kavk. 493.—*P. dealbatus* var. *simplicatus* Bordz. in Rep. Eur. et Mediterr. III, 34–37 (1932) 397.

Perennial. Stem thin, upright, to 65 cm high, branched from middle, with erect, adpressed branches. Leaves dark green above, sparsely arachnoid-hairy, grayish- or yellowish-tomentose beneath; basal leaves to 25 cm long, long-petiolate, ovate-oblong; segments narrowly lanceolate, pinnatifid into short linearly lanceolate lobes, terminal segment scarcely differing from lateral ones; lower cauline leaves like basal; middle ones pinnate with almost linear segments; uppermost leaves surrounding base of capitulum, sometimes simple, scaly. Capitula medium-sized. Involucres ovate to 2 cm in dia; appendages of involucre bracts triangularly ovate, brownish, with whitish fimbriae as long as width of appendage of slightly longer. Flowering June to July.

Steppes.—*Caucasus*: Eastern Transcaucasia. Endemic. Described from Lorii steppe (vicinity of Stepanavan). Type in Tbilisi.

61. *C. colchica* (Sosn.) Sosn. comb. nova.—*Psephellus calchicus* in Grossh. Fl. Kavk. IV (1934) 203; Sosn. in Zam. po Sist. i Geogr. Rast. Tbil. 14, 20 and in Fl. Gruzii, VIII, 544; Grossh. Oprod. Rast. Kavk. 493.—*P. dealbatus* β . *humilior* Alb. Prodr. Fl. Colch. (1895) 146, non Boiss.

Perennial. Stems numerous, 25 cm high, arcuately ascending from base, shaggy at base. Leaves dark green above, slightly arachnoid-pubescent, white-tomentose beneath; basal leaves bipinnate, as long as stem or at least more than half as long, 20–25 cm, spatulate, their segments decurrent on rachis, broadly lanceolate, with ovate-lanceolate, subobtusate lobes; middle cauline leaves ovate, pinnate, with coalesced lobes; uppermost leaves reduced, undivided, linear, surrounding capitula. Capitulum medium-sized; involucre subglobose, to 2 cm in dia; appendages of lower involucral bracts pale, whitish or yellowish, dorsally brown; fimbriae white, as long as width of appendage or 1.5 times as long; florets pink, peripheral ones strongly enlarged. Flowering July to September.

Lower alpine zone, primarily on limestones.—*Caucasus*: Western Transcaucasia. Endemic. Described from Megrelia (Dzhvari Mountain). Type in Tbilisi.

62. *C. carthalinica* (Sosn.) Sosn. comb. nova.—*C. declinata* MB. Fl. taur.-cauc. III (1819) 519 p. p. quoad pl. ex Iberia.—*Psephellus declinatus* var. *humilior* MB. l. c. II (1808) 349; Boiss. Fl. or. III, 609 p. p. quoad pl. e Thbilissi.—*P. leucophyllus* β . *declinatus* Boiss. Fl. or. III (1875) 609 p. p. quoad pl. ex Iberia.—*P. dealbatus* auct. p. p. non Boiss: Somm. and Lev. in Tr. Peterb. Bot. Sada, XVI (1900) 274.—*P. carthalinicus* Sosn. in Grossh. Fl. Kavk. IV (1934) 203; Sosn. in Zam. po Sist. i Geogr. Rast. Tbil. 14, 19 and in Fl. Gruzii, VIII, 546; Grossh. Oprod. Rast. Kavk. 493.—**lc.**: Sosn. in Fl. Gruzii, VIII (1952) Fig. 418.—**Exs.**: Hayek, Cent. exs. crit. fasc. II, No. 78 (sub *C. dealbata*).

Perennial. Stems numerous, low, to 25 cm high, shaggy at base, leafy to tip, prostrate or ascending, more or less arachnoid-hairy. Leaves dark green above, arachnoid-hairy, white-tomentose beneath; basal leaves ovate-oblong, bipinnately divided, 6–9 cm long, shorter than stems; leaf segments lanceolate, sessile, sometimes at base decurrent on rachis, divided into short oblong lobes; middle cauline leaves pinnately divided with lanceolate segments; uppermost leaves pinnate with linear segments. Capitula medium-sized. Involucres usually hemispheri-

cal, 1–2 cm in dia; appendages of involuclral bracts ovate-oblong, brown, dorsally with darker spot, fimbriate; fimbriae concolorous, almost 2 times as long as width of appendage. Florets pink, peripheral ones slightly enlarged. Flowering April to August.

Dry slopes.—*Caucasus*: Eastern Transcaucasia. Endemic. Described from vicinity of Tbilisi (near village of Tskhneti). Type in Tbilisi.

65. **V. meskhetica** Sosn. in Addenda XXVII, 612.

Perennial. Stems numerous, low, 5–15(25) cm high, ascending, prostrate, branched, shaggy at base, densely tomentose, leafy to tip. Leaves grayish-green above, scabrous and arachnoid-hairy, white-tomentose beneath; basal leaves short-petiolate, ovate-oblong, bipinnately divided, almost as long as stem, sometimes longer; leaf segments ovate or lanceolate, sessile, pinnatifid into oval or ovate lobes; cauline leaves pinnately divided into narrowly lanceolate segments; uppermost leaves pinnate with linear segments, sometimes undivided, lanceolate, appressed to capitulum. Capitula medium-sized. Involucres usually ovate, 1.0–1.5 cm in dia; appendages of involuclral bracts pale, light stramineous, with whitish fimbriae usually as long as width of appendages. Florets bright pink, peripheral ones enlarged. Flowering June to August.

Dry slopes, clayey mounds; in mid-montane zone—*Caucasus*: Eastern Transcaucasia. Endemic. Described from vicinity of Akhatsikhe. Type in Tbilisi.

Subgenus 5. Jacea (Juss.) Hayek, *Centaurea*-Art. Österr.-Ung. (1901) 5, 107 p. p.; Dobrocz. in Bot. Zhurn. Akad. Nauk URSR, VI, 2 (1949) 64, 66.—*Jacea* Juss. Gen. pl. (1789) 173; Dostal, Klic. (1958) 632, 738.—*Lepteranthus* Neck. Elem. I (1790) 73; Cass. in Dict. Sc. nat. XXVI (1823) 64.—*Phrygia* S.F. Gray, Nat. Arrang. Brit. Pl. II (1821) 441. p. p.—*Platylophus* Cass. op. cit. XLIV (1826) 36.—*Stenolophus* Cass. op. cit. XLIV (1826) 36, L (1827) 499, p. p.—*Centaurea* Sect. *Jacea* auct. non DC.: Boiss. Fl. or. III (1875) 615; O. Hoffm. in Pflanzenfam. IV, 5 (1893) 329.—*Centaurea* subgen. *Centaurea* Schmalh. Fl. Yugo-Zap. Ross. (1886) 329 p. p. and Fl. II (1897) 120 p. p.—Capitula medium- or large-sized, with many florets, at tips of stem and lateral branches, solitary, sometimes 2–3(4), in corymbose, racemose-corymbose, occasionally paniculate-corymbose inflorescence or single on plant. Involucre globose-ovate, ovate, or oblong-ovate, 6–18(20) mm in dia, usually arachnoid-hairy in lower part or at base, glabrous above; involuclral bracts coriaceous, greenish (yellowing during drying), with indistinct veins, ovate or lanceolately ovate outer to lanceolately ovate and almost ovate innermost; appendages of

involucral bracts membranous, not decurrent on bracts, round to oblong, attenuate into subulate or caudate, nonspiny tip, undivided or pectinate (except appendages of inner bracts) to filiform, mostly long cilia. Florets pink, pinkish- or lilac-purple, sometimes white (albinos), heterogeneous, central florets bisexual, tubular, peripheral sterile, lacking staminodes and rudiment of style, tubular-infundibular, strongly enlarged, with 5–6-fid corolla; stamen filaments flattened, papillate; stigma bifid. Achenes oblong-obovate, oblong-ellipsoid or almost oblong, 2.7–3.25(4.0) mm long, scatteredly hairy; pappus $(1/2)1/3 - 1/4$ as long as achenes, ochraceous, persistent, double; outer one consisting of several rows of flat, serrate bristles longer from outer to inner, and basally connate in ring, inner one $1/2$ to $2/5$ as long as outer, one-rowed consisting of very slightly shorter bristles. Perennial herbs, with
 442 solitary or numerous, mostly upright stems leafy to tip. Leaves entire, with remote teeth, less often sinuate-lobate or pinnately divided, woolly scabrous, with or without mixture of arachnoid hairs, sometimes subglabrous; basal and lower cauline leaves petiolate, others sessile, not decurrent on stem.

Type of subgenus: *C. jacea* L.

In the species of series *Nigrae* (Hayek) Dobroc. of section *Lepteranthus* (Neck.) DC., not found in the USSR, all florets in a capitulum are bisexual. Fourteen species [of subgenus *Jacea*] have been reported from our country.

1. Appendages of outer and middle involucral bracts weakly convex, round, more or less lacerate, irregularly toothed or fimbriate-toothed, sometimes almost entire; achenes lacking pappus (Section *Jacea*)...2.
- + Appendages of outer and middle involucral bracts flat, oblong, attenuate into subulate or caudate tip, pectinately incised into filiform, mostly long, cilia; achenes with short pappus (Section *Lepteranthus* (Neck.) DC.) 4.
2. Leaves elliptical or ovate-lanceolate to almost oblong, subacute or short-acuminate, green, quite thin, on both sides scabrous from flexuous, mostly scattered hairs; cauline leaves recurved, often subglabrous. Appendages of involucral bracts usually brown or brownish 64. *C. jacea* L.
- + Leaves narrow, lanceolate to linearly lanceolate, acuminate, thick; cauline leaves upward-spreading. Appendages of involucral bracts whitish, pale brownish or brownish in middle 2.
3. Involucres ovate, (8)10–12 mm in dia. Plants green, subglabrous or sparsely arachnoid-hairy; stems with fewer branches in upper part 65. *C. pannonica* (Heuff.) Hayek.
- + Involucres globose-ovate or subglobose, 12–16(18) mm in dia. Plants grayish-green or grayish from quite dense arachnoid pubescence,



- also with arcuate stiff hairs; stems mostly quite strongly branched from middle or upper part 66. **C. substituta** Czer.
4. Involucres subglobose to ovate, (8)10–20 mm in dia. Stems to 100(120) cm high, with fewer branches in upper part, branches scabrous (Section *Phrygiae* (Hayek) Dobrocz.) 5.
- + Involucres oblong-ovate, 6–8(10) mm in dia. Stems 20–40(70) cm high, quite strongly branched from middle or in upper part, with more or less spreading thin branches (Series *Trichocephalae* (Hayek) Dobrocz.) 13.
- 443 5. Appendages of inner involucre bracts rising above middle bracts and not covered by their appendages 6.
- + Appendages of inner involucre bracts not rising above middle bracts and covered by their appendages 10.
6. Appendages of outer and middle involucre bracts large, entirely covering bracts below 7.
- + Appendages of outer and middle involucre bracts quite small, partly covering bracts below 9.
7. Stems woolly from scattered flexuous hairs; cauline leaves lacking auricles at base 8.
- + Stems glabrous; cauline leaves with large-toothed auricles, decurrent on stem. Appendages of outer and middle involucre bracts black 69. **C. nigriceps** Dobrocz.
8. Involucres 14–20 mm long and 12–17 mm in dia; appendages of outer and middle involucre bracts black or dark brown, sometimes light brown. Cauline leaves attenuate or obtuse, not amplexicaul 67. **C. phrygia** L.
- + Involucres 18–20 mm long and 17–18 mm in dia; appendages of outer and middle involucre bracts black. Cauline leaves roundish at base and usually weakly amplexicaul 68. **C. carpatica** (Porc.) Porc.
9. Plants woolly or scabrous-woolly, without mixture of arachnoid-hairy-pubescent; stems distinctly thickened below capitula, branches somewhat coarse [scabrous]. Involucres 17–20 mm long and 12–15 mm in dia; appendages of outer and middle involucre bracts black or dark brown, attenuate into erect or scarcely recurved subulate tip 70. **C. abbreviata** (C. Koch) Hand.-Mazz.
- + Plants scabrous or scabrous-woolly, with mixture of arachnoid-hairy-pubescent; stems weakly thickened below capitula, branches thin. Involucres 13–18 mm long and 8–12 mm in dia; appendages of outer and middle involucre bracts much lighter in color (especially cilia), narrowed into recurved caudate tip 75. **C. salcifolia** MB.
10. Involucres 20–22 mm long and (15)17–20 mm in dia. Plants of upper forest and subalpine zones 71. **C. alutacea** Dobrocz.

- + Involucres 15–20 mm long and (8)10–15 mm in dia. Plants of valleys and low- and mid-montane zones 11.
11. Stems and leaves somewhat densely woolly, scabrous-woolly or scabrous from somewhat stiff hairs 72. **C. abnormis** Czer.
- + Stems weakly arachnoid-hairy or subglabrous 12.
12. Leaves green, on both sides scabrous from stiff hairs, often cauline leaves with insignificant mixture of arachnoid-hairy-pubescence. Involucres (8)10–15 mm in dia 73. **C. pseudophrygia** C.A.M.
- 444 + Leaves grayish-green from continuous, finely arachnoid-hairy-pubescence, with mixture of short, stiff hairs. Involucres narrower, 7–10 mm in dia. 74. **C. stenolepis** Kern.
13. Leaves ovate, ovate-lanceolate or oblong, mostly green, thin, soft pubescent on both sides. Achenes 2.5–3.0 mm long; pappus 0.5–1.0 mm long 76. **C. hyrcanica** Bornm.
- + Leaves narrower, narrowly lanceolate, linearly lanceolate or linear (upper cauline), usually grayish-green, more or less thick, on both sides scabrous from short, stiff hairs. Achenes 3–4 mm long; pappus 1.5–2.0 mm long. 77. **C. trichocephala** MB.

Section 1. Jacea.—*Jacea* auct.: S.F. Gray, Nat. Arrang. Brit. Pl. II (1821) 442; Cass. in Dict. Sc. nat. XXIV (1822) 88; XLIV (1826) 36, pro gen.—Sect. *Jacea* (Juss.) DC. Prodr. VI (1837) 570 p. p.—Sect. *Phalolepis* (Cass.) DC. ibid. 568 p. min. p.; Benth. in Benth. and Hook. f. Gen. pl. II (1873) 479 p. min. p.; O. Hoffm. in Pflanzenfam. IV, 5 (1893) 327 p. min. p.—Sect. *Jacea* **Eujacea* Boiss. Fl. or. III (1875) 616 p. p. Briquet, Monogr. Centaurees Alpes Maritimes (1902) 60 p. p.—Sect. *Eujacea* a) *Vulgares* Hayek. Centaurea-Art. Österr.-Ung. (1901) 5, 112.—Sect. *Eujacea* ser. *Vulgares* (Hayek) Dobrocz. in Bot. Zhurn. Akad. Nauk URSR, VI, 2 (1949) 64.—Appendages of outer and middle involucral bracts slightly convex, round, lacerate, irregularly toothed or fimbriate, less often almost entire; achenes without pappus.

Type of section: type of subgenus.

In this section belong species constituting a natural phylogenetic series, which hardly needs special nomenclatural designation.

64. **C. jacea** L. Sp. pl. (1753) 914; DC. Prodr. VI, 570 p. p. excl. var.; Ldb. Fl. Ross. II, 2, 690 p. p.; Schmalh. Fl. II, 122 p. p.; Fedtsch. and Fler. Fl. Evrop. Ross. 1022 p. p.; Syreitsch. Ill. Fl. Mosk. Gub. III, 311 p. p.; Iljin in Fl. Yugo-Vost. VI, 426 p. p.; Majeovski, Fl. ed. 8, 612 p. p.; Kryl. Fl. Zap. Sib. XI, 2952; Popov, Ocherk. Rast. i Fl.

*Asterisk not explained in the text—General Editor.

Karpat. 252 p. p.; Dobrocz. in Vozn. Rosl. URSR, 579; Stank. and Tal. Oprod. Vyssh. Rast. ed. 2, 416.—*C. jacea* *α. genuina* Wimm. and Grab. Fl. Sil. II (1829) 107.—*C. vulgaris* var. *jacea* (L.) Godr. Fl. Lorr. II (1843) 55, n. v.—*C. jacea* ssp. *jacea* (L.) Greml. Excursionfl. Schweiz. (1874) 248 p. p.; Hegi, Ill. Fl. VI, 2, 947 p. p.—*C. jacea* ssp. *eujacea* Gugler in Mitteil. Bayer. Bot. Ges. (1904) 405 p. p.; in Ann. hist. nat. Mus. Nat. Hung. VI, 45, 52 p. p.; Hayek in Fedde, Repert. Beih. XXX, 2, 785 (Prodr. Fl. Balc.).—*C. jacea* ssp. *genuina* (Wimm. and Grab.) Dostal. Kvet. CST (1950) 1695.—*Phaponticum jacea* (L.) Scop. Fl. Carn. ed. 2, II (1772) 135.—*Jacea pratensis* Lam. Fl. Fr. II (1778) 55.—*J. communis* Delarb. Fl. Auv. ed. 2 (1800) 201, n. v.—*J. nigra* S.F. Gray, Nat. Arrang. Brit. Pl. II (1821) 442.—*J. vulgaris* ssp. *vulgaris* Dostal, Klič. (1958) 740.—*Cyanus jacea* (L.) Gaertn. Mey and Scherb. Fl. Wett. III, 1 (1801) 172; Presl. Fl. Cech. (1819) 179.—**lc.**: Hayek, Centaurea-Art. Österr.-Ung. (1901) Taf. IX, fig. 11; Fedtsch. and Fler. op. cit. Fig. 1027, 1028; Syreistsch. op. cit. page 311; Hegi, op. cit. fig. 639a, 641d-f; Bonnier. Fl. Compl. III. France, Suisse et Belg. VI (1923) pl. 327, fig. 1600 and 1600 bis; Javorka and Csapody, Iconogr. Fl. Hung. (1933) 546, fig. 3902; Majeovski, op. cit. Fig. 231; Stank. and Tal. op. cit. Fig. 396; Dostal, Klic (1958) tab. 282, fig. 2504-II—**Exs.**: Herb. Fl. Ingr. No. 335; Pl. Finl. exs. Nos. 991, 1403; Hayek, Fl. stir. exs. No. 593; Petrak, Fl. Bohem. and Morav. exs. No. 262; Billot, Fl. Gall. et Germ. exs. No. 264.

Perennial. Whole plant green, with woody, reduced rhizome bearing string-like roots. Stems solitary or 2–3(5), 20–80(100) cm high, upright or weakly ascending at base, ribbed-sulcate, distinctly thickened below capitula, usually branched in upper half, sometimes simple, often some of them lilac-purple, mostly almost glabrous or weakly scabrous above along ribs, smooth below, sometimes very slightly arachnoid-hairy, less often entirely scabrous from scattered hairs. Leaves elliptical- or ovate-lanceolate, lanceolate to almost oblong, subacute or short acuminate, entire, with remote teeth, often basal, lower and sometimes some middle cauline leaves sinuate-lobate, less often pinnately divided, rather thin, scabrously pubescent on both sides, mostly with scattered, somewhat flexuous, short multicellular hairs or glabrous (mostly middle and upper cauline) and then only sharply scabrous on margin from very fine spinules; basal and lower cauline leaves petiolate, middle and upper cauline leaves sessile, distinctly narrowed toward base, divergent. Capitula solitary, at tips of stem and lateral branches, in corymbose inflorescence, surrounded by uppermost leaves. Involucre globose-ovate, 13–18 mm long and 10–15 mm in dia, glabrous, basally weakly arachnoid-hairy; appendages of involucre bracts membranous, entirely covering bracts below, brown or brownish, with

golden tinge, becoming lighter toward margin, sometimes pale brownish; appendages of outer and middle involucre bracts roundish, somewhat convex, fan-like incised, irregularly toothed, fimbriate-toothed, sometimes appendages of 1–3 outer rows of bracts long-fimbriate; appendages of inner bracts roundish-ovate or oval, weakly lacerate, undivided or irregularly small-toothed only at tip. Florets lilac-purple, sometimes white. Achenes 3 mm long and 1.0–1.2 mm wide; pappus absent. Flowering June to September.

Meadows, forest glades, edges, logging areas, and scrubs.—*Euro-pean Part*: Karelia-Lapland (in Kola Peninsula, introduced), Baltic Region, Ladoga-Ilmen, Dvina-Pechora (south), Upper Dniester, Upper Dnieper, Middle Dnieper, Bessarabia, Black Sea Region, Crimea, Lower Don (northern half of district, rarely), Volga-Don, Upper Volga, Volga-Kama, Trans-Volga (northern); *Western Siberia*: Altai (once collected near Kolyvansk factory, introduced). *General distribution*: Scandinavia (except north), Atlantic and Central Europe, Italy (northern), Balkans (northern), North America (introduced). Described from northern Europe. Type in London.

Note. *C. jacea* L. s. str. hybridizes rather often with *C. phrygia* L. s. str. A series of such hybrid forms has been described as varieties of the former species or even as separate species. Below we present the synonymy relating to these hybrids: *C. livonica* Weinm. *Bot. Garten in Dorpat* (1810) 38; DC. *Prodr.* VI, 602; Fleisch and Lindem. *Fl. Esth. Liv. Kurl.* (1839) 302; Ldb. *Fl. Ross.* II, 2, 690, pro syn.; Rupr. *Fl. Ingr.* (1860) 544.—*C. nigrescens* auct. fl. Ross. p. p. non Willd.—*C. austriacoides* Woloszcz. in *Spraw. Kom. fizyogr. Akad. Umjetn. Krakowie*, XXVII (1892) 206; in *Oest. Bot. Zeitschr.* XLIII (1893) 108; Fedtsch. and Fler. *Fl. Evrop. Ross.* 1023, fig. 1030; Syreitsch. *Ill. Fl. Mosk. Gub.* III (1910) 312.—*C. subjacea* (Beck) Hayek, *Centaurea-Art. Österr.-Ung.* (1901) 128; Popov, *Ocherk. Rast. i Fl. Karpat.* (1949) 252.—*C. pratensis* auct. fl. Ross. non Thuill.—*C. decipiens* auct. fl. Ross. p. p. non Thuill.—*C. commutata* Stank. in Stank. and Tal. *Opred. Vyssh. Rast.* ed. 2 (1957) 416 p. p.—*C. jacea* δ . *livonica* (Weinm.) Weinm. *Elench. pl.* (1824) 411.—*C. jacea* var. *pratensis* auct. fl. Ross.—*C. jacea* var. *decipiens, commutata, lacera* auct. fl. Ross. p. p. Sometimes this species hybridizes with *C. diffusa* Lam. and *C. pseudophrygia* C.A.M. s. str. Apparently, some of the above-mentioned synonyms refer to hybrids of *C. jacea* L. s. str. \times *C. pseudophrygia* L. s. str. When identifying centaureas of this subgenus, it must be borne in mind that the key to species has been compiled without regard to all these hybrid forms.

Economic Importance. Melliferous plants. Their leaves contain vitamin C. The leaves and stems are used to obtain a yellow dye.

65. **C. pannonica** (Heuff.) Hayek, Centaurea-Art. Österr.-Ung. (1901) 118; Wagner, Cent. Hung. 125; Prod. Fl. Roman, I, 2, 1064.—*C. amara* β. *pannonica* Heuff. in Verh. Zool.-Bot. Ges. Wien, VIII (1858) 142.—*C. amara* auct. fl. Ross. austro-occid. p. p. non L.; *C. amara* auct. fl. Ross. p. min. p. non L.—*C. jacea* ssp. *angustifolia* var. *integra* subvar. *pannonica* (Heuff.) Gugler in Ann. hist.-nat. Mus. Nat. Hung. VI (1908) 47, 59 p. p.—*C. jacea* ssp. *angustifolia* var. *pannonica* (Heuff.) Hayek in Fedde, Repert. Beih. XXX, 2 (1931) 785 (Prodr. Fl. Balc.); Stoyan. and Stef. Fl. na B'lg. ed. 3 (1948) 1206.—*C. jacea* var. *pannonica* (Heuff.) M. Pog. Ocherk. Rast. i Fl. Karpat. (1949) 252.—*C. jacea* ssp. *angustifolia* auct. non Gugler: Dostal, Květ. CSR (1950) 1694.—*C. jacea* ssp. *pannonica* (Heuff.) Soo and Javorka, A Magyar Növényvilág Kézikönyve, II (1951) 708.—*Jacea vulgaris* ssp. *angustifolia* (Schränk) Dostal, Klič' (1958) 740.—**447** **IC.**: Hayek, Centaurea-Art. Österr. Ung. (1901) Taf. IX, fig. 10; Javorka and Csapody, Iconogr. Fl. Hung. (1933) 546, fig. 3903; Dostal, Květ. CSR (1950) tab. 564, fig. 2; ej. Klič' (1958) tab. 282, fig. 2504-I; Soo and Javorka op. cit. tab. 154 fig. 922.—**Exs.**: Domin and Krajina, Fl. Cechosl. exs. No. 295; Schultz. Herb. norm. nov. ser. Cent. 29, No. 2851; Fl. exs. austro-hung. No. 3419; Hayek, Cent. exs. crit. fasc. II, No. 84.

Perennial. Whole plant green, with woody, reduced rhizome bearing string-like roots. Stems 1–3, 30–70(100) cm high, upright, sometimes somewhat ascending at base, ribbed-sulcate scarcely thickened below capitula, with fewer bristles in upper third, branches upward spreading, quite well-proportioned, mostly short, glabrous, usually lilac-purple in lower half. Leaves narrowly lanceolate to linearly lanceolate, acuminate, entire, sometimes basal, lower and in part middle cauline leaves remotely toothed or shallowly sinuately lobed, glabrous; scabrous only on margin from subacute tubercles or spines, often stem partly covered with very fine, mostly sparse, arachnoid pubescent; basal and lower cauline leaves petiolate, more or less withering early, sometimes somewhat broad, lanceolate, others sessile and weakly narrowed toward, base, upward spreading. Capitula solitary, at tips of stem and lateral branches, in corymbose inflorescence, surrounded by narrow, almost linear, uppermost leaves. Involucres ovate, less often globose-ovate, 15–17 mm long and (8)10–12 mm in dia, glabrous, weakly arachnoid-hairy at base; appendages of involucre bracts membranous, entirely covering bracts below, appendages of outer and middle bracts whitish, brownish in middle, somewhat bulging, fanlike incised, irregularly toothed or fimbriate-toothed; appendages of inner bracts dark brown to brownish, much lighter toward margin, round-ovate, or oval, weakly lacerate, undivided or with irregular small teeth at tip.

Florets lilac-purple. Achenes 2.7–3 mm long and 1–1.25 mm wide; pappus absent. Flowering (June) July to September.

Meadows, scrubs, groves.—*European Part*: Upper Dnieper (south), Middle Dnieper, Upper Dniester (south). *General distribution*: Central Europe (southeastern part), Balkans (except extreme south). Described from Hungary. Type in Vienna.

Note. This species is very similar to *C. jacea* L. s. str. and *C. substituta* Czer. It differs from the former by having stems that are scarcely thickened below the capitula, narrowly lanceolate or linear-lanceolate, acuminate, upward-spreading and more dense leaves, whitish, in the middle part pale brownish or brownish appendages of the outer and middle bracts; and from the latter species by having green, subglabrous or sparsely arachnoid-hairy stem and leaves, unbranched stems and narrower involucre.

448 66. **C. substituta** Czer. in Addenda XXVII, 612.—*C. amara* auct. fl. Ross. p. max. p. non L.—*C. jacea* auct. fl. Ross. austr. p. p. non L.

Perennial. Whole plant usually grayish-green or grayish; covered with more or less dense, weakly floccose, arachnoid-hairy pubescence, with short woody rhizome bearing string-like roots. Stems solitary or few, to 80 cm high, upright, ribbed-sulcate, slightly thickened below capitula, mostly quite strongly branched from middle or in upper part with long upward-spreading branches, often lilac-purple, mostly scabrous in upper half from sharp spines or short, stiff hairs. Leaves narrowly lanceolate, oblong-ob lanceolate, or narrowly oblong-lanceolate, sometimes upper cauline leaves almost linearly lanceolate, acuminate to subacute, entire, less often basal and even middle cauline leaves with remote small teeth or shallowly sinuate lobed, somewhat densely or scatteredly pubescent on both sides, with stiff, multi-cellular hairs; basal and lower cauline leaves petiolate, withering early relatively, others sessile, weakly narrowed toward base. Capitula solitary at tips of stem and lateral branches, in corymbose or racemose-corymbose inflorescence. Involucre globose-ovate, less often subglobose, 16–18 mm long and 12–16 (18) mm in dia, glabrous, grayish-arachnoid-hairy only at base; appendages of involucre bracts membranous, entirely covering bracts below, whitish, pale brownish or brownish in middle, sometimes entirely pale brownish, large; appendages of outer and middle bracts round, convex, fanlike incised; irregularly toothed or fimbriate-toothed; appendages of inner bracts roundish ovate to oval, weakly cut, undivided or only at tip with irregular small teeth. Florets lilac-purple. Achenes 3 mm long and 1–1.3 mm wide; pappus absent. Flowering July to August.

Meadows, scrubs, forest glades, and edges.—*European Part*: ?Bessarabia (Grigoriopol), Black Sea Region (south), Lower Don, Crimea (south); *Caucasus*: Ciscaucasia (extreme northwestern part), Western Transcaucasia (north.). Endemic. Described from Crimea. Type in Leningrad.

Note. Until now, this race has been identified with *C. amara* L., described from Italy and not found in the USSR. In reality, it is closest of all to *C. pannonica* (Heuff.) Hayek and *C. banatica* Roch. However, despite the undisputed great similarity of *C. substituta* Czer. to the latter two species, it cannot be combined with either of them. Apparently, the name *C. integrifolia* auct. fl. Cauc. non Tausch (1928) nec C.A.M. (1831) is a synonym of the species described by me.

The plants from the northeastern part of the Saratov Region (area between Khvalinsk and Saratov), which at present we refer to *C. jacea* 449 L.s. str., are very similar to *C. substituta* Czer. Possibly, further studies, especially directly in nature, on more material than is at our disposal will enable us to describe these plants as a separate race.

In the Krasnodar Territory (villages of Sudalskaya and Mikhailovskaya), hybrids of *C. abnormis* Czer. × *C. substituta* Czer. have been observed.

The species *C. oxylepis* auct. fl. Cauc. non Wimm. and Gr. (= *C. jacea* ssp. vel var. *oxylepis* auct. fl. Cauc.) is not clear to me. Quite likely, the authors of the Flora of the Caucasus (A.A. Grossheim) erroneously included under this name some hybrid forms (cf. also note to *C. pannonica* (Heuff.) Hayek).

Section 2. Lepteranthus (Neck.) DC. Prodr. VI (1837) 572; Hayek, Centaurea-Art. Österr.-Ung. (1901) 5, 146; Dobroc. in Bot. Zhurn. Akad. Nauk URSR, VI, 2 (1949) 64, 66.—*Lepteranthus* Neck. Elem. I (1790) 73; Cass. in Dict. Sc. nat. XXVI (1823) 64.—*Cyanus* sect. *Lepteranthus* (Neck.) DC. in Ann. Mus. Paris, XVI (1810) 158.—*Phrygia* S.F. Gray, Nat. Arrang. Brit. Pl. II (1821) 441 p. p.—*Platylophus* Cass. op. cit. XLIV (1826) 36.—*Stenolophus* Cass. op. cit. XLIV (1826) 36, L. (1827) 499 p. p.—*Centaurea* sect. *Jacea* (Cass.) DC. Prodr. VI (1837) 570 p. p.—*Centaurea* subgen. *Stenolophus* (Cass.) Spach, Vég. Phanerogam. × (1841) 11.—*Centaurea* sect. *Jacea* **Eujacea* Boiss. Fl. or. III (1875) 616 p. p.; Briquet, Monogr. Centaurees Alpes Martimes (1902) 60 p. p.—*Centaurea* sect. *Jacea* ***Phrygia* Boiss. op. cit. 616; Briquet, op. cit. 86.—*Centaurea* subgen. *Jacea* sect. *Eujacea* Hayek, op. cit. 5 p. p. quoad species c) *Nigrescentes*

*Asterisk not explained in the text—General Editor.

**Double asterisk not explained in the text—General Editor.

Hayek.—Appendages of outer and middle involucre flat, elongate, attenuate in subulate tip, pectinate to filiform with mostly long cilia; achenes with short pappus (lacking pappus in some alien species).

Type of section: *C. phrygia* L.

Series 1. *Phrygiae* (Hayek) Dobroc. in Bot. Zhurn.

Akad. Nauk URSR, VI, 2 (1949) 64.—Sect. *Eucyanus* b) *Phrygiae* Hayek, *Centaurea*-Art. Österr.-Ung. (1901) 5, 148.—Involucre subglobose, globose-ovate or ovate, (8) 10–20 mm in dia. Stems to 100 (120) cm high, with fewer branches in upper part, branches upward-spreading, scabrous, occasionally stem simple.

67. *C. phrygia* L. Sp. pl. (1753) 910 p. p.; Fl. Suec. ed. 2 (1755) 301; DC. Prodr. VI, 573 p. p.; Ldb. Fl. Ross. II, 2, 693 p. p.; C.A.M. in Bull. Acad. Sc. Pétersb. VI, 134, excl. auct. nonnull.; Rupr. Fl. Ingr. 544; Korsh. Tent. Fl. Ross. or. 237; Schmalh. Fl. II, 123 p. p.; Fedtsch. and Fler. Fl. Evrop. Ross. 1024; Syreistsch. III. Fl. Mosk. Gub. III, 313; Iljin in Fl. Yugo-Vost. VI, 427; Majeovski, Fl. ed. 8, 613; Dobroc. in Bot. Zhurn. Akad. Nauk URSR, III, 1–2 (1946) 29, 30, IV, 3–4 (1948) Karta 1, 4; in Vizn. Rosl. URSR, 579; Kryl. Fl. Zap. Sib. XI, 2953; Popov, Ocherk Rast. i Fl. Karpat, 252; Stank. and Tal. Opred. Vyssh. Rast. ed. 2, 416 p. p. excl. pl. taur.—*C. austriaca* Willd. Sp. pl. III, 3 (1803) 2283 and auct. fl. Ross. p. p.—*C. nigra, pectinata* auct. fl. Russ. p. p. non L.—*C. conglomerata* C.A.M. in Beitr. Pflanzenk. Russ. Reich. V (1848) 44, non Kauffm. (1866).—*C. phrygia* ssp. *austriaca* (Willd.) Gugler in Mitteil. Bayer. Bot. Ges. (1904) 408; in Ann. hist.-nat. Mus. Nat. Hung. VI, 90, 91; Hegi, Ill. Fl. IV, 2, 958; Dostal, Kvét. ČSR, 1700, excl. syn. *C. carpatica* Porc.—*Jacea phrygia* ssp. *austriaca* (Willd.) Dostal, Klic. (1958) 742.—**lc.**: Hayek, *Centaurea*-Art. Öster.-Ung. (1901) Taf. XI, fig. 5; Fedtsch. and Fler. op. cit. Fig. 1032; Syreistsch. op. cit. 313; Lapanonov in Zap. po Semenoved. Glav. Bot. Sada SSSR, IV, 8, Fig. 8 in p. 20; Dostal, op. cit. (1950) tab. 568, fig. 1; ej. op. cit. (1958) tab. 283, fig. 2507–I.—**Exs.** GRF No. 1480; Eston. pl. No. 92; Herb. Fl. Ingr. No. 336; Woloszcz. Fl. polon. exs. no. 653; Fl. exs. reip. Bohem.-Slov. No. 636 (sub *C. indurata* Janka); Fl. exs. austro-hung. No. 3423; Petrak, Fl. Bohem. and Morav. exs. No. 979; Callier, Fl. Siles. exs. 1893, No. 844.

Perennial. Whole plant woolly from scattered, flexuous, multicellular hairs, with woody, short rhizome bearing thicker string-like roots. Stems solitary or 2–3(4), 30–80(110) cm high, upright, ribbed-sulcate, noticeably thickened below capitula; branched above, with upward-spreading, usually simple and fewer branches, occasionally simple,

mostly lilac-purple. Leaves broadly lanceolate and elliptical-lanceolate, occasionally ovate-lanceolate, acuminate, with remote small teeth, green; basal and lower cauline leaves petiolate; petioles $1/2$ – $2/3$ as long or almost as long as lamina; other leaves sessile, narrowed toward base or obtuse, uppermost smaller, often oblong-lanceolate and entire. Capitula clustered in corymbose or subcorymbose inflorescence, sometimes single on plant; involucre globose-ovate, 14–20 mm long and 12–17 (20) mm in dia, weakly arachnoid-hairy in lower part; appendages of outer and middle involucre bracts blackish or dark brown, sometimes light brown, entirely covering bracts below, with triangularly lanceolate (in outer bracts), broadly triangular or broadly rhombic (in middle bracts), undivided middle part, apically attenuate into straight or scarcely recurved, somewhat long, nonspiny subulate tip, regularly pectinate with long, filiform short-plumose-setose cilia, of which lower ones approximate, upper ones somewhat remote; appendages of quite numerous inner bracts usually brown to light-brown, rising from under middle bracts and not covered by their appendages, rhombic-round or round, fimbriate or irregularly toothed. Florets pink, pink-purple, sometimes white (albinos). Achenes 2.75–3.25 mm long and 1.0–1.2 mm wide; pappus 0.7–1.0 mm long. Flowering July to August.

451 Meadows, forest edges, glades, logging areas, and scrubs.—*European Part*: Karelia-Lapland (in north up to Kem River, on Kola Peninsula in vicinity of village of Nikel, introduced), Dvina-Pechora, Ladoga-Ilmen, Baltic Region, Upper Dnieper, Upper Dniester, Middle Dnieper (Ternopol Region) Upper Volga, Volga-Kama, Volga-Don; *Western Siberia*: Ob Region (southwestern part); moreover reported from Krasnoyarsk Territory but, apparently, appears to be introduced here. *General distribution*: Central Europe, Scandinavia. Described from Finland. Type in London.

Note. Hybrids of *C. jacea* L. s. str. \times *C. phrygia* L. s. str. (cf. note to *C. jacea*) are rather common. Occasionally, hybridizes with *C. pseudophrygia* C.A.M. s. str.

Economic Importance. A honey-producing plant.

68. *C. carpatica* (Porc.) Porc. in Magyar Növénytani Lapok, IX (1885) 128; Hayek, Centaurea-Art. Österr.-Ung. 152; Dobroc. in Bot. Zhurn. Akad. Nauk URSS, IV, 3–4, 73, Map 1, 1; in Vozn. Rosl. URSS, 580; Popov, Ocherk Rast. i. Fl. Karpat. 252; Stank. and Tal. Opred. Vyssh. Rast. ed., 416.—*C. plumosa* β . *carpatica* Porc. Enum. pl. phan. distr. quond. Naszöd. (1878) 34.—*C. phrygia* ssp. *pseudophrygia* f. *intercedens* subf. *carpatica* (Porc.) Gugler in Ann.

hist.-nat. Mus. Nat. Hung. VI (1908) 92 p. p.—*C. austriaca* var. *carpatica* (Porc.) Hayek, Cent. exs. crit. fasc. II, No. 95.—**lc.**: Hayek, Centaurea-Art. Österr.-Ung. (1901) Taf. XI, fig. 8; Javorka and Csapody, Iconogr. Fl. Hung. (1933) 547, fig. 3911.—**Exs.**: Fl. exs. austro-hung. No. 3424; Hayek, Cent. exs. crit. fasc. II, No. 95.

Perennial. Whole plant woolly from scattered, flexuous, multicellular hairs, with woody, short, rhizome bearing more or less thick, string-like roots. Stems 1–3, 40–120 cm high, upright, ribbed-sulcate, distinctly thickened below capitula, usually branched above, with upward spreading, simple, few, long branches, pale green or partly lilac-purple. Leaves broadly lanceolate, elliptical- or ovate-lanceolate, acuminate, remotely toothed, green; basal and lower cauline leaves petiolate, others sessile, basally rounded and mostly weakly amplexicaul, uppermost leaves smaller, often oblong-lanceolate and entire. Capitula solitary, at tips of stem and lateral branches, in corymbose inflorescence. Involucres globose-ovoid or subglobose, 18–20 mm long and 17–18 (20) mm in dia, very weakly arachnoid-hairy below; appendages of outer and middle involucre bracts membranous, black to blackish-brown, entirely covering bracts below, with broadly triangular or broadly rhombic undivided middle part, strongly attenuate into straight or recurved, rather long, nonspiny, subulate tip, pectinate with long, filiform short plumose-setose cilia, of which only uppermost somewhat remote, sometimes brown; appendages of more or less numerous inner involucre bracts blackish-brown or brown, rising from under middle bracts and not covered by their appendages, rhombic-round to elliptical, much lighter on margin, fimbriate or irregularly toothed. Florets pink-purple or purple. Achenes 3.0–3.25 mm long and about 1.2 mm wide; pappus 1.0–1.2 mm long. Flowering July to August.

Mountain meadows and forests.—*European Part*: Upper Dniester (Carpathians). *General distribution*: Central Europe (Romania). Described from Romania. Type in Budapest?

Note. This species is very similar to the preceding one and is related to it through transitional forms. The features (black appendages of the outer and middle involucre bracts, narrower range of variation of the width of the involucre and weakly amplexicaul leaves) distinguishing it from *C. phrygia* L. s. str. are all transitory and not reliable.

C. carpatica (Porc.) Porc. hybridizes with *C. jacea* L. s. str.

69. **C. nigriceps** Dobroc. in Bot. Zhurn. Akad. Nauk URSR, III, 1–2 (1946) 31, 32, IV, 3–4 (1948) 73, Map. 1, 2; in Vizn. Rosl. URSR, 580; Stank. and Tal. Opred. Vyssh. Rast. ed. 2, 416.—**lc.**: Dobroc. op. cit. (1946) p. 31.

Perennial. Stems to 1 m high, upright, branched above, with short branches, deeply ribbed-sulcate, glabrous smooth, green. Basal and lower cauline leaves petiolate, withering after flowering, middle and upper oblong, 10–15 cm long and 3.0–4.5 cm wide, toothed, acute, sessile, basally with large, toothed auricles, amplexicaul, woolly below especially along midrib, glabrous above. Capitula solitary at tips of stem and lateral branches (uppermost branches strongly reduced and hence capitula on them appear in groups of 3–4 at stem tip); bracteal leaves small, lanceolate, entire; peduncles thickened below capitula to 5 cm long, weakly woolly-arachnoid-hairy. Involucre globose, 15–17 mm in dia; appendages of outer and middle involucre bracts membranous, almost round, 4–6 mm wide, black, with black cilia, longer than undivided part of appendage; appendages of inner bracts obovate, blackish-brown, toothed, rising from under middle bracts and not covered entirely by their appendages. Florets pinkish-purple, sterile, peripheral 20–28 mm long. Achenes to 3 mm long; pappus about 1 mm long. Flowering July.

Groves.—*European Part*: Upper Dniester (Ivano-Frankovst Region). Endemic. Described from vicinity of Vorokhta station of former Yaremchan District, Ivano-Frankovsk Region. Type in Kiev.

Note. We did not see specimens of this plant and relied entirely on the author's description. The species described by D.N. Dobroczaeva undoubtedly is similar to *C. carpatica* (Porc.) Porc., and possibly unnecessarily separated from it.

70. *C. abbreviata* (C. Koch) Hand.-Mazz. in Ann. nat. hist. Hofmus XXIII (1909) 198.—*C. phrygia* auct. fl. Cauc. et Taur. non L.—*C. salicifolia* β . *abbreviata* C. Koch and γ . *intermedia* C. Koch in Linnaea, XVII (1843) 39; XXIV (1851) 434; Ldb. Fl. Ross. II, 2, 691.—*C. nigrescens* β . *transalpina* C. Koch, op. cit. (1851) 424.—*C. nigra* auct. non L.: Somm. and Lev. in Tr. Peterb. Bot. Sada, XVI (1900) 282.—*C. solicifolia* f. *glabrata* Litw. in Spisok Rast. Gerb. Russk. Fl. VI (1908) 67.—*C. salicifolia* auct. p. min. p. non MB.: Grossh. Fl. Kavk. IV (1934) 216, incl. var. *glabrata* (Litw.) Grossh. Opred. Rast. Kavk. 499.—**Exs.**: GRF No. 1782 (sub *C. salicifolia* f. *glabrata* Litw.).

Perennial. Rhizome woody, short, with more or less cordlike roots. Stems 1–3, 30–60 (to 100) cm high, upright, ribbed-sulcate, distinctly thickened below capitula, with few branches above, branches upward spreading, mostly simple, scabrous, occasionally simple, pale green or lilac-purple, rather scatteredly hairy or like leaves woolly or scabrous-woolly from somewhat dense, flexuous, sometimes almost setaceous, multicellular hairs, not mixed with arachnoid-hairy-pubesence. Leaves elliptical or broadly lanceolate to oblong-lanceolate, acuminate, with

remote small teeth, green; basal and lower cauline leaves petiolate, others sessile, toward base roundedly narrowed or attenuated, uppermost leaves much smaller, mostly entire. Capitula solitary at tips of stem and lateral branches, incorymbose or subcorymbose inflorescence. Involucres globose-ovate, 17–20 mm long and 12–15 mm in dia, weakly arachnoid-hairy in lower part, less often subglabrous; appendages of outer and middle involucral bracts membranous, blackish- or dark-brown, usually partly covering bracts below, with broadly triangular or triangular-lanceolate, undivided middle part, apically attenuate into straight or slightly bent, often very short, nonspiny, subulate tip, pectinate with somewhat long, filiform, short plumose-setose cilia; appendages of relatively numerous inner involucral bracts brown; much darker in middle, rising from under middle bracts and not covered by their appendages, roundish to elliptical, fimbriate or irregularly toothed. Florets pink or pinkish-purple. Achenes 2.75–3.25 mm long and about 1.2 mm wide; pappus 0.5–1 mm long. Flowering July to August.

454 Forest and subalpine meadows, forest edges and glades, open (primarily birch and pine) forests, from upper part of forest zone to subalpine (to 2,600 m).—*European Part*: Crimea (Malyi [Lesser] Chuchel Mountain); *Caucasus*: Ciscaucasia, Dagestan, Eastern, Western and Southern Transcaucasia. *General distribution*: Armenia and Kurdistan (former Artvin District), Asia Minor (Pontic Mountains). Described from Darachichag in vicinity of Lake Sevan. Type in Berlin.

Note. In the Caucasus and Crimea this species geographically replaces *C. phrygia* L. s. str. from which it differs by the denser pubescence of the leaves, often also of the stems, smaller appendages of the outer and middle involucral bracts, usually partly (and not entirely) covering the bracts below. Plants of *C. abbreviata* (C. Koch) Hand.-Mazz., having very small appendages of the outer and middle involucral bracts, has been confused constantly with *C. salicifolia* MB. s. str., which grows in lower zones of the Caucasus Mountains, although in several other features these species are quite clearly delimited from each other.

At the contact of their ranges, *C. abbreviata* (C. Koch) Hand.-Mazz. hybridizes with *C. alutacea* Dobrocz. s. restr. and *C. salicifolia* MB. s. str.

71. ***C. alutacea*** Dobrocz. in Bot. Zhurn. Akad. Nauk URSR, VI, 2 (1949) 74 p. p. descr. latina, IV, 3–4 (1948) 74 p. p. descr. ucrainica; Grossh. Opred. Rast. Kavk. 499 p. p.; Kolak. Fl. Abkhazii, IV, 287; Sosn. in Fl. Gruzii, VIII, 591.—*C. phrygia* var. *subuniflora* MB. Fl. taur.-cauc. III (1819) 587.—*C. austriaca* β . *latifolia* DC. Prodr. IV (1837) 573; Ldb. Fl. Ross. II, 2, 693.—*C. stenolepis* auct. p. p. non

Kern.: Schmalh. Fl. II (1897) 123; Lipsky, Fl. Kavk. 364; Grossh. Fl. Kavk. IV, 217.

Perennial. Whole plant woolly, with relatively scattered, more or less intertwined or flexuous multicellular hairs, with strong, woody, short, rhizome bearing somewhat thick, string-like roots. Stems 1–3, 30–70 (110) cm high, rather thick, upright, ribbed-sulcate, distinctly thickened below capitula, simple or with few upward-spreading, simple, pale green branches above, sometimes mostly brown or lilac-purple usually at base. Leaves elliptical, elliptical-lanceolate to oblong-lanceolate, acuminate, with remote teeth, green, with punctiform glands; basal and lower cauline leaves petiolate, others sessile, at base roundedly narrow, often weakly amplexicaul, uppermost leaves smaller, mostly entire. Capitula solitary at tips of stem and lateral branches, in corymbose inflorescence or singly on plant, surrounded by bracteal leaves. Involucres globose-ovate, 20–22 mm long and (15) 17–20 mm in dia, weakly arachnoid-hairy in lower part; appendages of outer and middle involucre bracts membranous, large, entirely covering bracts below, with blackish- or dark brown triangularly or linearly lanceolate, undivided middle part, at apex attenuate into recurved, long (8–11 mm) nonspiny caudate tip, including bushy tailed tips with long, filiform, short pilose-setose cilia, of which lower ones approximate, upper ones somewhat remote; lateral cilia, like caudate tip, brownish, less often ochraceous; appendages of inner bracts light- or dark-brown, not rising from under middle bracts and covered by their appendages, roundedly elliptical or elliptical, fimbriate to irregularly toothed. Florets pinkish-purple. Achenes about 3 mm long and 1.2 mm wide; pappus 0.5–1.0 mm long. Flowering July to August (1st half of September).

Subalpine meadows, scrubs, open forests in upper part of montane forest zone.—*Caucasus*: Ciscaucasia (western and central Caucasus), Eastern and Western Transcaucasia (within limits of Glavnyi [Main] Range in east up to southern Ossetia). Endemic. Described from southern Ossetia (gorge of Bolshaya Liyakhva River near village of Vaneli). Type in Leningrad.

Note. This species is very similar to the Central European *C. elatior* (Gaud.) Hayek s. str. (= *C. pseudophrygia* auct. fl. Eur. med. non C.A.M.) and to the Ciscaucasian *C. abnormis* Czer. It is distinguished from the former by narrower and somewhat thicker leaves, elliptical or oblong lanceolate, middle and upper cauline leaves that are very weakly amplexicaul (and not ovate-lanceolate, distinctly amplexicaul), and a well demarcated range; from the latter, it differs by having, on the average, less tall, simple or very sparingly branched stems, softer, usually more or less scattered pubescence over the entire

plant, a globose-ovoid (and not ovoid), broader involucre, mostly dark-colored appendages of the outer and middle involucral bracts, and a different altitudinal distribution. It is also related to *C. pseudophrygia* C.A.M. s. str. and *C. stenolepis* Kern., with which it was compared in the original description.

C. alutacea Dobrocz. s. str. hybridizes with *C. abbreviata* (C. Koch) Hand.-Mazz. and *C. salicifolia* MB. s. str.

72. **C. abnormis** Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XXI (1961) 394.—*C. stenolepis* auct. p. p. non Kern.: Schmalh. Fl. II (1897) 123; Lipsky, Fl. Kavk. 364; Grossh. Fl. Kavk. IV, 217.—*C. alutacea* Dobrocz. in Bot. Zhurn. Akad. Nauk URSR, VI, 2 (1949) 74 p. p., IV, 3–4 (1948) 74 p. p.; Grossh. Opred. Rast. Kavk. 499 p. p.

Perennial. Whole plant densely woolly, scabrous-woolly or scabrous from flexuous or curved multicellular, stiff hairs, with woody short rhizome bearing string-like roots. Stems 1–3, (30) 50–100 cm high, upright, ribbed-sulcate, distinctly thickened below capitula, branched above, branches upward-spreading, simple, often in upper part with few short branches, usually branches more or less elongate, and relatively numerous, pale yellow, occasionally brownish or lilac-purple mostly at base. Leaves elliptical-lanceolate, lanceolate to oblong-lanceolate, acuminate, with remote teeth, green, sometimes grayish-green from quite dense pubescence, with punctiform glands; basal and lower cauline leaves petiolate, sometimes with shallow lobes at base, others sessile, narrowed toward base, uppermost leaves smaller, mostly entire, narrowly oblong-lanceolate. Capitula solitary at tips of stem and lateral branches or 2–3, in corymbose or racemose-corymbose inflorescence. Involucres ovate, 18–20 mm long and (8)10–13 mm in dia (lacking recurved bushy-tailed tips), sparsely whitish-arachnoid hairy, subglabrous in lower part; appendages of outer and middle involucral bracts membranous, large, completely covering bracts below, with dark brown or brown, linearly lanceolate, occasionally triangularly lanceolate, undivided, middle part, at apex terminating in long (6–11 mm), recurved nonspiny, tailed tip, including tip pectinate with long, filiform short plumose-setose cilia, of which lower ones approximate, upper ones somewhat remote; lateral cilia, like tailed tip, ochreous; appendages of inner bracts brown or dark brown, not rising from under middle bracts and covered by their appendages, roundish-elliptical to elliptical, much lighter along margin, fimbriate or irregularly toothed. Florets pinkish-purple. Achenes 2.75–3.0 mm long and about 1.2 mm wide; pappus to 1 mm long. Flowering July to August.

Forest edges, scrubs, in open (especially hornbeam and hornbeam-beech) forests, in low and mid-montane zones.—*Caucasus*: Ciscaucasia (north, in east up to Beshtau Mountain). Endemic. Described from Serale River in Maikop District. Type and isotype in Leningrad.

Note. It shows the most similarity with *C. pseudophrygia* C.A.M. and *C. alutacea* Dobrocz. s. restr. From the first species it is distinguished by somewhat dense woolly and scabrous-woolly (and not subglabrous or weakly arachnoid-hairy, in lower part smooth, in upper part scarcely scabrous) stems, more densely pubescent leaves, and a different range. From the second species it is distinguished by features mentioned in the note to that species.

73. ***C. pseudophrygia*** C.A.M. in Rupr. Beitr. Pflanzenk. Russ. Reich. IV (1845) 82; in Bull. Acad. Sc. Pétersb VI, 134, excl. syn. nonnull.; Claus in Beitr. Pflanzenk. Russ. Reich. VIII, 116; Schmalh. Fl. Yugo-Zap. Ross. (1886) 331 p. p.; Litwinow in Spisok Rast. Gerb. Russk. Fl. V, 104, in obs. ad. *C. phrygiam* L.; Dobrocz. in Bot. Zhurn. Akad. Nauk URSR, III, 1–2 (1946) 29, 30, IV, 3–4 (1948) 73; Map 1, 5; in Vizn. Rosl. URSR, 580; Majeovski, Fl. ed. 8, 613; Stank. and Tal. Opred. Vyssh. Rast. ed. 2, 416.—*C. phrygia, austriaca* auct. fl. Ross. p. p.—*C. conglomerata* auct. non C.A.M.: Kauufm. Mosk. Fl. (1886) 281, ed. 2 (1889) 287.—*C. stenolepis* auct. non Kern.: Korsh. in Izv. Akad. Nauk, 1 (1894) 105; Schmalh. Fl. II, 123 p. p.; Syreistsch. Ill. Fl. Mosk. Gub. III, 313; Iljin in Fl. Yugo-Vost. VI, 428; Majeovski, Fl. ed. 7, 751; Kryl. Fl. Zap. Sib. XI, 2954, excl. syn.; Stank. and Tal. 457 Opred. Vyssh. Rast. ed. 2, 416, p. p.— **Ic.**: Syreistsch. op. cit. p. 313; Hayek, *Centaurea*-Art. Österr.-Ung. (1901) Taf. XII, fig. 3 (sub *C. stenolepide* Kern.).— **Exs.**: GRF No. 221; Fl. exs. austro-hung. No. 230.

Perennial. Rhizome woody, short, with thicker string-like roots. Stems 1–2 (to 4), (30)50–100 cm high, upright, ribbed-sulcate, distinctly thickened below capitula, branched above or at very tip, with upward-spreading, simple branches or branches short-branched above, usually fewer, less often simple, pale green or lilac-purple, smooth below, scarcely scabrous above, weakly arachnoid-hairy throughout or subglabrous. Leaves broadly elliptical-lanceolate or oblong-lanceolate, acuminate, sometimes acute, with remote fine teeth, green, with punctiform glands, scabrous on both sides due to scattered, curved or straight, multicellular stiff hairs, often (mostly middle and upper cauline) weakly arachnoid-hairy; basal and lower cauline leaves petiolate, others sessile, toward base roundedly narrowed, uppermost leaves smaller, mostly entire. Capitula solitary at tips of stem and lateral branches or 2–3(4) in corymbose or almost corymbose inflorescence. Involucres ovate or

globose-ovate, 15–20 mm long and (8)10–15 mm in dia, loosely white-arachnoid-hairy below; appendages of outer and middle involucre bracts membranous, entirely covering bracts below with blackish or dark brown, less often light brown, linearly lanceolate or linearly subulate undivided middle part, recurved, with long, nonspiny, tailed tip, including tip pectinate with long, filiform, shortly plumose-setose, ochreous or brownish cilia, of which lower ones approximate, upper ones distinctly distant and longer; appendages of fewer inner bracts pale brown, often dark brown in middle, not rising from under middle bracts and covered by their appendages, roundish-elliptical or elliptical, fimbriate to irregularly toothed. Florets pink or pinkish-purple sometimes white (albinos). Achenes 2.75–3.5 mm long and 1.0–1.3 mm wide; pappus 0.5–1.0 mm long. Flowering July to August.

Meadows, forest edges and glades, scrubs and in thin open forests.—*European Part*: Bessarabia, Black Sea Region, Middle Dnieper, Upper Dnieper (south), Upper Volga, Volga-Don, Volga-Kama, Trans-Volga, Lower Don (northern part); *Western Siberia*: Ob Region (former village of Kamyslovsk near Talitsky factory; report needs verification). *General distribution*: Central Europe (southeastern part). Described from Saratov. Type in Leningrad.

Note. It hybridizes with *C. jacea* L. s. str. Occasionally one comes across hybrids of *C. phrygia* L. s. str. × *C. pseudophrygia* C.A.M. s. str.

458 74. *C. stenolepis* Kern. in Oest. Bot. Zeitschr. XXII (1872) 45 p. p.; Dobrocz. in Bot. Zhurn. Akad. Nauk URSR, III, 1–2 (1946) 29, 30, IV, 3–4 (1948) 73, Map 1, 3; in Vozn. Rosl. URSR, 580; Stank. and Tal. Opred. Vyssh. Rast. ed. 2, 416 p. p.—*C. pseudophrygia* auct. fl. Ross. p. p. non C.A.M.—**Exs.**: Hayek, Cent. exs. crit. fasc. I, No. 42.

Perennial. Very close to *C. pseudophrygia* C.A.M. but differing from it only by grayish-green, entirely finely arachnoid-hairy pubescence of the leaves (including the basal and lower cauline ones), more densely arachnoid-hairy stems covered by short, stiff hairs, and less broad (7–10 mm) involucre.

Thin forests, scrubs.—*European Part*: Bessarabia (village of Lipkany, former Kishinev District), Middle Dnieper (southwestern). *General distribution*: Central Europe (southeastern part), Balkans. Described from Hungary. Type in Vienna.

Note. Contrary to the opinion of D.N. Dobroczaeva (op. cit.), the morphological differences between this species and *C. pseudophrygia* C.A.M. s. str. are insignificant and, with a partial loss of the arachnoid pubescence of the leaves and stems, are hardly perceptible. All the same, we are retaining it as a separate species, based mainly on some

separation of its range. We have doubts about the use of the name *C. stenolepis* Kern. for this race, since, apparently already in the original description, A. Kerner confused these two races under the latter name.

75. *C. salicifolia* MB. in Willd. Sp. pl. III, 3 (1803) 2283; Fl. taur.-cauc. II, 343, III, 588; DC. Prodr. VI, 571, excl. syn.; Ldb. Fl. Ross. II, 2, 691 p. p.; Boiss Fl. or. III, 630 p. p.; Schmalh. Fl. II, 123 p. p.; Lipsky, Fl. Kavk. 364; Grossh. Fl. Kavk. IV, 216 p. p.; Oprel. Rast. Kavk. 499 p. p.; Kolak. Fl. Abkhazii, IV, 287; Sosn. in Fl. Gruzii, VIII, 590.—*C. salicifolia* α . *elongata* C. Koch in Linnaea, XVII (1843) 39; XXIV (1851) 424.—*C. nigrescens* γ . *vochinensis* C. Koch, op. cit. (1851) 424, non *C. vochinensis* Bernh.—*C. jacea* var. *salicifolia* (MB.) Briquet, Monogr. Centaureés Alpes Maritimes (1902) 86, in obs.—*C. nigrescens* ssp. *eu-nigrescens* var. *rotundifolia* subvar. *salicifolia* (MB.) Gugler in Ann. hist.-nat. Mus. Nat. Hung. VI (1908) 69, 75 p. p.

Perennial. Rhizome woody, short, bearing more or less thick, string-like roots. Stems 1–3, (30) 50–100 cm high, upright, ribbed-sulcate, weakly thickened below capitula, with few, upward-spreading, simple branches or short-branched above, somewhat well proportioned, mostly elongate branches, stem occasionally simple, pale green or lilac-purple, scarcely arachnoid-hairy, with scattered, usually short, setose hairs, scarcely scabrous above, sometimes in lower part, occasionally completely glabrous, smooth. Leaves elliptical-lanceolate, lanceolate to oblong-lanceolate, acuminate, with remote small teeth, light green or grayish due to pubescence, with punctiform glands, scabrous on both sides or scabrous-woolly due to somewhat dense, multicellular, setaceous or flexuous hairs, mostly with few, less often very copious (var. *canescens* Alb.) mixture of arachnoid hairs; basal and lower cauline leaves petiolate, others sessile, narrowed toward base, uppermost leaves much smaller, entire. Capitula solitary at tips of stem and lateral branches, less often 2–3, in corymbose or paniculate-corymbose inflorescence. Involucres ovate or globose-ovate, 13–18 mm long and (7)8–12 mm in dia, whitish-arachnoid-hairy in lower part; appendages of outer and middle involucral bracts membranous, small, partly covering bracts below, with dark, less often blackish-brown triangularly lanceolate, linearly lanceolate (in outer involucral bracts), broadly triangular or rhombic (in middle involucral bracts) undivided middle part, with recurved, usually short, nonspiny, tailed tip, including tip pectinate with rather long, filiform, short plumose-setose, brownish or brown cilia, of which lower ones approximate, upper ones somewhat distant; appendages of more or less numerous inner involucral bracts brown to brownish, often much darker in middle, rising from under middle bracts

and not curved by their appendages, roundish or elliptical, fimbriate to irregularly toothed. Florets pinkish-purple. Achenes 2.5–3.0 mm long and 1.0–1.2 mm wide; pappus 0.5–1.0 mm long. Flowering July to September.

Forest meadows, edges and glades, open (mostly oak and horn-beam) forests, scrubs in low- and mid- (to 1,600 m, sometimes higher) montane zones.—*Caucasus*: Ciscaucasia, Dagestan, Eastern, Western, and Southern Transcaucasia. *General distribution*: Armenia and Kurdistan (former Artvin District), Asia Minor (Pontic Mountains). Described from vicinity of Vladikavkaz (now Ordzhonikidze). Type in Leningrad.

Note. D.N. Dobroczaeva (*Bot. Zhurn. Akad. Nauk Ukr. SSR*, III, 1–2 [1946] 30, IV, 3–4 [1948] Map 1, 6; *Vizn. Rosl. URSS*, 580) reports *C. salicifolia* MB. from the Donetsk Ridge (former Chistyakovsk District, Lugansk Region, Ukraine SSR). We could not verify this report for lack of specimens of this species from that region in the Herbarium of the V.L. Komarov Botanical Institute, Academy of Sciences of the USSR, in Leningrad.

C. salicifolia MB. hybridizes with *C. alutacea* Dobrocz. and *C. abbreviata* (C. Koch) Hand.-Mazz. Yu.N. Woronow (*Tr. Tifl. Bot. Sada*, VIII, 3 [1908] 124) describes the hybrid *C. iberica* Trev. × *C. salicifolia* MB. under the name *C. tzebeldiana* Woron.

Series 2. Trichocephalae (Hayek) Dobrocz. in *Bot. Zhurn. Akad. Nauk. URSS*, VI, 2 (1949) 64, 67.—Sect. *Eucyanus* e) *Trichocephalae* Hayek, *Centaurea*-Art. *Österr.-Ung.* (1901) 5, 169.—Involucres oblong-ovate, 6–8 (10) mm in dia. Stem 20–40 (70) cm high, quite strongly
460 branched from middle or upper part, with more or less spreading, well proportioned branches.

76. *C. hyrcanica* Bornm. in *Bull. Herb. Boiss. ser. II, VII* (1907) 425; *Grossh. Fl. Kavk. IV*, 216; *Opred. Rast. Kavk.* 499.—*C. austriaca* auct. non Willd.: C.A.M. *Verzeichn* (1831) 64; *Ldb. Fl. Ross. II*, 2, 693 p. p.—*C. trichocephala* β. *latifolia* Fisch. and Mey. *Ind. Sem. hort. Petrop. VIII* (1841) 54; *Ldb. op. cit.* 692; *Boiss. Fl. or. III*, 631; *Lipsky, Fl. Kavk.* 364 p. p.—*C. hyrcana* *Grossh. in Tr. Tifl. Bot. Sada, Ser. 2, 1* (1920) 42; *Fl. Kavk. IV*, 216, pro syn.—**Exs.**: Aucher-Eloy, *Herb. d'Orient. No.* 4832.

Perennial. Whole plant covered with soft, more or less intertwined, multicellular hairs; rhizome woody, very short, bearing string-like roots. Stems 1–4, 20–40 (60) cm high, upright, ribbed-sulcate, weakly thickened below capitula, somewhat divaricately branched usually from middle or slightly above, branches simple or with few branches, well-



proportioned, elongate, pale green, in lower part often pale lilac-purple, densely leafy. Leaves ovate, oblong-ovate, ovate-lanceolate to oblong, short-acuminate, acute, less often with subacute, remote teeth, green, sometimes grayish-green from thin, scattered, punctiform glands; basal and lower cauline leaves short petiolate, others sessile, roundedly narrowed toward base, semiamplexicaul, upper leaves much smaller, flat. Capitula solitary at tips of stem and lateral branches, in paniculate-corymbose, often racemose-corymbose or almost corymbose inflorescence. Involucres oblong-ovate, about 15 mm long and 6–8(10) mm in dia, weakly pubescent in lower part, glabrous above; appendages of outer and middle involucral bracts membranous, ochraceous, sometimes light brown with very narrow, linearly subulate, undivided, middle part, with recurved, long, nonspiny tip, including tip pectinate with long, thin, filiform short-pilose-setose, mostly distant cilia; appendages of less numerous inner involucral bracts light brown, not rising from under middle involucral bracts and covered by their appendages, roundish to elliptical, fimbriate or irregularly toothed. Florets pink. Achenes 2.5–3.0 mm long and 1.0–1.2 mm wide; pappus 0.5–1.0 mm long. Flowering June to August.

Forest edges, scrubs, dry exposed slopes in low- and mid-montane zones.—*Caucasus*: Talysh. *General distribution*: Iran (northern). Described from Iran. Type in Weimar.

- 462 77. **C. trichocephala** MB. in Willd. Sp. pl. III, 3 (1803) 2286; Fl. taur.-cauc. II, 344, III, 588; DC. Prodr. VI, 573; Boiss. Fl. or. III, 631 p. p. excl. var.; Schmalh. Fl. II, 124; Grossh. Fl. Kavk. IV, 216; Oprod. Rast. Kavk. 499; Iljin in Fl. Yugo-Vost. VI, 428; Kryl. Fl. Zap. Sib. XI, 2955; Dobrocz. in Vizn. Rosl. URSR, 580; Majevisky, Fl. ed. 8, 613; Stank. and Tal. Oprod. Vyssh. Rast. ed. 2, 416.—*C. phrygia* auct. non L.: Gmel. Reise, I (1770) 136.—*C. trichocephala* α . *angustifolia* Fisch. and Mey. Ind. Sem. hort. Petrop. VIII (1841) 54; Ldb. Fl. Ross. II, 2, 692.—*C. salicifolia* auct. non MB.: Ldb. ibid. 691 p. p.; Schmalh. Fl. II, 123 p. p.—**lc.**: Gmel. Fl. sibirica, II (1749) tab. XLV, fig. I, II; Gmel. Reise. I (1770) tab. XXIII (mala).—**Exs.**: Hayek, Cent. exs. Crit. fasc. II, No. 97; Novopokr. Herb. Fl. Tanait. No. 111.

Perennial. Root woody, vertical or oblique, many-headed, long. Stems few or numerous (to 12), 20–40 (70) cm high, upright, sometimes arcuately ascending, ribbed-sulcate, scarcely thickened below capitula, branched usually from middle or above, branches rather well proportioned, pale green, less often pale lilac-purple, densely leafy, covered with more or less intertwined, multicellular hairs. Leaves narrowly lanceolate, linearly lanceolate, linear (upper cauline); occasionally oblong (to 12 cm wide), acuminate or acute, entire or with

occasional teeth, mostly grayish-green, more or less thick, with punctiform glands, scabrous on both sides or scabrous from somewhat dense, short, stiff hairs; basal and lower cauline leaves short-petiolate, others sessile, often weakly amplexicaul, with small acute auricles at base, upper smaller, usually weakly convolute above. Capitula solitary at tips of stem and lateral branches, in paniculate-corymbose or almost corymbose inflorescence. Involucres oblong-ovate, 13–15 mm long and 6–10 mm dia, weakly arachnoid-hairy in lower part, glabrous above; appendages of outer and middle involucre bracts membranous, ochreous, sometimes light brown, with very narrow, linearly subulate, undivided middle part, apically attenuate into strongly recurved, long, nonspiny bushy tailed tip, including tip with pectinate long, thin, filiform, short-plumose bristly, more or less distant cilia; appendages of fewer inner involucre bracts light brown, not rising from under middle involucre bracts and covered by their appendages, round to ovate, fimbriate or irregularly toothed. Florets pink or pinkish-purple. Achenes 3–4 mm long and about 1.25 mm wide; pappus 1.5–2.0 mm long. Flowering second half of June to August.

Steppes, steppe slopes, gullies, dry meadows, old fields, scrubs, sometimes on edges of oak forests.—*European Part*: Bessarabia, Black Sea Region, Middle Dnieper, Volga-Don (south), Upper Volga (collected from railroad embankment near Moscow, introduced), Lower Don, Lower Volga, Trans-Volga; *Western Siberia*: Upper Tobol (former Zverinogolovsk District, near village of Pologovo); *Caucasus*: ?Ciscaucasia. Endemic. Type in Leningrad.

Note. All specimens from Ciscaucasia preserved to date in Leningrad under the name *C. trichocephala* MB. were found to belong to other Caucasian species of the series *Phrygiae* (Hayek) Dobrocz. Reports about the occurrence of this species in Ciscaucasia need verification.

Subgenus 6. Heterolophus (Cass.) Dobrocz. in Bot. Zhurn. Akad. Nauk URSR, VI, 2 (1949) 64.—*Heterolophus* Cass. in Dict. Sc. nat. L (1827) 250.—Capitula rather large; involucre ovate or subglobose, involucre bracts many-rowed, coriaceous, with fimbriate, toothed or partly entire appendages not decurrent on margin. Florets tubular, purple or pinkish-purple, heterogeneous; peripheral ones sterile, with long narrow tube and wide limb; central ones fertile, bisexual; anthers at apex with obtuse appendages; stigma branches long. Achenes oblong, thickened, rather large (about 5 mm long); pappus much shorter than achenes (1.5–3.0 mm long); persistent, double; outer pappus consisting of several rows of plumose-finely setose hairs, elongating from periphery to center; inner pappus one-rowed, consisting of linear-lan-

ceolate, smooth scales, connivent. Perennial herbs, lacking well developed main stem, but with axillary stems—scapes arising from axils of basal leaves, prostrate or ascending—with pinnately incised or lyrate basal leaves.

Type of subgenus: *C. sibirica* L.

To this small natural subgenus I refer only the species described here distributed in the south of the European part of the USSR, southern Siberia, and northern Kazakhstan. The subgenus *Heterolophus* (Cass.) Dobroc. is sharply delimited from all other groups of the composite genus *Centaurea* L. in its presently accepted circumscription, approaching most closely the primitive section *Jacea* (= *Eujacea* Hayek) from the subgenus *Jacea* (Juss.) Hayek. *Centaurea* species of the subgenus *Heterolophus* (Cass.) Dobroc. show morphological resemblance to the West Asian subgenus *Psephellus* (Cass.) Schmalh., from which they differ mostly by the structure of the pappus. Closest to subgenus *Heterolophus* (Cass.) Dobroc., however, is the systematically undefined group *Psephelloideae* (Boiss.) Sosn., treated by D.I. Sosnowsky (1931) as a separate section of the genus *Centaurea* L. To his section, Sosnowsky assigned 10 species, some of which were first described in the genus *Psephellus* Cass. The species of this section are so diverse that they can hardly be combined into any one natural genus and need special treatment.* Of these, the closest to subgenus 464 *Heterolophus* (Cass.) Dobroc. is *Centaurea pyrrolephara* Boiss.; however, it differs strongly by the presence of a well developed main stem.

Species of *centaurea* from the subgenus *Heterolophus* (Cass.) Dobroc. are well distinguished when material from those extensive regions where any one of the species grows is compared; however, where the species are in contact, forms with mixed characters are found, which should always be taken into consideration. Moreover, the habit of each species is quite variable depending on changes in [environmental] conditions. It is entirely possible that local races with restricted ranges exist, which have not been detected by us in the herbarium material among the diverse hybrid or ecological forms, and require *in situ* investigation in nature. In the present treatment, we have recognized as species major geographic races represented by extensive material in herbaria. We were able to rely on personal observations and collections in treating the species growing in the European part of the USSR.

All recognized species can be combined in one common series *Sibiricae* Klok. comprising two branches or subseries: European—

*This section has been revised by N.N. Tzvelev in *Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XIX (1959) 420–422.

Carbonatae Klok. (first three species), and Asiatic—*Sibiricae* Klok.

1. Involucral bracts entirely covered by large appendages; appendages of middle involucral bracts roundish or ovate, 5–9 mm long and almost as wide, with numerous (not less than 20) regular fimbriae along entire margin; involucre subglobose 2.
- + Involucral bracts weakly [partly] covered by small appendages or not at all covered; middle involucral bracts oblong-ovate to linear-lanceolate, not longer than 5 mm, with fewer fimbriae along margin or entire; involucre ovate 4.
2. Stem 10–50 mm high, usually ascending. Involucre wider than long; appendages of involucral bracts brownish yellow 81. *C. sibirica* L.
- + Stem to 25 cm high, usually prostrate, rarely ascending. Involucre not wider than long; appendages of involucral bracts usually dark (brownish dark yellow or reddish brown-yellowish with reddish brown purple spot at base) 3.
3. Stems 1–2, always prostrate (procumbent). Basal leaves to 25 cm long, their lateral segments mostly entire (to 5 on each side). Involucre to 18 mm long; appendages of middle involucral bracts with numerous but short (1.0–1.5 mm long) fimbriae. Achenes 4–5 mm long 78. *C. carbonata* Klok.
- + Stems 1–10, sometimes ascending. Basal leaves to 12.5 cm long, their lateral segments small-toothed. Involucre to 22 mm long; appendages of middle involucral bracts with less numerous (22–34) but longer (1.5–3.0 mm) fimbriae. Achenes 5–6 mm long 82. *C. turgaica* Klok.
- 465 4. Involucre broadly ovate, about 15 mm long and 12–14 mm in dia; appendages of middle involucral bracts ovate, to 3 mm long and as wide, toothed-fimbriate 79. *C. marschalliana* Spreng.
- + Involucre ovate or oblong-ovoid, larger; appendages of involucral bracts lanceolate, elongate, with few short fimbriae on margin or entire 5.
5. Involucre ovate, 15–22 mm long and 8–14 mm in dia; appendages of middle involucral bracts linearly lanceolate, 2.25–3.50 mm long, dark reddish-brown. Achenes 4.0–5.5 mm long; pappus 1–2 mm long 80. *C. sumensis* Kalen.
- + Involucre oblong-ovate, 15–20 mm long and 7–10 mm in dia; appendages of middle involucral bracts lanceolate to oblong ovate-lanceolate, 2.5–5.0 mm long, yellowish-brown. Achenes 6.5–7.0 mm long; pappus 2–3 mm long 83. *C. sergii* Klok.

78. *C. carbonata* Klok. in *Nauk. Zap. KDU*, VII, 6 (1948) 77 and 82; Dobrocz. in *Vizn. Rosl. URSR*, 580; Iljin in *Majeovski, Fl. ed.* 8,

610.—*C. marschalliana* auct. fl. ross. and ucr. p. p. non Spreng.—*C. sibirica* auct. nonnull. p. p. non L.

Perennial. Rhizome ascending, usually branched above, producing short shoots with cluster [rosette] of leaves. Floriferous stems [scapes] 1–2, arising from axils of previous year's leaves, prostrate, 10–25 cm long, thin, simple or weakly branched, with 1–2 branches, like leaves densely hairy, almost tomentose. Basal leaves in rosettes, more or less long-petiolate, pinnately divided 4–25 cm long, to 4.5 cm wide, lateral segments 1–5 on each side, oblong-lanceolate (to ovate-lanceolate), at apex attenuate into very short, subobtusate, callous cusp, mostly entire, terminal segment often larger than lateral ones, small-toothed; cauline leaves 0.5–4.5 cm long, 1–8 mm wide, short-petiolate, undivided, oblong-lanceolate or pinnately parted with 1–2 lateral segments on each side. Capitula 1–3 per stem, arising at tips of ascending stems, thickened below capitulum and branches. Involucre short-ellipsoidal or globose, 15–18 mm long and 13–19 mm in dia; involucre bracts entirely covered by reddish-brown-yellow, lustrous appendages; inner involucre bracts linear, 11–16 mm long and 1–2 mm wide, with 3–5 inconspicuous veins, with oblong-elliptical or elliptical apical appendage; appendages 2–5 mm long, 1.25–4.0 mm wide, yellowish with reddish-brown-purple, triangular spot at base, apically or throughout irregularly small-toothed; middle involucre bracts oblong, 5–9 mm long (excluding appendage; with appendage 10–15 mm long) and 2.75–3.0 mm wide, dorsally with up to 11 inconspicuous veins, their appendages roundish or ovate, 6–8 mm long, 6.5–8.5 mm wide, flat, with numerous short cilia (to 1.5 mm long); central part [body] of appendages medially with oblong, dark reddish-brown spot, speckled with purple bands, around which yellowish-reddish-brown, along margin of appendage whitish below and yellowish above; outer involucre bracts about 3 mm long (excluding appendage; with appendage about 6 mm) and about 2 mm wide; their appendages oblong-triangular, about 4 mm long and 2 mm wide, with occasional fimbriae, reddish-brown, less often identical in shape with those of middle bracts but narrower and longer. Florets light-purple; corolla of peripheral florets about 17 mm long. Achenes 4–5 mm long, with up to 1.5 mm long pappus. Flowering May to June.

Chalk outcrops, less often on limestones.—*European Part*: Volga-Don (south), Trans-Volga (south), Black Sea Region (east), Lower Don (north). Endemic. Described from chalks along Derkul River (vicinity of Belovodsk, Lugan Region, Ukraine). Type in Kiev.

Note. *C. carbonata* Klok. is a species distinctly associated with chalk and is distributed from the extreme western limits of the chalk flora of the steppe zone on the Volchya River—a tributary of the

Donets, up to the extreme eastern limits along the Ural River. Its range covers the northeastern part of E. Lavrenko's Pontic and western Kazakhstan steppe provinces. The form found on the Volga chalk differs slightly from the typical Donets form by having longer appendages. Less often one comes across hybrids of this species with *C. sumensis* Kalen. (known from the collections of V.A. Dubjansky from the Khopra River). At the eastern limit of the range there are probable hybrids with *C. turgaica* Klock. or *C. sibirica* L., whose influence perhaps also explains a certain atypicalness of the Volga and Ural specimens. However, in the Volga Basin, *C. sibirica* L. is undoubtedly absent. It begins to appear only in the Kama Basin.

79. *C. marschalliana* Spreng. Syst. veg. 3 (1826) 398; DC. Prod. VI, 576 p. p.; Ldb. Fl. Ross. II, 2, 607 p. p.; Boiss. Fl. or. III, 634; Grossh. Opred. Rast. Kavk. 498; Dobroc. in Vozn. Rosl. URSR, 580.—*C. sibirica* MB. Fl. taur.-cauc. II (1808) 348, non L.—*C. sibirica* c. *marschalliana* Schmalh. Fl. II (1897) 125 p. p.—*C. marschalliana* var. *bessarabica* Trautv. ex Korsh. Tent. fl. Ross. or. (1898) 240.

Perennial. Rhizome ascending, branched above, producing short sterile shoots, with rosettes of leaves; scape-like shoots 1–2, arising from axils of basal leaves, prostrate, 4–20 cm long, simple or weakly branched, densely covered with long, distant fibers. Leaves more densely pubescent, white from tomentose pubescence (especially beneath), with punctiform glands; basal leaves more or less long-petiolate, 3–6 cm long, to 4 cm wide, pinnately incised, less often bipinnately incised, with oblong-obovate segments, with terminal segment slightly longer than lateral ones; lateral segments 1–5 on each side, lobed, their segments or lobules distant, small-toothed or serrate, obtuse, with short-triangular cusp; cauline leaves 7–18 mm long, 8–10 mm wide, undivided or pinnately parted, with 1–2 lateral lobes on each side. Capitula solitary, on ascending stem thickened below capitulum and lateral branches, 1–3 per stem. Involucre broadly ovate, about 15 mm long and 12–14 mm in dia; involucre bracts arachnoid-hairy, greenish, almost not covered by appendages; outer bracts ovate, to 6 mm long, with reddish-brown, oblong-triangular, short-fimbriate appendage, about 3 mm long, middle bracts oblong or oblong-ovate, 5–7 mm long and 2.0–3.5 mm wide, their appendages ochreous, oblong- or broadly ovate, 2–3 mm long and 1.5–3.0 mm wide, weakly bulged, toothed-fimbriate; inner bracts linear or narrowly linear, 12–13 mm long and 1–2 mm wide, dorsally with 3–5 inconspicuous veins, their appendages obovate or ovate-lanceolate, 1.5–2.0 mm long and 1–2 mm wide, bulged, at apex toothed-fimbriate, fimbriae often lustrous-white, remaining part of appendage reddish-brown. Florets purple.

Achenes 3.5–4.0 mm long; pappus 1.0–1.5 mm long. Flowering May to June.

Limestone outcrops and steppe slopes with stony subsoil.—*European Part*: Upper Dniester (only in south along Dniester), Middle Dnieper (along Dniester[sic]), Bessarabia, Black Sea Region, Lower Don (south); *Caucasus*: Ciscaucasia (in Stavropol District along border with Lower Don; reports for more southern localities doubtful). *General distribution*: Balkans-Asia Minor (cited for Dobrudzha). Described probably from Stavropol District. Type (or isotype) in Leningrad.

Note. The species is well-known by the name that served as pseudonym for the widely distributed but essentially forgotten *C. sumensis* Kalen. I mentioned it in the paper “Novye i maloizvestnye vidy roda *Centaurea* L. s. Ukrainy” [New and Little-known Species of the Genus *Centaurea* L. From Ukraine] (1948). The distribution of this species is traced from Dniester to the Caucasian foothills. Contact with other species has not been observed nor are hybrids of it known. It should be noted that in outward appearance it can be readily confused with the much more northern contact hybrids of *C. carbonata* Klok. × *C. sumensis* Kalen. The resemblance in the present case is entirely understandable (“hybrido-copy”), since, in the natural system, *C. marschalliana* Spreng. occupies an intermediate position between the above-mentioned species. Within its range this species is marked by a stronger constancy of characters than in all other members of the subgenus, and is hardly of hybrid origin.

80. *C. sumensis* Kalen. in Bull. Soc. Nat. Mosc. XVIII, 1 (1845) 238; Klok. in Nak. Zap. KDU, VII, 6 (1948) 78; Dobroc. in Vozn. Rosl. URSR, 580.—*C. marschalliana* f. *ledebouri* Korsh. Tent. fl. Ross. or. (1898) 240 p. p. (quoad plantam europaeam) and f. *vulgaris* Trautv. ex Korsh. 1. c.—*C. marschalliana* auct. fl. europ. p. max. p.—**Exs.**: GRF No. 720; Fl. polon. exs. No. 175.

468 Perennial. Rhizome ascending, often branched above, producing shortened shoots with leaf rosettes; floriferous [scape-like] stems arising from axils of previous year's basal leaves, 1–4, 7–32 cm high, simple or branched with 3–4 branches, shaggy from long, distant hairs. Leaves more densely pubescent beneath, especially young leaves, white-tomentose, greenish above, arachnoid-hairy, on both sides punctiform-glandular; basal leaves more or less long-petiolate, 6–32 cm long (including petioles); to 8 cm wide, pinnately incised or some undivided, lateral segments of leaves 1–6 on each side, oblong, oblong-ovate, or obovate, obtuse, attenuated into very short, triangular cusp, or (smaller), short and obtusely acuminate, terminal segment usually larger than

lateral ones; cauline leaves short-petiolate, 1.0–6.5 cm long, mostly undivided or some pinnately divided with 1–2 lateral lobes on each side; apical leaves linearly lanceolate, small, often absent. Capitula raised, solitary at tips of stem and branches, branches upcurved and thickened below capitula, with conspicuous ridges and furrows. Involucre ovate, 15–22 mm long and 8–14 mm in dia, arachnoid-hairy, with thin pubescence; greenish throughout; involucre bracts not covered by narrow and elongated, curved, blackish appendages; outer bracts 2.5–5.0 mm long and 2.0–2.5 mm wide, with triangular blackish appendages lacking fimbriae; middle bracts oblong or oblong-ovate, abruptly narrowed into linearly lanceolate appendages, together 6.5–12.0 mm long and 2.25–4.0 mm wide; appendage 2.25–3.50 mm long and 1–2 mm wide, entire or with 3–5 short fimbriae on each side, reddish-brown ochreous along margin, with darker midrib; inner bracts linear or narrowly linear, 12–15 mm long and 0.75–3.0 mm wide, dorsally with 5–7 inconspicuous veins, appendages oblong to obovate, 1.5–2.0 mm long and 0.5–2.0 mm wide, more or less bulged, irregularly small-toothed above or along margin, scarious, ochreous, with oblong or oblong-lanceolate reddish-brown spot having purple bands, spot spreading from base to middle of appendage. Florets light purple; corolla of peripheral florets 26–39 mm long, of central florets 15–17 mm long. Achenes flattened, narrowed at ends, 4.25–5.40 mm long, 1.8–2.5 mm wide, dark reddish-brown, with 1–2 mm-long, ochreous pappus. Flowering May to June.

Pine sands, less often on steppes and stony (chalk, gypsum, limestone) slopes.—*European Part*: Upper Dniester, Upper Dnieper, Upper Volga, Volga-Kama, Bessarabia (north), Middle Dnieper, Volga-Don, Black Sea Region (north), Lower Don (north). Endemic. Described from vicinity of Sum (Ukraine SSR). Type in Kiev.

Note. This species is widely distributed in the forest-steppe zone of the European part of the USSR and extends along river valleys and in the forest and steppe zones roughly from the Seret River in the 469 Ternopol Region of the Ukrainian SSR in the west up to the Vyatka River in the Perm Region of the RSFSR in the east. In Siberia and northern Kazakhstan, it is replaced by *C. sergii* Klok. Within its extensive eastern European range, *C. sumensis* Kalen. is marked by rather significant variation. As mentioned above, it hybridizes with *C. carbonata* Klok. and, apparently, with *C. sibirica* L. in the extreme northeast of its range, producing forms resembling *C. marschalliana* Spreng.

81. *C. sibirica* L. Sp. pl. (1753) 913; Ldb. Fl. alt. IV, 50; DC. Prodr. VI, 576; Ldb. Fl. Ross. II, 2, 696 p. p.; Kryl. Fl. Zap. Sib. XI,

2956.—*C. marschalliana* auct. p. p. non Spreng.: Kryl. Ibid. 2957.—*Heterolophus sibiricus* (L.) Cass. in Dict. Sc. nat. L (1827) 250, quoad nom.—**Exs.:** GRF No. 1170.

Perennial. Floriferous [scape-like] stems originating from axils of leaves of basal rosette, 1–10, almost upright, ascending, or often prostrate, (7)10–50 (54) cm high, white-tomentose, at least in lower part. Basal leaves 7–35 cm long, pinnately incised, with 1–5 pairs of lateral segments, upper leaves often undivided, lateral segments oblong-lanceolate to almost ovate, 7–40 mm long, 1.5–15.0 mm wide, toothed-crenate, small-toothed or entire, terminal segment to 90 mm long and 5–50 mm wide; upper cauline leaves undivided; all leaves white-tomentose beneath, greenish or grayish-pubescent above. Capitula solitary, 2 per stem. Involucre subglobose, usually weakly compressed above, 14–22 mm long, 17–25 mm in dia; appendages of involucre bracts brownish-yellow, weakly lustrous, imbricate and entirely covering bracts, all except innermost bracts regularly fimbriate, undivided part of appendage of outer involucre bracts oblong-lanceolate, of middle ones broadly ovate-triangular or almost rhombic; appendages of inner bracts directly covering bracts or slightly broader than them, oblong or oblong-elliptical, irregularly toothed at apex; appendages of middle bracts 5–7(9) mm long and 5–7(8) mm wide with 2.0–2.5 mm-long, 12–19 fimbriae on each side of apical spinule. Florets pinkish-purple. Achenes 4.5–5.0 mm long, with 1.5–2.5 mm long pappus. Flowering June to July.

Stony, Steppe, and mountain slopes.—*European Part:* Volga-Kama (only in Kama Basin), Trans-Volga (also); *Western Siberia:* Upper Tobol, Irtysh, Altai. Endemic. Described from Siberia. Type in London.

Note. *C. sibirica* L., in the circumscription considered here, has an entirely natural, compact geographic range roughly corresponding with E. Lavrenko's Siberian forest-steppe province. Within this area, it exhibits some weak differentiation, in as much as it is possible to observe that the southern Ural plants, on the average, are larger and usually differ somewhat from the Altai specimens (when comparing not individuals but a mass collection of the former with a mass collection of the latter). Such differences are typical of "subspecies," not in the botanical but the zoological sense of the term, and are usually overlooked in the study of flora, which of course is an already known simplification. Such weakly differentiated geographic forms do not correspond to so-called ecotypes. Other deviations from the average type of forms are partly modifications (for example var. *diffusa* Korsh.), and partly also, apparently, hybrids (\times *C. sergii* Klok.). In the penultimate edition of Majewski's flora, *C. sibirica* L. was reported

from the Volga Region (Sosnovka of Saratov and Olkhovka of Volgograd regions) not as the typical Ural form but one transitional to *C. marschalliana* Spreng. var. *intermedia* Schmalh. This report, apparently, relates to the western species *C. carbonata* Klok., cited already in the recent edition. *C. sibirica* L. disappears to the south and is replaced by the similar species *C. turgaica* Klok. in the Kazakhstan steppe province.

82. *C. turgaica* Klok. in Addenda XXVII, 613.—*C. sibirica* auct. fl. As. Med. non L.

Perennial. Floriferous [scape-like] stems originating from axils of leaves of basal rosette 1–10, prostrate, ascending, 5–25 cm long (or high), simple or weakly branched, with 1–2 branches, white-tomentose. Basal leaves 3.5–12.5 mm long, pinnately incised with 2–7 pairs of lateral segments, segments oblong-lanceolate or elliptical, 1.5–20 mm long, 1.5–7.0 (11.0) mm wide, acuminate or obtuse, with distant small teeth, terminal segment to 16 mm wide; upper cauline leaves always undivided; all leaves white-tomentose beneath, grayish above. Capitula 1–3 per stem. Involucre subglobose, 15–22 mm long and 14–22 mm in dia; appendages of outer involucral bracts lanceolate, with 1–2 fimbriae on each side of apical cusp, in peripheralmost appendages with inconspicuous small teeth narrowed, to 2 mm long; appendages of middle bracts entirely covering bracts, brownish-dark-yellow to brownish-orange or reddish-brown, almost round or broadly ovate-triangular, 5–8 mm long and as wide, regularly fimbriate, with 11–18 fimbriae on each side of short apical cusp, fimbriae 1.5–2.0–(3.0) mm long, longer than terminal spine, central part broadly ovate-triangular, basally along median line and above with reddish-brown to brown, lanceolate spot; appendage of inner bracts oblong-ovate to ovate, 1.5–3.5 mm long, irregularly small-toothed, in lower half lilac-reddish-brown. Florets purple. Achenes 5–6 mm long, 1.75–3.0 mm wide, with about 1.5 mm-long pappus. Flowering May to July.

Steppes and stony mountain slopes.—*Western Siberia*: Upper Tobol (south); *Soviet Central Asia*: Aralo-Caspian (northern), Lake Balkhash Region (north). Endemic. Described from vicinity of Kustanai. Type in Leningrad.

471 **Note.** This more southern and xeromorphic species differs from *C. sibirica* L. by having stems half as long (on the average) and weak, leaves half as small, involucre subglobose and not compressed above, the width of the involucre not exceeding length, appendages of the bracts of a darker color, fimbriae of the middle appendages shorter, achenes longer with a shorter pappus, as well as more oblong segments of the basal leaves, and other difficult to spot char-

acters. Being distant from *C. sibirica* L., the Kazakhstan species comes closer to the eastern Pontic *C. carbonata* Klok.

Hybrids of this species with *C. sergii* Klok. are known; they also resemble *C. marschalliana* Spreng. A form was collected in Tarbagatai, which is closer to *C. sibirica* L., possibly representing a distinct local race. It is possible that besides hybrids, there may exist a separate species occupying an intermediate position between *C. turgaica* Klok. or *C. sibirica* L. and *C. sergii* Klok. and representing an analogue of the Eastern European *C. marschalliana* Spreng. However, despite a search, we were not able to locate such a species and are as yet not convinced that it was possible for L.P. Sergievskaja, who described *C. kryloviana* Serg., to do so (cf. note to the next species).

83. *C. sergii* Klok. in Addenda XXVII, 614.—*C. marschalliana* auct. fl. sibir. p. p. non Spreng.

Perennial. Floriferous [scape-like] stems arising from axils of previous years' leaves 2–3 (sometimes more), prostrate or obliquely ascending, (8)10–20 cm long (high), simple or branched, with leaves arachnoid-hairy tomentose. Basal leaves short-petiolate, 6–15 cm long, pinnately incised, with 7–13 pairs of lateral segments, oblong or elliptical, 5–32 mm long and 5–11 mm wide, acuminate, with attenuate, glabrous callous tip, terminal segment larger than lateral ones, to 50 mm long and 15 mm wide; lower cauline leaves pinnately divided, usually with 5 segments, upper leaves undivided; all leaves whitish on both sides from arachnoid hairy-woolly pubescence, remotely finely crenate-toothed. Capitula 1–4 per stem. Involucre oblong-ovoid, 15–20 mm long, 7–10 mm in dia, basally noticeably arachnoid-hairy-woolly. Involucral bracts (outer to inner) ovate to oblong, slightly covered by appendages and longer than latter, pubescent below appendages; appendages narrow, yellowish-brown, not connate, appendages of outer bracts light brown, narrowly lanceolate to linearly lanceolate, about 3 mm long and 1 mm wide, entire, more or less recurved, appendages of middle bracts to oblong-ovate, lanceolate, 2.5–5.0 mm long, 1–2 mm wide, irregularly short-fimbriate with up to 1 mm-long, 2–7 fimbriae on each side along margin of cusp (spinule), often longer than fimbriae, less often small-toothed or entire; appendages of inner bracts 472 oval or oblong-obovate, very finely erose-toothed. Florets pinkish-purple. Achenes 6.5–7.0 mm long, about 2 mm wide, with 2–3 mm long pappus of light brown (smoky) bristles. Flowering June to July.

Stony and sandy slopes.—*Western Siberia*: Upper Tobol (in south-east along Irtysh), Altai (south); *Soviet Central Asia*: Lake Balkhash Region (northeast). Described from upper reaches of Irtysh. Type in Leningrad.

Note. The combination *C. ledebouri* (Korsh.) Klok. in *Nauk Zap. KDU*, VII, 6 (1948) 79, already in use in the literature (Dobroczaeva in *Bot. Zhurn. Akad. Nauk Ukr. SSR*, VI, 2), cannot be applied to this species, since Korshinsky implied mainly *C. sumensis* Kalen. under the name *C. marschalliana* f. *ledebouri* Korsh., and his identifications in herbaria relate to this European plant, and not to the Siberian one. Wrongly reporting for Siberia the entirely nonexistent species *C. marschalliana* Spreng., both earlier and present-day authors attempted to search there for its European variety or to describe their own, as done by L.P. Sergievskaja in *Flora Zapadnoi Sibiri* [Flora of Western Siberia]. She also described the new, similar species *C. kryloviana* Serg. in *Sist. Zam. po Mater. Gerb. Tomsk. Univ.*, Nos. 1–2 (1949), and in *Flora Zapadnoi Sibiri*, XI (1949) 2958. Judging from the description, it is very similar to the hybrid form *C. turgaica* Klok. × *C. sergii* Klok. but is sharply distinguished by the pappus, which is a little shorter or almost as long as the achene. It is described from the northeastern part of the former Semipalatinsk District. The long pappus reported for it is completely uncharacteristic of the members of the subgenus and was not even once observed by us.

Subgenus 7. Amblyopogon (DC.) Tzvel. comb. nova.—*Amberboa* sect. *Amblyopogon* DC. Prodr. VI (1837) 561.—*Amblyopogon* (DC.) Jaub. and Spach. Ill. pl. or. III (1847–1850) 23; Fisch. and Mey. ex DC. op. cit. 561, pro syn.—*Centaurea* sect. *Amblyopogon* (DC.) Sosn in Vestn. Tifl. Bot. Sada, Nov. Ser. V (1931) 23 p. p.; Tzvelev in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX (1959) 417.—*Amblyopogon* sect. *Centauroides* Grossh. in Tr. po Prikl. Bot. Gen. i Sel. Ser. 1, II (1937) 243.—Capitula medium-sized, with relatively many florets (over 20), solitary, less often in groups of 2–4. Involucre broadly ovate, glabrous, 12–18 mm in dia; involucre broadly ovate, glabrous, 12–18 mm in dia; involucre broadly ovate, innermost much longer, linearly lanceolate; appendages of involucre broadly ovate, glabrous, 12–18 mm in dia; involucre broadly ovate, innermost much longer, linearly lanceolate; appendages of involucre quite large, lax, membranous, weakly decurrent on bracts and almost as long as width of bracts, lanceolate or broadly lanceolate, whitish, but usually with brownish tinge, ciliate. All florets tubular, pale pink, 1.25 times as long as involucre, heterogeneous: central bisexual, peripheral slightly broadened at corolla throat but not enlarged, sterile, lacking staminodes; stamen filaments covered with short papiliform hairs; stigma shortly bifid. Achenes about 4 mm long, less often pubescent; pappus 1/3–1/2 as long as achenes, persistent, double; outer pappus almost as long as inner, comprising few irregular rows of weakly scabrous, bristle-like scales on both sides; inner pappus comprising single row of much wider, oblong, at apex erose-ciliate scales, less

often (in *C. incanescens*) almost as wide as scales of outer pappus. Perennial herbs, apparently lacking creeping underground stolons, with strongly shortened, prostrate or ascending stems and rosettes of basal leaves; stems terminating in 1, rarely 2–4 capitula; leaves usually undivided and almost entire, less often partially lobed or toothed, grayish from appressed tomentum, punctate-glandular.

Type of subgenus: *C. incanescens* (DC.) Sosn.

Of the two very close species of the subgenus, one is found in the Talysh Mountains and the other in the northwestern part of Iran. Possibly, one more species—*C. karduchorum* Boiss. from northeastern Turkey—belongs to this section. We have not seen specimens of it.

84. *C. meyeriana* Tzvel. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX (1959) 418.—*C. integrifolia* C.A.M. Verzeichn. (1831) 64; DC. Prodr. VI, 576; Ldb. Fl. Ross. II, 2, 697, non Tausch. (1828).—*Psephellus integrifolius* (C.A.M.) C. Koch in Linnaea, XXIV (1851) 438.—*P. incanescens* (DC.) Boiss. Fl. or. III (1875) 610 p. p.—*Amblyopogon integrifolius* (C.A.M.) Boiss. ex Grossh. Fl. Kavk. IV (1934) 207 and Opred. Rast. Kavk. 494; Boiss. ex Trautv. in Tr. Peterb. Bot. Sada, VIII (1883) 490, pro syn.—*A. meyerianus* (Tzvel.) Karjag. in Fl. Azerb. VIII (1961) 454.—Ic.: Karjagin, Ibid. Plate XLVI, 2.

Perennial. Plants to 8–10 cm high, grayish from appressed arachnoid-hairy tomentum. Stems solitary or few, prostrate or ascending, strongly shortened, with 1–3 capitula. Basal leaves in rosettes at tips of branched and thickened root neck, on quite long (usually almost as long as lamina) petioles, oblong-elliptical, undivided or almost entire (with inconspicuous, subobtusate, small teeth), narrowed at both ends, subacute, appressed-grayish-tomentose. Involucres broadly ovate, 13–18 mm in dia and 18–22 mm long; involucral bracts greenish, attenuate into fairly large, oblong-lanceolate appendage, terminating in somewhat laterally deflected, to 2 mm long spine, with 8–15 cilia on each side. Florets light pink. Achenes about 4 mm long; pappus 1.5–2.0 mm long, scales of inner pappus much wider than those of outer. Flowering June to July.

Clayey and stony slopes; up to middle mountain zone.—*Caucasus*: Talysh. Endemic. Described from Talysh. Type and isotypes in Leningrad.

Note. The closely related species *C. incanescens* (DC.) Sosn. (in 474 *Vestn. Tifl. Bot. Sada*, V [1931] 23) may also be found in the southeastern part of Transcaucasia; it differs from *C. meyeriana* by having pinnately lobed leaves and pappus scales of almost equal width.

Subgenus 8. Xanthopsis Tzvel. comb. nova.—*Amberboa* sect. *Xanthopsis* DC. Prodr. VI (1837) 561.—*Xanthopsis* (DC.) C. Koch. in *Linnaea*, XXIV (1851) 422.—*Centaurea* sect. *Amblyopogon* (DC.) Sosn. in *Vestn. Tifl. Bot. Sada*, Nov. Ser. V (1931) 23 p. p.—*Amblyopogon* sect. *Xanthopsis* (DC.) Grossh. in *Tr. po Prikl. Bot.*, Gen. i Sel. Ser. 1, II (1937) 243.—*Centaurea* sect. *Xanthopsis* (DC.) Tzvel. in *Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XIX (1959) 418.—Capitula smaller, with fewer (6–15) florets, in compound corymbose or paniculate inflorescence. Involucres ovate or short-cylindrical, 7–15 mm in dia, glabrous; involucre bracts thin-coriaceous, with inconspicuous veins, from broadly ovate middle ones to oblong innermost; appendages of involucre bracts very large, loosely arranged, entirely covering bracts, ovate to broadly lanceolate, membranous, basally not decurrent on bracts and longer than width of bract, whitish, often with weak brownish-yellow tinge, acuminate, pectinate-ciliate or serrate-toothed; almost as long in innermost bracts, considerably longer in outer ones (almost absent [strongly reduced]). All florets tubular, light yellow or whitish, sometimes to weakly pinkish-violet, slightly exceeding involucre, heterogeneous; central florets bisexual, peripheral ones 1–4, often entirely absent, sterile, not enlarged, with staminodes not exerted from corolla tube, stamen filaments covered with very short papilliform hairs, stigma weakly bilobed. Achenes 3.5–5.0 mm long, twice as long as wide, initially very short and sparsely hairy, later subglabrous; pappus 1/7–1/5 as long as achene, persistent, double; outer pappus strongly reduced, consisting of several rows of narrowly linear, erose-ciliate scales, usually very slightly longer than corona, less often almost as long as broader, oblong scales of inner pappus. Perennial herbs with many stems from base, lacking creeping stolons; stems upright, usually strongly branched; leaves usually undivided and entire, less often partly toothed, or pinnately lobed with quite inconspicuous veins, grayish from appressed arachnoid tomentum and punctate-glandular, basal leaves withering early, cauline leaves numerous, more or less evenly distributed on stem.

Type of subgenus: *C. xanthocephala* (DC.) Sosn.

Of the four very closely related species of this subgenus, three are distributed in the southern part of Transcaucasia and the bordering regions of Turkey and Iran. The fourth species—*C. atropatana* (Grossh.) Tzvel.—so far is known only from northwestern Iran.

- 475 1. Appendages of involucre bracts serrate, 8–12 mm long; involucre 12–16 mm in dia 85. *C. erivanensis* (Lipsky) Bordz.
 + Appendages of involucre bracts pectinate-ciliate, 5–8 mm long; involucre 7–12 (13) mm in dia 2.

2. Inner pappus scales almost as long as narrower outer pappus scales; florets light yellow with weak pinkish-violet tinge 86. *C. xanthocephaloides* Tzvel.
- + Inner pappus scales considerably longer than outer pappus scales, scarcely longer than corona; florets light yellow to whitish 87. *C. xanthocephala* (DC.) Sosn.

85. *C. erivanensis* (Lipsky) Bordz. in Mém. Soc. Nat. Kiew, XXV, 1 (1915) 128; Sosn. in Vestn. Tifl. Bot. Sada, Nov. Ser. V, 28.—*Psephellus erivanensis* Lipsky, Fl. Kavk. Dop. 1 (1902) 64.—*P. holargyreus* Bornm. and Woron. in Vestn. Tifl. Bot. Sada, XXXII (1914) 5.—*Amblyopogon erivanensis* (Lipsky) Sosn. ex Grossh. in Beih. Bot. Centralbl. XLIV, 2 (1927) 245; Grossh. Fl. Kavk. IV, 207 and Opred. Rast. Kavk. 494.—**lc.**: Bornm. and Woron. op. cit. 5; Grossh. in Tr. po Prikl. Bot., Gen. i Sel. Ser. 1, II (1937) 246, Fig. 1, Figs. 4, 6 and 7.—**Exs.**: Herb. Fl. cauc. No. 249.

Perennial. Plants up to 30–35 cm high, grayish from appressed arachnoid tomentum. Stems numerous, upright, but often arcuate closer to base, branched mostly in upper part, with upward-spreading branches, terminating in one or several capitula on peduncles. Leaves petiolate, petioles gradually reducing upward, almost as long as lamina in basal leaves; lamina broadly oval to oblong, undivided and entire or in part with small teeth (or even weakly lobed), with cartilaginous cusp to 2.5 mm long. Capitula in lax corymbose inflorescence. Involucres 15–18 mm long and 12–16 mm in dia, silvery; appendages of involucre lanceolate-ovate, 8–12 mm long, with short soft cusp, serrate-dentate, sometimes teeth cuspidate. Florets pale yellow, scarcely surpassing involucre. Achenes 4–5 mm long; pappus 1/6–1/5 as long as achene; inner pappus scales considerably longer than narrower outer pappus scales, scarcely surpassing crown. Flowering June to July.

Alkaline clayey (often gypsiferous) slopes; up to lower montane zone.—*Caucasus*: Southern Transcaucasia (in vicinity of city of Yerevan). *General distribution*: Armenia and Kurdistan (northwestern part). Described from Armenian SSR. Type in Leningrad.

Note. In southern Transcaucasia, the closely related species ⁴⁷⁶ *C. atropatana* (Grossh.) Tzvel. (*Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XIX [1959] 419) may be found. It is distinguished by ciliate involucre bracts and has been described from northwestern Iran.

Economic Importance. Deserves introduction into cultivation as an ornamental plant.

86. *C. xanthocephaloides* Tzvel. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 25.

Perennial. Plants 25–40 cm high, grayish from appressed arachnoid-hairy tomentum. Stems numerous from base (strongly thickened root collar), upright or partly arcuately ascending, branched almost from base, with upward-spreading branches terminating in one or many capitula on long peduncles. Leaves numerous, petiolate, petioles gradually reduced upward, in basal leaves almost as long as lamina; lamina spatulate and broadly oval to oblong-linear, partly undivided and entire, often irregularly remotely toothed (or even weakly lobed), gradually narrowed toward base, acuminate. Capitula in very lax corymbose or paniculate inflorescence. Involucre 12–14 mm long and 10–12 mm in dia, whitish with very weakly brownish-yellow tinge; appendages of involucre bracts lanceolately ovate, 5.5–7.5 mm long, with 1.0–1.5 mm long cusp, usually longer than lateral fimbriae, petiolate-ciliate. Florets pale yellow, with weakly pinkish-violet tinge, slightly surpassing involucre. Mature achenes unknown, immature achenes with pappus 1/6–1/5 as long as achene; inner pappus scales almost as long as narrower outer pappus scales. Flowering May to July.

Alkaline clayey and stony slopes of lower mountain zone.—*Caucasus*: Southern Transcaucasia (Daralagez). Endemic. Described from Armenian SSR (Ekhegnadzor District, saline clayey slope of a hill northwest of village of Ortakend, No. 775, 8.VII.1957, N. Tzvelev and S. Czerepanov) Type in Leningrad.

Note. Despite great morphological similarity to the next species, *C. xanthocephaloides* differs from it and *C. erivanesis* by the structure of the pappus and the color of florets, being closer in these characters to the subgenus *Amblyopogon* (DC.) Tzvel.

87. *C. xanthocephala* (DC.) Sosn. in Vestn. Tifl. Bot. Sada, Nov. Ser. V (1931) 27; Tzvelev in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX (1959) 418.—*Amberboa xanthocephala* DC. Prodr. VI (1837) 561; Ldb. Fl. Ross. II, 2, 552.—*Psephellus xanthocephalus* Fisch. and Mey. ex DC. op. cit. 561, pro syn.; Boiss. Fl. or. III, 610.—*Xanthopsis xanthocephala* (DC.) C. Koch in Linnaea, XXIV (1851) 422.—*Amblyopogon xanthocephalus* (DC.) Sosn. ex Grossh. in Beih. Bot. Centralbl. XLIV, 2 (1927) 245; Grossh. Fl. Kavk. IV, 208 and Opred. Rast. Kavk. 494.—*A. woronowii* Grossh. in Tr. po Prikl. Bot., 477 Gen. i Sel. Ser. 1, II (1937) 247.—**lc.**: Sosn. op. cit. (1931) 27, 28; Grossh. op. cit. (1937) 246, Fig. 1, Figs. 2, 5, and 9; Karjagin in Fl. Azerb. VIII (1961) Plate XLVI, 1.—**Exs.** Herb. Fl. cauc. No. 250; Fl. or. exs. No. 250 (var. *spinescens* Grossh.).

Perennial. Plants to 35–40 cm high, grayish from appressed arachnoid tomentum. Stems numerous, arising from base of plant (strongly reduced, many-headed root collar), upright or partly arcuate, branched almost from base, with upward spreading branches, terminating in one or many capitula on long peduncles. Leaves numerous, petiolate; petioles gradually reduced upward (to almost sessile), in basal leaves almost as long as lamina; lamina almost spatulate and oval to linear, undivided and entire, less often entirely or partly more or less toothed or lobed, acuminate or short-cuspidate, gradually narrowed toward base. Capitula in lax corymbose or almost paniculate inflorescence. Involucre 10–13 mm long and 7–11 mm in dia, whitish with very weakly brownish-yellow tinge; appendages of involucre bracts broadly ovate to lanceolately ovate, 4–7 mm long, acute or cuspidate, usually not longer than lateral cilia, pectinate-ciliate. Florets pale yellow, slightly surpassing involucre. Achenes about 4 mm long; pappus 1/7–1/6 as long as achene, inner pappus scales considerably longer than narrower outer pappus scales, slightly surpassing crown. Flowering June to July.

Stony to clayey, usually more or less saline slopes; up to lower montane zone.—*Caucasus*: Southern Transcaucasia (Nakhichevan ASSR). *General distribution*: Armenia and Kurdistan (northern part). Described from Nakhichevan ASSR (salt pits near Nakhichevan). Type in Geneva; isotypes in Leningrad.

Note. Apparently, it splits off into many very weakly defined and narrowly endemic ecogeographical races, differing by the shape of the leaves and the size of the capitula. Besides, the plants with linear, partly lobate leaves and not those with relatively broad, entire leaves, described by A.A. Grossheim also from the Nakhichevan salt pits as a separate species *Amblyopogon woronowii* Grossh., differ most from the type specimen.

Subgenus 9. Sosnovskaya (Takht.) Czer. comb. nova.—*Sosnovskya* Takht. in Sov. Bot. 5 (1936) 98.—*Centaurea* sect. *Acrolophus* §2. *Acrolophoides* Ldb. Fl. Ross. II, 2 (1845) 702 p. min. p.—*Phaeopappus* sect. *Euphaeopappus* §4. *Microcephali* Boiss. Fl. or. III (1875) 593 p. p.—Capitula somewhat small- or medium-sized, with many florets, solitary at tips of stem and lateral branches, in corymbose-inflorescence. Involucre oblong to ovate, 4–10 mm in dia, glabrous; involucre bracts coriaceous, with inconspicuous veins, greenish (yellowing during drying), from broadly ovate outer to oblong and oblong-linear innermost; appendages of involucre bracts small, not decurrent on bracts, partly covering their coriaceous part, membranous, whitish, whitish-yellowish, sometimes partly pale brownish, semicircular to triangular, crimped- or pectinate-ciliate, less often deeply toothed; fimbriae of appendage finely setose (under a hand lens!). All florets

tubular, pale pink, yellowish-white or whitish, 1.5 times as long as involucre, heterogeneous; central florets bisexual, peripheral ones sterile, with 5 staminodes exerted from corolla tube, fewer, not enlarged (only with very slightly broadened and more deeply 5-parted limb); stamen filaments flattened, short-papillate; stigma weakly bilobed. Achenes oblong, less often oblong-ellipsoidal, 5–7 mm long, scatteredly hairy; pappus 1/2–2/3 as long as achene, less often as long, pale violet brown, or ochraceous, persistent, simple, consisting of several irregular rows of serrate-scabrous bristles, gradually longer from very short outer to inner ones and basally connate in ring, less often (*C. arpensis*) double inner almost half as long as outer, outer pappus consisting of one row of oblong, serrate-scabrous scales. Perennial herbs; stems numerous, arising from woody, branched base, upright, branched in lower part; leaves whitish, grayish or grayish-green from fine tomentose pubescence, sessile (except short-petiolate lowermost), not decurrent on stem, pinnately incised to entire.

Type of subgenus: *C. amblyolepis* Ldb.

The subgenus is endemic to the Caucasus.

1. Pappus simple, setose 2.
- + Pappus double: outer pappus setose, inner one consisting of one row of almost half-as-long, oblong scales; florets whitish 91. *C. arpensis* (Czer.) Czer.
2. Leaves pinnately incised, sometimes lower ones lyrate pinnate ... 88. *C. amblyolepis* Ldb.
- + Leaves entire or lower and some of middle cauline ones with 1–2 teeth or lobes on each side, rarely lyrate pinnate 3.
3. Involucre (6)7–10 mm in dia; appendages of involucre bracts semi-circular, 3.0–4.5 mm long and as wide; florets yellowish-white; achenes 6–7 mm long and 2.5–3.0 mm wide; pappus 4.5–5.0(6.0) mm long. Leaves usually flat, narrowly linear, lower and some of middle cauline leaves toothed to lyrate pinnate 89. *C. daghestanica* (Lipsky) Czer.
- + Involucre 5–7 mm in dia; appendages of involucre bracts triangular or ovately triangular, smaller; florets pale pink; achenes 5.0–5.5 mm long and 2.0–2.3 mm wide; pappus 3.0–3.5(4.0) mm long. Leaves convolute, mostly narrowly linear-subulate, all entire 90. *C. ruprechtii* (Boiss.) Czer.

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88. *C. amblyolepis* Ldb. Fl. Ross. II, 2 (1845) 703.—*Phaeopappus amblyolepis* (Ldb.) Boiss. Fl. or. III (1875) 601; Lipsky, Fl. Kavk. 362 p. p. excl. var.; Grossh. Fl. Kavk. IV, 206.—*Sosnovskya amblyolepis* (Ldb.) Takht. in Sov. Bot. 5 (1936) 99 p. p. excl. pl. e Transcaucaso

australi; Grossh. Opred. Rast. Kavk. 494 p. p.; Ter-Khacha-turova in Fl. Gruzii, VIII, 554; Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX 482.— **Ic.**: Ter-Khachaturova op. cit. Fig. 420.— **Exs.**: Pl. or. exs. No. 300.

Perennial. Roots woody, robust, long. Stems numerous, arising from woody branched base, 20–40 cm high, upright, finely ribbed, branched in lower part. Leaves whitish or grayish from strongly appressed, soft, thin tomentum, pinnately incised; lower cauline leaves short-petiolate, others sessile, not decurrent, apical leaves sometimes entire, narrowly linear, strongly reduced; leaf segments flat, narrowly linear, subacute or acute, entire to small-toothed, 1–3 (4) on each side. Capitula in corymbose inflorescence. Involucre oblong-ovate or ovate, 15–17 mm long and 8–10 mm in dia; appendages of involucre bracts membranous, ovately triangular or semicircular, crimped or pectinate-ciliate, (2.5)3.0–4.0 mm long and 3–5 mm wide in outer and middle bracts. Florets pale pink. Achenes 5.0–5.5 mm long and 2.2–2.7 mm wide; pappus 3–4 mm long, simple, setose. Flowering June to August.

Dry stony slopes and crests of sandy ridges in mid-montane zone.— **Caucasus**: Eastern Transcaucasia (Inner Kartalinia in Georgia). Endemic. Described from Whiteman's collection from Georgia. Type and isotypes in Leningrad.

89. **C. daghestanica** (Lipsky) Czer. comb. nova.— *C. amblyolepis* var. *daghestanica* Trautv. in Tr. Peterb. Bot. Sada, IV (1876) 156, V (1878) 447, excl. syn. and VII (1881) 472, non basionym.— *Phaepappus amblyolepis* β. *daghestanicus* (Trautv.) Lipsky, Fl. Kavk. (1899) 362.— *P. daghestanicus* Lipsky, Fl. Kavk. Dop. I (1902) 62, basionym.; Grossh. Fl. Kavk. IV, 206.— *P. ruprechtii* β. *samurensis* Lipsky, op. cit. (1902) 63; Grossh. op. cit.— *Sosnovskya ruprechtii* (Boiss.) Takht. in Sov. Bot. 5 (1936) 99 p. p.; Grossh. Opred. Rast. Kavk. 494 p. p.— *S. daghestanica* (Lipsky) Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 482.

480 Perennial. Root woody, long. Stems numerous, arising from woody branched base, 20–40 cm high, upright, finely ribbed, branched in lower part, more or less grayish from strongly appressed, thin tomentum, usually grayish-green above, weakly arachnoid-hairy, covered at base with dense whitish tomentum. Leaves usually flat, grayish-green or green, not densely arachnoid-hairy or subglabrous, lower ones short-petiolate, some of middle cauline leaves lyrate pinnate to toothed, with 1–2 lobes or teeth on each side, others sessile, not decurrent, entire, narrowly linear, subacute or acute, apical leaves strongly reduced. Capitula aggregated in corymbose inflorescence. Involucre oblong-ovate or ovate, 15–17 mm long and (6–7–10 mm in dia;

appendages of involucre bracts membranous, semicircular, crimped or pectinate-ciliate, 3–4 mm long and wide in outer and middle bracts. Florets yellowish-white. Achenes 6–7 mm long and 2.5–3.0 mm wide; pappus 4–5 (6) mm long, simple, setose. Flowering June to July.

Dry rubbly-schistose mountain slopes.—*Caucasus*: Dagestan (between Chir-Yurt and Gumali; Achi Ravine in former Buinak District; Akhty). Endemic. Described from first locality. Type in Leningrad.

Note. A variety has been reported: var. *lacerata* (Lipsky) Czer.—*Phaeopappus daghestanicus* var. *laceratus* Lipsky, *Fl. Kavk. Suppl.* I (1902) 62; Grossh. *Fl. Kavk.* IV, 206.—*Sosnovskya ruprechtii* var. *lacerata* (Lipsky) Takht. in *Sov. Bot.* 5 (1936) gg.—*S. daghestanica* var. *lacerata* (Lipsky) Czer. in *Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR* (1960) 483.—The whole plant is grayish from rather dense tomentum; the appendages of the involucre bracts are undivided and irregularly toothed. The plants collected by F. Alekseenko from the area between Alty-Boyun and the town of Buinaksk.

90. **C. ruprechtii** (Boiss.) Czer. comb. nova.—*C. amblyolepis* var. *daghestanica* Trautv. in *Tr. Peterb. Bot. Sada*, X (1887) 118, quoad pl. e. flum. Koissu.—*Phaeopappus ruprechtii* Boiss. *Fl. or.* III (1875) 601 and *Suppl.* (1882) 312; Lipsky, *Fl. Kavk.* 362 and *Dop.* I, 62 p. p. excl. var. Grossh. *Fl. Kavk.* IV, 206 p. p. excl. var.—*Sosnovskya ruprechtii* (Boiss.) Takht. in *Sov. Bot.* 5 (1936) 99 p. p.; Grossh. *Opred. Rast. Kavk.* 494 p. p.; Czer. in *Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XX (1960) 483.—**Exs.**: *Herb. Fl. cauc.* No. 395, excl. syn.

Perennial. Root woody, robust, long. Stems numerous, arising from woody branched base, 20–40 cm high, upright, finely ribbed, branched in lower part, more or less grayish from strongly appressed soft, thin tomentum, like leaves more or less grayish-green above, weakly arachnoid-hairy, at base densely whitish-tomentose. Leaves entire, narrowly linear-subulate or narrowly linear, subacute to short acuminate, usually convolute; lower cauline leaves short-petiolate, less often with 1–2 lobes or teeth on each side, others sessile, not decurrent; apical leaves strongly reduced. Capitula aggregated in corymbose-inflorescence. Involucre oblong, less often oblong-ovate, 13–15 mm long and 5–7 mm in dia; appendages of involucre bracts membranous, triangular or
481 ovately triangular, pectinate-ciliate, 1.5–2.0 mm long and 1.0–2.25 (3.0) mm wide in outer and middle bracts. Florets pale pink. Achenes 5.0–5.5 mm long and 2.0–2.3 mm wide; pappus 3.0–3.5(4.0) mm long, simple, setose. Flowering June to August.

Limestones and dry schistose slopes, in mid-montane zone.—*Caucasus*: Dagestan (Inner Dagestan). Endemic. Described from

vicinity of Golotla at confluence with Avaria. Type in Geneva; isotype in Leningrad.

91. **C. arpensis** (Czer.) Czer. comb. nova.—*Sosnovskya amblyolepis* (Ldb.) Takht. in Sov. Bot. 5 (1936) 99 p. p. quoad pl. e Transcaucaso australi; Grossh. Opred. Rast. Kavk. 494 p. p.—*S. arpensis* Czer. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 484.

Perennial. Root woody, robust, long. Stems numerous, arising from branched woody base, 30–40 cm high, upright, finely ribbed, branched in lower part, at base covered with quite dense, whitish tomentum, above with leaves more or less grayish or whitish from strongly appressed, very thin tomentum, weakly arachnoid-hairy above, and leafless. Leaves entire, narrow linearly subulate, subacute, less often acute, convolute; lower cauline leaves short-petiolate, less often with 1–2 lobes or teeth on each side, others sessile, not decurrent on stem, upper cauline ones reduced. Capitula aggregated in corymbose-inflorescence. Involucre oblong, 12–14 mm long and 4–6 (7) mm in dia; appendages of involucre bracts membranous, semicircular, crimped- or pectinate-ciliate, 2–3 mm long and 2.5–4.0 mm wide in outer and middle bracts. Florets whitish. Achenes 5–6 mm long and 2.0–2.5 mm wide; pappus 5–6 mm long, double, outer pappus setose, inner one almost half as long as outer, consisting of one row of broad, oblong scales. (Plate XXIV, Fig. 1.)

Dry clayey and rubbly slopes, at 1,400 m.—*Caucasus*: Southern Transcaucasia (middle reaches of Arpa River in Daralagez; ?Nakhichevan ASSR). Endemic. Described from Daralagez (left bank of Arpa River opposite mouth of Elegis River). Type and isotypes in Leningrad; isotype and paratype in Yerevan.

Subgenus 10. **Odontolophus** (Cass.) Hayek, *Centaurea* Art. Österr.-Ung. (1901) 5.—*Centaurea* sect. *Odontolophus* (Cass.) DC. Prodr. VI (1837) 579.—*Odontolophus* Czer. in Dict. Sc. Nat. L (1827) 252.—Capitula smaller, with many florets, usually solitary at tips of numerous stems, often forming corymbose inflorescence. Involucre ovate to short-cylindrical, 4–10 mm in dia, more or less grayish-tomentose to subglabrous; involucre bracts thin-coriaceous, with 4–7 inconspicuous veins, from broadly ovate outer ones to lanceolately linear innermost; appendages of involucre bracts membranous, yellowish or whitish, often with brownish tinge, acuminate or with short spine, irregularly toothed, or pectinate-ciliate, not distinctly demarcated from bracts, decurrent and almost as wide as bracts (less often considerably narrower), gradually enlarged from broadly semicircular outermost bracts to triangular and broadly ovate inner ones. Florets pink of various

shades, heterogeneous; central florets tubular, bisexual, 1–5 times as long as involucre, peripheral ones tubular-infundibuliform, weakly enlarged (only slightly longer than central ones) and more or less broadened at corolla throat, sterile, with 5 staminodes far exserted from corolla tube, less often (in *C. avarica*) almost not exserted; stamen filaments strongly flattened, with short papilliform hairs on two sides; stigma very weakly bilobed. Achenes oblong, 4–6 mm long, sparsely short-hairy, mostly in upper part and near hilum, later subglabrous; pappus 1/4–2/5 as long as achene, persistent, usually with weak brownish tinge, double; outer pappus consisting of several irregular rows of bristles, scabrous on two sides, gradually elongated from very short outer to middle and inner ones; inner pappus 1/4–1/2 as long as outer, consisting of one row structurally identical bristles but shorter and often partly connate (and then scarious). Perennial herbs, with many stems arising from base, lacking creeping underground shoots; stem upright, simple or branched near base, uniformly leafy; leaves usually entire and undivided, sessile or subsessile, oblong-elliptical to linear, with 3 prominent veins, more or less arachnoid-hairy tomentose like entire plant, with inconspicuous punctate glands.

Type of subgenus: *C. trinervia* Steph.

Three species of this subgenus are distributed in the steppes of southeastern Europe—from Hungary to Romania in the west to the Lower Volga and eastern foothills of the Caucasus Range in the east. All of them are found in the USSR.

1. Achenes about 4 mm long, with 1 mm-long pappus; appendages of involucre bracts very small, narrower than bracts (Dagestan) 94. *C. avarica* Tzvel.
- + Achenes 5–6 mm long with 2.0–2.5 mm-long pappus; appendages of involucre bracts larger, almost as wide as bracts 2.
2. Appendages of involucre bracts very short-fimbriate or ciliate, cilia 1/6–1/3 as long as width of appendage at its base (widely distributed species) 92. *C. trinervia* Steph.
- + Appendages of involucre bracts with longer cilia; cilia 1/2–2/3 as long as width of appendage (eastern foothills of the Caucasian Range) 93. *C. kobstanica* Tzvel.

483 92. *C. trinervia* Steph. in Willd. Sp. pl. III, 3 (1803) 2301; MB. Fl. taur.-cauc. II, 350; DC. Prodr. VI, 579; Ldb. Fl. Ross. II, 2, 700; Schmalh. Fl. II, 119; Grossh. Fl. Kavk. IV, 206 and Opred. Rast. Kavk. 495.—*Odontolophus cyanoides* Cass. in Dict. Sc. nat. 1 (1827) 253.—*Phaeopappus trinervius* (Steph.) Boiss. Fl. or. III (1875) 600; Dobrocz. in Vozn. Rosl. URSR, 572.—**lc.**: Rchb. Ic. Fl. Germ. XV

(1852) tab. 767; Fedtsch. and Fler. Fl. Evrop. Ross. (1910) Fig. 1026.—
Exs.: F. Schultz. Herb. norm. Cent. 11, No. 1084.

Perennial. Plants to 50–60 cm high, mostly covered with floccose, grayish tomentum, mixed with very short, spiniform hairs, dark or grayish-green. Stems numerous, arising from base of plant, upright, simple or branched near base. Leaves sessile or subsessile, oblong-elliptical (lowermost) to narrowly linear, acuminate, from dull green, very weakly pubescent to grayish-tomentose, usually with 3 prominent, almost parallel veins. Capitula solitary at tips of stem and lateral branches on long leafless peduncles. Involucre 5–8 mm in dia and 12–15 mm long; appendages of involucre bracts almost as wide as bracts, with 6–9 small teeth or short cilia on each side, cilia $1/6$ – $1/3$ as long as width of appendage at its base. Florets pink. Achenes 5–6 mm long, with 2.5-mm long pappus; inner pappus $1/3$ – $1/2$ as long as outer one, its bristles as wide as those of outer pappus or only slightly wider. Flowering June to August. (Plate XXII, Fig. 2.)

Steppes, scrubs, stony slopes; up to lower montane zone.—*European Part:* Bessarabia, Black Sea Region Lower Don, Crimea; *Caucasus:* Ciscaucasia. *General distribution:* Central Europe (southeastern part). Described from European part of USSR (“Siberia” in original description). Type (or isotype?) in Leningrad.

Note. It varies considerably in the width and degree of pubescence of the leaves, width of the capitula, and dissection of the appendages of the involucre bracts, possibly splitting into several still inadequately studied ecogeographical races. Hybrids of this species with species of the subgenus *Psephellus*: *C. declinata* MB. and *C. dealbata* Willd. are known from Ciscaucasia (vicinity of Pyatigorsk) and Crimea (vicinity of Sudak). They have broader, often partially pinnately lobed or toothed leaves, more or less arising from the base of the stem, as well as a much broader involucre. Such plants apparently do not produce mature achenes.

93. ***C. kobstanica*** Tzvel. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX (1959) 425.—**Exs.:** GRF No. 4395.

Perennial. Plants to 50 cm high, very profusely floccose, grayish-tomentose, mixed (on leaves) with few, very short, spiniform hairs. Stems numerous, simple or branched in lower part. Leaves sessile or subsessile, oblong, elliptical (lowermost) to linear, acuminate, more or less grayish-tomentose, usually with 3 prominent veins. Capitula solitary at tips of stem and lateral branches, on long leafless peduncles. Involucre 4–6 mm in dia and 10–13 mm long; appendages of involucre bracts almost as wide as bracts, with 5–8 cilia on each side, longest cilia half or less as long as width of appendage at base. Florets

pink. Achenes 5–6 mm long; pappus about 2 cm long, inner pappus 1/4–1/3 as long as outer one, its bristles often thicker than those of outer pappus, sometimes partly connate, and then scarious. Flowering June to July.

Stony slopes, mountain steppes, in lower mountain zone.—*Caucasus*: Eastern Transcaucasia (eastern and southeastern foothills of Caucasus Range). Endemic. Described from Azerbaidzhan SSR (between Baku and Shemakha). Type in Leningrad.

94. *C. avarica* Tzvel. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 27.

Perennial. Plants to 30–40 cm high, profusely floccose, grayish-white-tomentose, mixed with (on leaves) some spinules. Stems numerous, upright, simple or branched in lower part. Leaves sessile or subsessile, lowermost oblong-elliptical, sometimes with 1–2 short lateral lobes on each side, others lanceolately linear to narrowly linear, acuminate, more or less grayish-tomentose, usually with 3 prominent veins. Capitula on long leafless peduncles, solitary at tips of stems and lateral branches. Involucre 7–10 mm in dia and 10–15 mm long; appendages of involucre bracts very small, considerably narrower than bracts and scarcely decurrent on their tip, longer than wide as compared to previous species, with lighter cilia almost as long as width of appendage at its base. Florets pink. Achenes about 4 mm long; pappus brownish, about 1 mm long, inner pappus 1/2–2/3 as long as outer one, with bristles almost as wide as outer pappus bristles. Flowering June to July.

Stony slopes, in lower montane zone.—*Caucasus*: Dagestan. Endemic. Described from Dagestan ASSR (in vicinity of village of Botlikh). Type in Tbilisi.

Note. Until recently, this species was known only from the lone type specimen in the Herbarium of the Botanical Institute of the Academy of Sciences of Georgian SSR. However, in the summer of 1961, I and other participants of the Dagestan expedition of the Botanical Institute of the Academy of Sciences of the USSR collected from the vicinity of the village of Botlikh a large quantity of additional material of this species, which confirmed its separateness as well as its affinity to the subgenus *Odontolophus*, despite a strong reduction of the staminodes in the peripheral florets. The latter character, and the other distinctive features of *C. avarica* are all seemingly transitional to the subgenus *Sosnovskya*. Because of this, given the absence at present of other species of the subgenus *Odontolophus* in the Botlikh region and the wide distribution here of one of the species of the subgenus *Sosnovskya* (*C. ruprechtii*), we consider a hybrid origin of *C. avarica*

(*C. trinervia* × *C. ruprechtii* in the more or less distant past quite probable.

Subgenus 11. *Odontolophopsis* Tzvel. subgen. nov.—*Phaeopappus* sect. *Psephelloides* Jaub. and Spach. Ill. pl. or. III (1847–1850) 16.—*Centaurea* sect. *Odontolophoideae* Tzvel. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX (1959) 422.—Capitula small-sized, with many florets, solitary at tips of numerous stems and their lateral branches, sometimes aggregated in corymbose inflorescence. Involucre ovate or short-cylindrical, 5–13 mm in dia, glabrous; involucre bracts thin-coriaceous, with 4–7 inconspicuous veins, gradually elongated from broadly ovate outer to oblongly linear innermost; appendages of involucre bracts large, membranous, quite loosely arranged, whitish or yellowish, with brownish tinge intensifying in upper part, entirely covering bracts and wider than them, broadly ovate to sub-orbicular, at base not decurrent on bracts, acuminate or with short spine, pectinate-ciliate. Florets pink of various shades, tubular, heterogeneous; central florets bi-sexual, 1.5 times as long as involucre, peripheral sterile, slightly larger, with weakly developed staminodes included in corolla tube; stamen filaments flattened, covered with very short, papilliform hairs; stigma weakly bilobed. Achenes oblong, 5–7 mm long, very sparsely pubescent, later subglabrous; pappus 1/4–1/2 as long as achenes, persistent, usually with weak brownish tinge, double; outer pappus consisting of several irregular rows of scabrous bristles, gradually elongating from very short outer to middle and inner ones; inner pappus 1/3–2/3 as long as outer, consisting of one row of oblong-spatulate, arose-ciliate scales. Perennial herbs, many-stemmed from base, lacking underground shoots; stems upright, simple or somewhat branched, uniformly leafy; leaves oblong to narrowly linear, sessile or subsessile, entire or some pinnately lobed, usually with 3 prominent veins, more or less floccose-tomentose to sub glabrous.

Type of subgenus: *C. aucheriana* DC.

Of the four species of this subgenus, distributed in the eastern regions of Turkey, northwestern Iran, and Transcaucasia, only one is found in the USSR.

Note. The priority epithet for the section *Psephelloides* Jaub. and Spach (1847–1850), appearing initially in the genus *Phaeopappus* Boiss., cannot be retained (according to Article 54 of the Paris Code) on transferring this section to the genus *Centaurea* L., since in the latter genus there is already a section *Psephalloideae* (Boiss.) Sosn. (1931), based on another type. Because of this, with such a transfer, the sectional epithets *Psephalloides* and *Psephalloideae* (being very obvious orthographic variants) would appear to become homonyms (according to Article 75 of the Paris Code).

95. **C. phaeopappoides** Bordz. in Zhurn. Inst. Bot. Ukr. Akad. Nauk III (1935) 82; Grossh. Opred. Rast. Kavk. 498.—**Ic.**: Bordz. op. cit. 82, Fig. 6.—**Exs.**: GRF No. 4397.

Perennial. Plants to 60–70 cm high, more or less thinly floccose-tomentose with occasional spines. Stems numerous, upright, strongly branched in lower half. Leaves sessile or subsessile, oblong to narrowly linear, (lower ones often with one or few teeth or lobes on each side), acuminate, with 3 distinct veins, dull-green, less often grayish-green. Capitula solitary at tips of stem and lateral branches, on long leafless peduncles. Involucre ovate, 8–12 mm in dia and 15–18 mm long; appendages of involucre broadly ovate to almost rotund, with short spine at apex and 8–14 cilia on each side. Florets pink. Achenes 6–7 mm long; pappus 2.5–3.0 mm long; inner pappus 1/2–2/3 as long as outer. Flowering July to August.

Stony slopes, rocks; in lower montane zone.—*Caucasus*: Southern Transcaucasia (between Daralagez and Vardenis ranges). Endemic. Described from Armenian SSR (in vicinity of Ekhegnadzor). Type in Kiev.

Subgenus 12. **Pseudohyalea** (Tzvel.) Tzvel. comb. nova.—*Centaurea* sect. *Pseudohyalea* Tzvel. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX (1959) 428.—*Centaurea* sect. *Phalolepis* (Cass.) DC. Prodr. VI (1837) 568 p. p.—*Hyalea* (DC.) Jaub. and Spach. Ill. pl. or. III (1847–1850) 19 p. p.—Capitula medium-sized with many florets; solitary; involucre subglobose, glabrous, 15–20 mm in dia; involucre bracts coriaceous, light brownish-green, with 8–15 inconspicuous (only in upper part) veins, gradually enlarged from almost semicircular outer to oblong innermost; appendages of involucre large, almost entirely covering bracts and considerably broader than them, bulging on outer side; membranous, semitransparent (often with weak brownish tinge), rounded at tip, entire or with very small teeth (often with lacerate margin), in outer involucre bracts broadly semilunar, decurrent almost to base of bract, in innermost bracts almost round, weakly decurrent on bract. Florets pink of various shades, heterogeneous; central florets tubular, bisexual, 1.5–2 times as long as involucre, peripheral ones tubular-infundibuliform, larger and strongly broadened at corolla throat, sterile, with weakly developed staminodes included in corolla tube; stamen filaments strongly flattened, with very short papilliform hairs mostly only on two sides; stigma weakly bilobed. Achenes oblong, 5–7 mm long, with very short, less often erect hairs, later subglabrous; pappus almost as long as achene, longer, or slightly shorter, persistent, brownish, double; outer pappus consisting several irregular rows of bristles, scabrous on two sides, gradually

elongated from very short outer to middle and inner; inner pappus $1/2-2/3$ as long as outer, consisting of one row of oblong or oblong-linear, at apex irregularly toothed and erose-ciliate scales. Perennial herbs with upright, simple stems arising from strongly branched rhizome, grayish from profuse arachnoid-hairy tomentose; leaves crowded mostly in lower part of stems, entire, toothed, or more or less pinnately incised, long-petiolate except uppermost, with inconspicuous punctate glands.

Type of subgenus: *C. pergamacea* DC.

Of the two species of this subgenus, distributed in Turkey and northwestern Iran, only one is found in the USSR.

96. *C. leuzeoides* (Jaub. and Spach.) Walp. Ann. Bot. I (1848–1849) 447; Tzvelev in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX, 429.—*C. pergamacea* auct. non DC.: Boiss. Fl. or. III (1875) 624 p. p.; Grossh. Opred. Rast. Kavk. 496.—*Hyalea leuzeoides* Jaub. and Spach. Ill. pl. or. (1847–1850) 21.—**IC.**: Jaub. and Spach. *ibid.*, tab. 216.

Perennial. Plants to 50–60 cm high, grayish from weakly floccose, arachnoid-hairy tomentum. Stems upright, simple, terminating in single capitulum on long, almost leafless peduncle. Leaves crowded mostly in lower part of stem, lower ones very long-petiolate, lyrate, with very large terminal segment and few lateral segments, irregularly toothed or entire, subobtusely; uppermost leaves strongly reduced, sessile. Involucre 15–20 mm in dia and 18–24 mm long; involucre bracts at apex with large, almost entire, semitransparent, membranous appendage, except uppermost, strongly decurrent on bract. Florets pink; peripheral florets sterile, large, tubular-infundibuliform, with corolla of (5)6(7) lanceolately linear lobes. Achenes 6–7 mm long; pappus about 6 mm long. Flowering June to July.

Stony slopes, mountain steppes; in lower and middle montane zones.—*Caucasus*: Southern Transcaucasia (Daralagez). *General distribution*: Armenia and Kurdistan, Iran (northwestern part). Described from northwestern part of Iran. Type in Paris; isotype in Leningrad.

Note. This species has previously been confused with the similar species *C. pergamacea* DC. distributed in Turkey (Cappadocia). However, the latter species, besides having a completely isolated range, is readily distinguished from *C. leuzeoides* by having deeply pinnately lobed leaves with the terminal lobes not larger than the lateral ones, the corolla of the peripheral florets with 8–10 lobes, and a longer pappus.

Subgenus 13. Hyalinella (Tzvel.) Tzvel. comb. nova.—*Centaurea* sect. *Hyalinella* Tzvel. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR,

XIX (1959) 426.—*Centaurea* sect. *Phalolepis* auct. non DC.: Boiss. Fl. or. III (1875) 615 p. p.—Capitula relatively small- or medium-sized, with many florets, solitary at tips of stems and lateral branches. Involucre ovate, 7–14 mm in dia, glabrous or subglabrous; involucre bracts thin-coriaceous, greenish, with 3–7 fairly distinct veins, gradually enlarged from broadly ovate outer to lanceolately linear innermost; appendages of involucre bracts quite large, membranous, usually almost entirely semitransparent (only in middle part darker, brownish), from almost round to ovate, usually considerably broader than bracts, less often almost as wide, very short-decurrent in outer involucre bracts, not decurrent in middle and inner bracts, on outer side more or less convex, obtuse or emarginate, less often subacute or with short spine, entire to pectinate-ciliate, often more or less divided, with much deeper notch at apex. Florets pink, heterogeneous; central florets tubular, bisexual, 1.5–2 times as long as involucre, peripheral ones sterile, tubular-infundibuliform, enlarged, usually with staminodes not exerted from corolla tube and with rudiments of style; stamen filaments flattened, covered with very short papilliform hairs; stigma weakly bilobed. Achenes oblong, 3.5–5.0 mm long, sparsely short-hairy; pappus usually 1.5–2 times as long as achene, persistent, often with brownish tinge, double, outer pappus consisting of several irregular rows of scabrous bristles, gradually elongated from very short outer to middle and inner ones; inner pappus 1/6–1/3 as long as outer, comprising one row of linear, at apex irregularly toothed and erose-ciliate scales, sometimes inner pappus almost entirely reduced. Perennial herbs with flowering and nonflowering (comprising leaf rosettes) shoots arising singly or in groups from strongly branched reduced rhizome; stems upright, simple or with few lateral branches, weakly leafy, often only with few, strongly reduced leaves; basal leaves in rosettes, more or less pinnately parted or lobed, sometimes some of them undivided and entire, whitish-tomentose beneath or less often on both sides, with inconspicuous punctate glands.

Type of subgenus: *C. simplicicaulis* Boiss. and Huet.

Six closely related species of the subgenus are distributed in southwestern Transcaucasia and in the northeastern part of Turkey. We have placed one more morphologically very distinct species from northeastern Turkey in a separate section.

- 489
1. Appendages of involucre bracts subacute or with short spine, pectinate-ciliate. Stems more or less woody at base, divaricately branched, with strongly reduced but numerous almost coriaceous leaves 103. **C. pecho** Alb.
 - + Appendages of involucre bracts entire (but usually more or less

- lacerate) or with small t̄eth (teeth sometimes modified into fimbriae), obtuse or emarginate. Stems herbaceous, simple or with few branches, usually weakly leafy 2.
2. Appendages of involucre bracts very large, almost entirely covering bracts and considerably broader than them 3.
- + Appendages of involucre bracts smaller, not covering greater part (usually more than half) of bracts and almost as wide as them 6.
3. Leaves white-tomentose on both sides (usually more weakly above than beneath) 99. **C. bagadensis** Woron.
- + Leaves above lacking tomentum or with very fine grayish tomentum.
4. Appendages of middle involucre bracts with fine small teeth, teeth to 0.2–0.3 mm long 5.
- + Appendages of middle involucre bracts with larger (0.4–0.6 mm long) teeth, changing into fimbriae 100. **C. simplicicaulis** Boiss. and Huet.
5. Lateral leaflets of lower leaves elliptical 97. **C. bella** Trautv.
- + Lateral leaflets of lower leaves almost round 98. **C. nathadzeae** Sosn.
6. Appendages of innermost involucre bracts very large, 4–5 mm wide 101. **C. dimitriewiae** Sosn.
- + Appendages of innermost involucre bracts smaller, 1.5–3 mm wide 102. **C. adjarica** Alb.

Section 1. Hyalinella.—*Centaurea* sect. *Hyalinella* Tzvel. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX (1959) 426.—Appendages of involucre bracts strongly bulging, obtuse or emarginate, with small teeth on margin or entire (but often lacerated [divided]). Stems herbaceous at base, simple or with few branches, usually weakly leafy.

Type of section: Type of subgenus.

97. **C. bella** Trautv. in Bull. Acad. Sc. Petersb. X (1866) 394; Boiss. Fl. or. III, 624; Grossh. Fl. Kavk. IV, 213 and Opred. Rast. Kavk. 496.—**lc.**: Sosn. in Fl. Gruzii, VIII (1952) Plate 424.—**Exs.**: Fl. or. exs. No. 98.

Perennial. Plants to 30–40 cm high, appressed whitish-tomentose.
 490 Stems rather numerous, less often solitary, upright, terminating in single capitulum on long leafless peduncle. Basal leaves rather long-petiolate, pinnately divided or lobed, sometimes some of them undivided, whitish-tomentose beneath, grayish- or dark-green above from very fine tomentum, with 1–4 lateral leaflets or lobes on each side, oblong-ovate or elliptical; terminal lobe like lateral ones or much larger. Cauline

leaves less numerous, strongly reduced. Involucre 10–14 mm in dia, and 14–20 mm long; appendages of involucre bracts large, almost entirely covering bracts, with very tiny teeth (to 0.2–0.3 mm long), often divided, with broad semi-transparent part. Florets pink. Achenes 3.0–5.5 mm long; pappus 8–10 mm long, inner pappus 1/5–1/4 as long as outer. Flowering May to July.

Stony slopes; up to middle montane zone.—*Caucasus*: Eastern Transcaucasia (western part), Western Transcaucasia (southeastern part). Endemic. Described from Georgia (Borzhomi area). Type in Leningrad.

98. *C. nathadzeae* Sosn. in Zam. po Sist. i Geogr. Rast. Tbil. 21 (1959) 58; in Fl. Gruzii, VIII (1952) 584, diagn. georgica.—*lc.*: Sosn. op. cit. (1952) Plate 425.

Perennial. Plants 15–30 cm high, appressed whitish-tomentose. Stems quite numerous, upright, but often ascending at base, terminating in single capitulum on long leafless peduncle. Basal leaves quite long-petiolate, lyrate-pinnately parted or some undivided, white-tomentose beneath, dark green above from thin arachnoid-hairy tomentum; lateral leaflets or lobes 1–3 on each side, almost round; terminal lobe considerably larger; cauline leaves few, strongly reduced. Involucre 10–15 mm in dia; appendages of involucre bracts large, almost entirely covering bracts, with very tiny teeth (to 0.2–0.3 mm long), but often divided. Florets pink (or lilac, according to original description). Achenes as in previous species. Flowering May to July.

Rocks, up to mid-montane zone.—*Caucasus*: Western Transcaucasia (Kutaisi area). Endemic. Described from Georgia. Type in Tbilisi.

Note. The separateness of this species needs to be confirmed with more extensive material.

99. *C. bagadensis* Woron. in Tr. Peterb. Obshch. Est. XXXIV (1905) 31; Grossh. Fl. Kavk. IV, 212 and Opred. Rast. Kavk. 496; Sosn. in Fl. Gruzii, VIII (1952) 584.—*C. frickii* Fisch. and Mey. ex Sosn. *ibid.* pro syn.

Perennial. Plants to 30–40 cm high, appressed whitish-tomentose. Stems rather numerous, less often solitary, upright, simple or with 1–2 branches at base, terminating in single capitulum on long leafless
491 peduncle. Basal leaves rather long-petiolate, pinnately parted, lobed or some undivided and entire, whitish-tomentose on both sides (but above with thinner layer of tomentum), lateral leaflets or lobes 1–3 on each side, ovate or broadly elliptical, entire or almost entire, usually smaller than terminal leaflet (or lobe); cauline leaves few, strongly reduced with narrower lobes. Involucre 10–14 mm in dia and 15–20 mm long;

appendages of involucre bracts large, almost entirely covering bracts, almost entire but often divided, with broad semitransparent part. Florets pink. Achenes 4–5 mm long; pappus 8–10 mm long, inner pappus $1/5-1/3$ as long as outer. Flowering May to July.

Limestone rocks, in middle montane zone.—*Caucasus*: Western Transcaucasia (northern part). Endemic. Described from Abkhazia. Type in Tbilisi; isotype in Leningrad.

100. *C. simplicicaulis* Boiss. and Huet in Boiss. Diagn. pl. or ser. II, 3 (1856) 67; Boiss. Fl. or. III, 625; Grossh. Fl. Kavk. IV, 212 and Opred. Rast. Kavk. 496.

Perennial. Plants to 30–40 cm high, appressed whitish-tomentose. Stems rather numerous, less often solitary, upright (but at base often ascending), simple, terminating in single capitulum on long leafless peduncle. Basal leaves rather long-petiolate, pinnately parted or lobed, sometimes some undivided and subentire, whitish tomentose beneath, dark green above, thinly arachnoid-hairy tomentose; lateral leaflets or lobes 1–3 on each side, elliptical to almost round, terminal leaflet (or lobe) usually only slightly larger than lateral ones; cauline leaves few, strongly reduced, with narrower lobes. Involucres 12–15 mm in dia and 18–20 mm long; appendages of involucre bracts large, almost entirely covering bract, with very tiny teeth (0.4–0.6 mm long, changing into short fimbriae), often divided, with broad semitransparent part. Florets light pink. Achenes 3.5–4.0 mm long; pappus 7–9 mm long, inner pappus $1/6-1/4$ as long as outer. Flowering May to July.

Stony slopes, rocks; in middle montane zone.—*Caucasus*: Western Transcaucasia (southwestern part?). *General distribution*: Armenia and Kurdistan (northwestern part). Described from Turkey (Ispir area). Type in Geneva; isotype in Leningrad.

Note. Probably by mistake, this species was reported by A.A. Grossheim for Abastumani (Georgia) instead of *C. adjarica*. Apparently, it is found only in Turkey, in the area of Ispir and Oltu, replacing here the very similar Transcaucasian species *C. bella*.

101. *C. dimitriewiae* Sosn. in Zam. po Sist. i Geogr. Rast. Tbil. 21 (1959) 59; in Fl. Gruzii, VIII (1952) 586, diagn. geogica.

492 Perennial. Plants to 30–40 cm high, appressed whitish-tomentose. Stems rather numerous, less often solitary, upright, simple or with 1–3 branches at base, like main stem terminating in single capitulum on long leafless peduncle. Basal leaves rather long-petiolate, outer ones undivided and subentire, obovate or ovate, others pinnately parted or lobed, with lateral leaflets or lobes elliptical to almost round, 1–3 on each side, terminal leaflet usually slightly larger than lateral ones,

all whitish-tomentose beneath; cauline leaves strongly reduced, with narrower lobes. Involucres 8–14 mm in dia and 14–18 mm long; appendages of outer and middle involucre bracts short-fimbriate or toothed, often divided, with rather broad semitransparent part; appendages of innermost bracts larger, 4–5 mm wide. Florets pink. Achenes about 3.5–4.0 mm long; pappus 5–7 mm long, inner pappus almost entirely reduced. Flowering April to July.

Rocks; in middle montane zone.—*Caucasus*: Western Transcaucasia (Adzharian ASSR). Endemic. Described from Adzharie-Tskhali Ravine. Type in Tbilisi.

Note. In the size of the appendages, this species occupies an intermediate position between *C. simplicicaulis* and *C. adjarica*, being closer to the latter.

102. *C. adjarica* Alb. in Bull. Herb. Boiss. II (1894) 639; Grossh. Fl. Kavk. IV, 212 and Opred. Rast. Kavk. 496; Sosn. in Fl. Gruzii, VIII, 585.—*C. koenigii* Sosn. in Vestn. Tifl. Bot. Sada, XLIX (1920) 38.

Perennial. Plants to 30–40 cm high, appressed whitish-tomentose. Stems rather numerous, less often solitary, upright, simple or with 1–3 branches near base, like main stem terminating in single capitulum on long leafless peduncle. Basal leaves rather long-petiolate pinnately parted or lobed, appressed whitish-tomentose beneath, grayish-green above from very thin arachnoid-hairy tomentum, lateral leaflets or lobes ovate or oblong-elliptical, 1–4 on each side, terminal leaflets usually only slightly larger than lateral ones, outer leaves of rosette often partly undivided and entire; cauline leaves strongly reduced. Involucres 8–12 mm in dia and 14–16 mm long; appendages of outer and middle involucre bracts relatively small, not covering larger part of bract, short-fimbriate or with remote teeth at apex, often divided; 493 appendages of innermost involucre bracts not large, 1.5–3.0 mm wide. Florets pink. Achenes 3.5–4.0 mm long; pappus 5–7 mm long, inner pappus 1/6–1/5 as long as outer, sometimes strongly reduced. Flowering May to June.

Rocks, stony slopes; in middle montane zone.—*Caucasus*: Western Transcaucasia (southwestern part). *General distribution*: Armenia and Kurdistan (northwestern part). Described from Turkey (Artvin area). Type in Geneva.

Note. This species has previously been confused with *C. simplicicaulis*, for which its smaller plants were taken to be. In the USSR, *C. adjarica* is known so far only from the Abastumani area (specimens in the Herbarium of the Botanical Institute of the Academy of Sciences of the Georgian SSR).

Section 2. Albovia Tzvel. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX (1959) 421.—Appendages of involucre bracts weakly bulged, subacute or with spine, pectinate-ciliate. Stems basally more or less woody, with strongly reduced but numerous, almost coriaceous leaves.

Type of section: *C. pecho* Alb.

103. *C. pecho* Alb. in Bull. Herb. Boiss. II (1894) 639; Grossh. Fl. Kavk. IV, 215.

Perennial. Plants to 30–40 cm high. Stems upright, but often at base ascending, divaricately branched in lower half with divergent branches terminating in single capitulum on long almost leafless peduncle. Leaves almost coriaceous, white-tomentose beneath, dark green above, usually with somewhat crimped, more or less convolute margin; basal leaves pinnately parted, lyrate, or undivided, cauline ones reduced but rather numerous, mostly undivided, oblong, gradually narrowed into short petiole, at apex usually short-cuspidate. Appendages of involucre bracts ovate to almost round, pectinate-ciliate (cilia 0.7–1.5 mm long). Florets pink. Achenes 4–5 mm long, with 6–7 mm long-pappus. Flowering June to July.

Stony slopes, rocks; up to middle montane zone.—May be found in extreme southwest of Transcaucasia. *General distribution*: Armenia and Kurdistan (Artvin area). Described from Turkey. Type in Geneva.

Subgenus 14. Lopholoma (Cass.) Dobroc. in Bot. Zhurn. Akad. Nauk, URSS, VI, 2 (1949) 64.—*Lopholoma* Cass. in Dict. Sc. nat. XLIV (1826) 37.—*Acrocentron* Cass. *ibid.*—*Centaurea* sect. *Acrocentron* (Cass.) DC. Prodr. VI (1837) 586, emend. Boiss. Fl. or. III (1875) 617; Tzvelev in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX (1959) 430.—*Centaurea* sect. *Lopholoma* (Cass.) DC. *op. cit.* 580.—Capitula medium- or rather large-sized, with many florets, solitary at tips of main stem and lateral branches. Involucre ovate to subglobose, (9) 12–30 (35) mm in dia, glabrous or more or less thin tomentose (or papillate); involucre bracts coriaceous, greenish, lacking conspicuous veins or with 5–9 rather inconspicuous veins, gradually enlarged from semicircular and broadly ovate outer to oblong innermost; appendages of involucre bracts thin-coriaceous or membranous, more or less decurrent on bracts (but not beyond middle or one-third), usually as more or less broad pectinate ciliate border, often terminating in spine or prickle at apex, less often appendages large (sometimes even larger than bract), broadly lanceolate to almost round, also ciliate or fimbriate, sometimes almost absent, and then involucre bracts terminating in short spine and few, not always ciliate along

margin. Florets yellow, pink, or dark red, 1.5–2.0 times as long as involucre, heterogeneous; central florets bisexual, peripheral ones sterile, lacking staminodes, usually like central, tubular, not enlarged or even reduced, less often noticeably enlarged, and then tubular-infundibuliform; stamen filaments dorsally flattened and covered with papilliform hairs; stigma reduced, weakly short-bilobed. Achenes 3–7 mm long, hairy, less often subglabrous; pappus as long as or longer than achene, less often (in *C. sterophylla* Bess.) 1/3–1/2 as long, whitish or brownish, double; outer pappus consisting of several irregular rows of flattened bristles, scabrous on two sides, gradually elongated from very short outer to middle and inner ones; inner pappus as long as outer or shorter, sometimes (in *C. kotschyana* Heuff.) entirely reduced, consisting of one row of thicker and obtuse, scale-like bristles, erose-ciliate or weakly scabrous along margin in upper part or almost throughout. Perennial (but usually surviving a few years or even biennial) herbs with string-like root and upright, more or less branched, stems; leaves more or less long-petiolate or sessile, more or less crisped-hairy or papillose, sometimes mixed with thin tomentum or subglabrous, pinnately parted or lobed, less often (in *C. integrifolia* Tausch) undivided and subentire, with or without inconspicuous punctate glands.

Type of subgenus: *C. scabiosa* L.

The subgenus includes over 80 species distributed in Europe, northern Africa, and a large part of Asia (except the southwestern part and extreme north). Sixteen species have been found in the USSR.

1. Pappus almost as long as achene or longer 2.
 + Pappus 1/3–1/2 as long as achene; florets pale pink, less often yellowish; appendages of involucre bracts triangular-lanceolate 119. *C. sterophylla* Bess.
- 496 2. Florets yellow 3.
 + Florets pinkish or red, less often whitish (albinos) 7.
3. Outer and middle involucre bracts at apex with rather large, yellowish or brownish apical appendage, terminating in short spine or without it 4.
 + Outer and middle involucre bracts at apex with narrow pectinate-ciliate border, often changing into spine or prickle 5.
4. Appendages of involucre bracts yellowish or brownish-yellow, very large, almost covering bracts; florets yellow 108. *C. orientalis* L.
 + Appendages of involucre bracts brownish or dark-brown, triangular, smaller, not covering bracts; florets pale yellow or pink *C. rigidifolia* Bess. (cf. note to *C. orientalis* L.).
5. Involucre bracts at apex lacking prickle or with short spine 0.8(1)



- cm long, lateral cilia to 1.0–1.5 mm long 104. *C. salonitana* Vis.
- + Middle involucre bracts at apex with spine, more than 1 cm long, lateral cilia usually longer (1–6 mm) 6.
6. Spine of middle involucre bracts 1.5–3.5 cm long, thick (near base 2.5–6.0 mm thick), concave above, longitudinally grooved; involucre 20–30 mm in dia 107. *C. sosnovskyi* Grossh.
- + Spine of middle involucre bracts 1–3 cm long, thinner (usually to 1.5–2.0 mm thick at base), flat or convex above; involucre 15–23 mm in dia 106. *C. reflexa* Lam.
7. Florets dark red 8.
- + Florets pink of various shades, less often reddish 9.
8. Involucre bracts with very large (almost entirely covering them), blackish-brown appendages; capitula always solitary; pappus simple 109. *C. kotschyana* Heuff.
- + Appendages of involucre bracts in form of very narrow brownish border; stems usually many-headed; pappus double 105. *C. rubriflora* Illar.
9. All leaves undivided and entire, less often with 1–2 small lobes near base 111. *C. integrifolia* Tausch.
- + Leaves pinnately parted or lobed, less often lower ones entire 10.
10. Appendages of middle involucre bracts at apex with recurved spine, 7–40 mm long, brownish 11.
- + Appendages of involucre bracts at apex lacking spine or with very short spine to 5–7 mm long, usually dark brown or almost black 12.
- 497 11. Apical spines of middle involucre bracts 7–16 mm long, thinner, flat or convex above (Transcaucasia) 117. *C. carduiformis* DC.
- + Apical spines of middle involucre bracts 15–40 cm long, thick, usually concave above, longitudinally grooved 118. *C. sintenisiana* Gand.
12. Appendages of middle involucre bracts rather large, (1.8)2.0–4.0(6.0) mm long, excluding part decurrent on bract margin; peripheral florets distinctly enlarged 13.
- + Appendages of middle involucre bracts very small, to 1.5(1.8) mm long, excluding part decurrent on bract margin and apical spinule; peripheral florets not surpassing middle 15.
13. Appendages of middle involucre bracts at apex with short recurved spine (or spinule) 2.5–6.0 mm long (Transcaucasia) 116. *C. glehnii* Trautv.
- + Appendages of middle involucre bracts at apex lacking spine, rarely

- with straight spinule to 2 mm long 14.
14. Achenes 5–6 mm long, with pappus 4.5–6.0 mm long (Caucasus) 112. *C. ossethica* Sosn.
 + Achenes 3.5–4.5 mm long, with pappus 4–5 mm long (forest zone of European part of the USSR and Siberia)
 110. *C. scabiosa* L.
15. Appendages of middle involucre bracts at apex with short recurved spine or spinule 2–6 mm long; achenes 5.0–6.5 mm long, with pappus 6–8 mm long (Southern Transcaucasia)
 115. *C. pseudoscabiosa* Boiss. and Buhse
 + Appendages of middle involucre bracts at apex lacking spine, sometimes with spinule to 2 mm long, but then achenes smaller (3.5–4.5 mm long) 16.
16. Involucre bracts at apex lacking or with very small appendage to 0.8(1.0) mm long, usually with few very short cilia along margin (steppe and semi-steppe zone) 114. *C. adpressa* Ldb.
 + Involucre bracts with apical appendage, 0.8–1.5 mm long, with fairly long cilia along margin (mostly plants of forest-steppe zone) 113. *C. apiculata* Ldb.

Section 1. Acrocentron (Cass.) DC. Prodr. VI (1837) 586. p. p.—*Centaurea* sect. *Acrocentron* **Euacrocentrae flaviflorae* Boiss. Fl. or. III (1875) 618.—Florets yellow, less often dark red; involucre bracts with apical appendages in form of narrow, more or less pectinate-ciliate border, often terminating in cusp or spine; achenes with more or less equally long double pappus.

Type of section: *C. collina* L.

- 498 104. *C. salonitana* Vis. in Flora, XII, 1 (1829) 23; Boiss. Fl. or. III, 666; Schmalh. Fl. II, 127; Grossh. Fl. Kavk. IV, 217 and Opred. Rast. Kavk. 499.—*C. centauroides* auct. non L.: MB. Fl. taur.-cauc. II (1808) 359; Ldb. Fl. Ross. II, 2, 708.—*C. latisquama* DC. Prodr. VI (1837) 589.—*C. pelia* auct. non DC.: Stank. and Tal. Opr. Vyssh. Rast. (1949) 676.—*Acrocentron salonitanum* (Vis.) A. and D. Löve in Bot. Notis. CXIV, 1 (1961) 44.—*lc.*: Vis. Fl. Dalm. II (1847) tab. 13; Rchb. 1c. Fl. Germ. XV (1852) tab. 793; Fedtsch. and Fler. Fl. Evrop. Ross. Fig. 1050; Prod. Fl. Roman II (1923) tab. 35; Stojan. and Stef. Fl. Bulg. (1925) 1187; Javorka and Csapody, Iconogr. Fl. Hung. (1933) 550, fig. 3941.—*Exs.*: Fl. Dalm. exs. No. 89; Schultz. Herb. norm. nov. ser. No. 1595; Fl. exs. austro-hung. No. 235; Hayek, Cent. exs. crit. No. 10; GRF No. 572.

*Asterisk not explained in the original—General Editor.

Perennial. Plants to 80–100 cm high, with short, crisped and papiliform hairs, often mixed with arachnoid-hairy tomentum, more or less scabrous, green. Stems solitary or few, upright, more or less branched. Leaves bipinnately parted to pinnately lobed, lower ones rather long-petiolate, usually with longer and denser hairs, uppermost leaves sessile, sometimes with undivided and entire lamina; lateral segments or lobes oblong to almost linear, terminal segment usually not larger than lateral ones. Capitula usually aggregated in corymbs. Involucre 13–20 mm in dia and 18–25 mm long, glabrous or subglabrous; outer and middle involucral bracts short-ciliate in upper half (usually cilia to 1 mm long), obtuse, rounded, with short spine or with recurved spine to 1 cm-long; innermost involucral bracts with almost round or kidney-shaped membranous apical appendage. Florets yellow, peripheral ones not enlarged. Achenes sparsely short-hairy, 4–5 mm long; pappus whitish or smoky, 7–9 mm long, scale-like bristles of inner pappus 1/4–1/3 as long as longest outer pappus bristles. Flowering June to August.

Steppes, slopes, often as weed in wastelands, near roads.—*European Part*: Bessarabia, Black Sea Region, Lower Don (western part), Crimea; *Caucasus*: Ciscaucasia (western part), Western Transcaucasia (in Novorossiisk area). *General distribution*: Central Europe (south eastern part), Balkans. Described from Yugoslavia (Dalmatia). Type in Padua.

Note. On the southern coast of Crimea (especially near Sudak) and on the Taman Peninsula, together with the typical form with relatively short spines or entirely without them, one finds plants with longer spines.—*C. salonitana* var. *macracantha* (DC.) Boiss. and Heldr. in Boiss. *Diagn. Pl. or. ser. II*, 3 (1856) 78. This variety apparently is a weakly separated, more southern, ecogeographical race, intimately related to typical *C. salonitana*. The known hybrids are: *C. salonitana* × *C. orientalis* and *C. salonitana* × *C. adpressa*.

105. **C. rubriflora** Illar. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVIII (1957) 309.—*C. salonitana* var. *purpurea* Ferm. ex Stojan. and Stef. Fl. na B'lg. ed. 3 (1948) 1203.

499 Perennial. Plants to 20–30 cm high, with short, crisped and papiliform hairs, more or less scabrous, green. Stems solitary, upright, with few lateral branches. Leaves pinnately parted to lobed, uppermost sessile, undivided, lower ones fairly long-petiolate; lateral segments or lobes oblong, entire, terminal lobe usually not larger than lateral ones. Involucre 15–22 mm in dia and 22–24 mm long, glabrous or subglabrous; outer and middle involucral bracts short-ciliate in upper half, at apex with short, recurved spine; innermost bracts with almost

round, short, and irregularly fimbriate apical appendage. Florets dark red. Achenes sparsely short hairy, 4.5–5.0 mm long, pappus 5–9 mm long. Flowering June to August.

Stony slopes, along roads, up to lower montane zone.—*European Part*: Crimea (southeastern part). *General distribution*: Balkans (northeastern part). Described from Crimea (Karadag Mountain). Type in Leningrad.

Note. Possibly this is a color variant of the previous species and needs confirmation on the basis of more extensive material.

106. *C. reflexa* Lam. Encycl. meth. I (1783) 675; MB. Fl. taur.-cauc. II, 359; DC Prodr. VI, 589 p. p.; Ldb. Fl. Ross. II, 2, 708 p. p.; Boiss. Fl. or. III, 667 p. p.; Grossh. Fl. Kavk. IV, 218 and Opred. Rast. Kavk. 499.

Perennial or biennial. Plants to 70–80 cm high; with short, crisped and papilliform hairs, often mixed with arachnoid tomentum, more or less scabrous, green or grayish-green. Stems solitary, erect, branched mostly in upper part. Lower leaves rather long-petiolate, pinnately parted, less often lobed, upper fewer, strongly reduced, sessile; lateral segments or lobes linear to oblong, more or less pinnately lobed, less often undivided; terminal segment not larger than lateral ones. Capitula often aggregated in corymbs. Involucre 15–23 mm in dia, 18–27 mm long, glabrous or subglabrous; outer and middle involucre bracts in upper half pectinate-ciliate (with 1–4 mm-long cilia), terminating in recurved spine, 1–3 cm long and up to 1.5–2 mm thick (at base) in middle bracts; upper (inner) surface of spine convex or flat; innermost involucre bracts oblong, with almost round membranous, long-fimbriate apical appendage. Florets yellow, peripheral ones not enlarged. Achenes 4–5 mm long, with rather dense, connate hairs; pappus 7–9 mm long, whitish or weakly smoky; scale-like inner pappus bristle 1/4–1/3 as long as longest outer pappus bristle. Flowering June to July.

Steppes, on stony slopes; up to lower montane zone.—*Caucasus*: Dagestan (southern part), Eastern Transcaucasia (Kura River basin), Western Transcaucasia. Endemic. Described from “East” (“Levant”) without precise mention of locality, probably from Georgia. Type in Paris.

500 **Note.** Apparently, it splits up into several, still inadequately studied ecogeographical races, differing mostly in the form and nature of the pubescence of the leaves, as well as the length of the cilia of the involucre bracts. The hybrid *C. reflexa* × *C. adpressa*, which usually shows the normal development of achenes, is, known from Dagestan.

107. *C. sosnovskiyi* Grossh. in Beih. Bot. Centralbl. XLIV (1928) 246; Fl. Kavk. IV, 218 and Opred. Rast. Kavk. 499.—*C. reflexa* auct. non Lam.: C.A.M. Verzeichn. (1831) 65; DC. Prodr. VI, 589 p. p.; Ldb. Fl. Ross. II, 2, 708 p. p.; Boiss. Fl. or. III, 667 p. p.—*C. reflexa* var. *macracantha* C. Koch in Linnaea, XXIV (1851) 429.—*C. reflexa* var. *grandiflora* Grossh. in Tr. Tifl. Bot. Sada, Nov. Ser. 1 (1920) 41.

Perennial. Plants to 70–80 cm high, with crisped and papilliform hairs, sometimes mixed with arachnoid tomentum, more or less scabrous, green or somewhat grayish. Stems solitary, upright, usually with few lateral branches, often simple. Lower leaves rather long-petiolate, pinnately parted, upper ones fewer, strongly reduced, sessile or subsessile; lateral segments linear to oblong, pinnately lobed or undivided; terminal segment not longer than laterals. Capitula solitary or aggregated in lax corymb. Involucre 20–30 mm in dia and 20–28 mm long, glabrous or subglabrous; outer and middle involucral bracts in upper half pectinate-ciliate (cilia 2–6 mm long), terminating in long spine, 1.5–3.5 mm long and 3–6 mm wide (at base) in middle bracts; upper (inner) surface of spine concave; innermost bracts ovate-oblong, with almost round, pectinate-fimbriate appendage. Florets yellow, peripheral ones not large. Achenes 5–6 mm long, with rather dense, appressed hairs; pappus 8–10 mm long, whitish, scale-like inner pappus bristles $1/4$ – $1/3$ as long as longest outer pappus bristle. Flowering June to July. (Plate XXV, Fig. 2.)

Stony slopes, rocks; up to lower montane zone.—*Caucasus*: Eastern Transcaucasia (southern part), Southern Transcaucasia, Talysh. *General distribution*: Armenia and Kurdistan. Described from Nakhichevan ASSR (between Ordubad and village of Magri). Type in Tbilisi.

Note. It is not ruled out that the name *C. reflexa* Lam. pertains to this and not the previous species.

Section 2. Orientales (Hayek) Tzvel. comb. nova.—*Centaurea* sect. *Acrocentron* D. *Orientales* Hayek, *Centaurea*-Art. Österr.-Ung. (1901) 53.—*Centaurea* sect. *Acrocentron* subsect. *Orientales* (Hayek) Tzvel. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX (1959) 433.—Capitula yellow, less often dark red; involucral bracts with very large, lanceolate, ovate or roundish, weakly decurrent apical appendage, ciliate or fimbriate, and often terminating in a short cusp; achenes with more or less as long pappus; pappus double or simple (because of reduction of inner pappus).

Type of section: *C. orientalis* L.

108. *C. orientalis* L. Sp. pl. (1753) 913; MB. Fl. taur.-cauc. II, 351 and III, 592; DC. Prodr. VI, 587; Ldb. Fl. Ross. II, 2, 707; Boiss. Fl. or. III, 666; Schmalh. Fl. II, 127; Grossh. Fl. Kavk. IV, 217 and Oprel. Rast. Kavk. 499.—*C. coelolepis* Fisch. and Mey. ex Heynh. Nomen. bot. hort. II (1846) 130, nom. nud.—*Acrocentron orientale* (L.) A. and D. Löve in Bot. Notis. CXIV, 1 (1961) 44.—**lc.**: Rchb. Ic. Fl. Germ. XV (1852) tab. 790; Fedtsch. and Fler. Fl. Evrop. Ross. Fig. 1048; Stojan. and Stef. Fl. Bulg. 1183; Javorka and Csapody, Iconogr. Fl. Hung. (1933) 550, fig. 3942.—**Exs.**: Fl. exs. austro-hung. No. 656; Fl. cauc. exs. No. 175.

Perennial. Plants to 80–100 cm high, with very short papilliform hairs, sometimes mixed with thin arachnoid-hairy-tomentum, more or less scabrous, green. Stems solitary or few, upright, usually with few lateral branches. Leaves pinnately parted or lobed, sometimes some bipinnately incised, except uppermost rather long-petiolate; lateral leaf segments oblong to narrowly linear, sessile or basally narrowed into petiolule, entire or irregularly toothed, subacute, sometimes with short spinule; terminal segment often longer than lateral ones. Capitula solitary or less numerous at tips of stems and lateral branches. Involucre 15–24 mm in dia and 17–25 mm long, glabrous; appendages thin-coriaceous, brownish-yellow or yellowish, weakly decurrent, almost covering bract, broadly lanceolate to almost round in outer bracts, pectinate-ciliate (cilia shorter than width of appendage), usually with upto 2–3 mm-long apical spinule, considerably smaller in innermost bracts, almost round, short-fimbriate, lacking spinule. Florets yellow, peripheral ones almost not enlarged. Achenes 4–5 mm long, hairy; pappus almost as long as achenes, usually with brownish-gray (smoky) tinge; inner pappus bristles scale-like, 1/5–1/4 as long as longest outer pappus bristle. Flowering June to September.

Steppes, stony slopes; up to lower montane zone.—*European Part*: Middle Dnieper, Volga-Don (southern part), Bessarabia, Black Sea Region, Lower Don, Crimea; *Caucasus*: Ciscaucasia. *General distribution*: Central Europe (southeastern part), Balkans (northern part). Described from European part of USSR (“hab. in Sibiria”). Type in London.

Note. Two varieties of this species are known: *C. orientalis* var. *brachylepis* Fisch. and Mey. *Ind. Sem. hort. Petrop.* VII (1840) 44—with obtuse appendages on the lower and middle involucre bracts and a terminal spinule no longer than the lateral cilia, and *C. orientalis* var. *macrolepis* Fisch. and Mey. loc. cit. 44—with elongated, more or less broadly lanceolate appendages on the lower and middle involucre bracts and a prickly terminal spinule distinctly longer than the lateral cilia. Although their ranges almost overlap, the second variety, on the

average, is more southern and typical of arid localities, constituting a separate but morphologically very weakly distinguished, ecogeographical race.

C. orientalis easily hybridizes with other species of the genus, especially with *C. apiculata* Ldb., *C. pseudomaculosa* Dobroc., and *C. salonitana* Vis. The more common fertile hybrids of *C. apiculata* Ldb. × *C. orientalis* L. (cf. E.M. Lavrenko in *Bot. Mat. Gerb. Glavn. Bot. Sada*, IV, 1923, 33–38) are known under the following names: *C. rigidifolia* Bess. in DC. Prodr. VI (1837) 587.—*C. rubescens* Bess. in DC. op. cit. 587.—*C. calocephala* auct. fl. Ross. non Willd.—*C. orientalis* L. var. *calocephala* Schmalh. *Fl. Yugo.-Zap. Ross.* (1886) 335.—*C. orientalis* L. var. *rubescens* (Bess.) Schmalh. op. cit. 335.—Stem and leaves as in *C. orientalis* but pubescence usually much stronger. Involucre 15–25 mm wide; appendages of outer and middle involucral bracts more or less triangular-lanceolate, pectinate-ciliate, with apical spine, various shades of brown but usually darker than in *C. orientalis* and lighter than in *C. apiculata*; florets pale yellow, more rarely pinkish (*C. rubescens* Bess.); achenes as in *C. orientalis* but smaller, 3.5–4 mm long; pappus 4–5 mm long.

109. *C. kotschyana* Heuff. in *Flora XVIII*, 1 (1835) 245; Dobroc. in *Vizn. Rosl. URSR*, 581.—*C. heuffelii* Rchb. fil. in *Rchb. Ic. Fl. Germ.* XV (1852) 27.—*Acrocentron kotschy anum* (Heuff.) A. and D. Löve in *Bot. Notis.* CXIV, 1 (1961) 44.—**Ic.:** *Rchb. Ic. Fl. Germ.* XV (1852) tab. 775 and 801; *Prod. Fl. Roman.* I (1923) 1095 and *Cent. Roman.* (1930) tab. 3; *Stojan. and Stef. Fl. Bulg.* (1925) 1183; *Javorka and Csapody, Iconogr. Fl. Hung.* (1933) 550, fig. 3945.—**Exs.:** *Fl. exs. austro-hung.* No. 3428; *Hayek, Cent. exs. crit. fasc. II*, No. 65; *Fl. exs. reip. Bohem.-Sloven.* No. 383; *Fl. Cechoslov. exs.* No. 97.

Perennial. Plants to 80–100 cm high, with short papilliform hairs mixed with crisped hairs and thin arachnoid-hairy-tomentum, weakly scabrous, green. Stems usually solitary, upright, simple, less often with 1–2 lateral branches. Leaves pinnately parted or lobed, lower ones rather long-petiolate, sometimes undivided and then toothed, upper leaves sessile; lateral segments or lobes oblong to lanceolately linear, usually more or less toothed or lobed, acuminate; terminal segment often larger than lateral ones. Capitula usually solitary. Involucre 22–35 mm in dia and 20–27 mm long, subglabrous; appendages of outer and middle involucral bracts very large, entirely covering bracts, thin-coriaceous, weakly decurrent, oblong-ovate, blackish-brown, long finbricate-ciliate (cilia to 6–7 mm long, usually much lighter in color than appendages). Florets dark red, peripheral ones almost not enlarged. Achenes about 5 mm long, sparsely hairy (to subglabrous);

pappus 3–4 mm long, consisting of numerous irregular bristles of identical structure. Flowering June to August. (Plate XXV, Fig. 1).

Mountain meadows, in upper montane zone.—*European Part*: Upper Dniester. *General distribution*: Central Europe (southeastern part), Balkans (northern part). Described from Carpathian Mountains. Type in Vienna.

Note. This species very closely approaches *C. orientalis* through another high-mountain centaury species, *C. atripurpurea* Willd.

Section 3. Lopholoma. —*Centaurea* sect. *Lopholoma* (Cass.) DC. Prodr. VI (1837) 580 p. p.—*Centaurea* sect. *Acrocentron* C. Lopholomae Hayek. *Centaurea*-Art. Österr.-Ung. (1901) 34.—Florets various shades of purple; involucre bracts with apical appendages of different sizes and forms (from broadly ovate to very narrow, sometimes almost lacking border) but always strongly decurrent on bracts, pectinate-ciliate, terminating in short or long spine; achenes with more or less as long double pappus.

Type of section: type of subgenus.

Series 1. Scabiosiformes Dobroc. in Ukr. Bot. Zhurn. XIX, 1 (1962) 43, descr.; in Bot. Zhurn. Akad. Nauk URSS, IV, 3–4 (1948) 78, nomen.—Polycarpic plants surviving few years, with not thick roots. Appendages of involucre bracts lacking spine, less often with spine to 5 mm long.

110. *C. scabiosa* L. Sp. pl. (1753) 913; MB. Fl. taur.-cauc. II, 350 p. p.; DC. Prodr. VI, 580 p. p.; Ldb. Fl. Ross. II, 2, 700 p. p.; Boiss. Fl. or. III, 655 p. p.; Schmalh. Fl. II, 126 p. p.; Grossh. Fl. Kavk. IV, 218 p. p.; Kryl. Fl. Zap. Sib. XI, 2960 p. p.—*C. coriacea* Waldst. and Kit. Descr. et icon. pl. rar. Hung. II (1805) 214.—*Acrocentron scabiosa* (L.) A. and D. Löve in Bot. Notis. CXIV (1961) 44.—**lc.**: Waldst. and Kit. loc. cit. tab. 195; Rchb. Ic. Fl. Germ. XV (1852) tab. 774; Fedtsch. and Fler. Fl. Evrop. Ross. Fig. 1046; Syreistsch. Ill. Fl. Mosk. Gub. III (1910) 315; Prod. Fl. Roman. I (1923) 1095; Hegi, Ill. Fl. VI, 2 (1929) Taf. 273, fig. 3; Javoroka and Csapody, Iconogr. Fl. Hung. (1933) 550, fig. 3950.—**Exs.**: Fl. Bohem. and Morav. exs. No. 1164; Fl. exs. austrohung. No. 972; Pl. Finl. exs. No. 995; GRF No. 1619.

Perennial. Plants to 80–100 cm high, with short papilliform hairs mixed with crisped hairs and thin arachnoid-hairy-tomentum, more or less scabrous, green. Stems solitary or few, upright, more or less branched mostly in upper part. Leaves pinnately parted or lobed, sometimes some bipinnately incised, lower rather long-petiolate, upper ones strongly reduced, partly sessile; lateral segments oblong to linear,

504 terminal one usually not much larger than lateral ones. Involucre (11) 13–22(25) mm in dia and 17–23 mm long, glabrous or thinly arachnoid-hairy tomentose; appendages of outer and middle involucre bracts thin-coriaceous, obtuse triangular, (1.8)2–6 mm long (excluding border, decurrent on bract), blackish-brown or almost black, pectinate-ciliate, with 0.8–2.5 mm long cilia, usually lighter in color than appendage, often with apical spine or cusp; appendages of innermost bracts almost round, membranous, brownish, fimbriate-ciliate. Florets various shades of pink, peripheral ones slightly large. Achenes 3.5–4.5 mm long, sparsely short-hairy; pappus 4–5 mm long, whitish with brownish-gray tinge, scale-like inner pappus bristles 1/5–1/4 as long as largest outer pappus bristles. Flowering June to September.

Meadows, scrubs, along roads; up to mid-montane zone.—*European Part*: Karelia-Lapland (southern part), Dvina-Pechora, Volga-Kama, Baltic Region, Ladoga-Ilmen, Upper Dnieper, Upper Volga, Upper Dniester, Middle Dniester (northern part), Volga-Don (rarely), Trans-Volga (rarely); *Western Siberia*: Ob (southern part), Upper Tobol, Irtysh, Altai; *Eastern Siberia*: Angara-Sayans. *General distribution*: Atlantic Europe, Scandinavia, Central Europe, Balkans (northern part). Described from northern Europe. Type in London.

Note. It varies greatly in the shape of the leaves, pubescence, and size of the appendages of the involucre bracts (the appendages, as a rule, gradually reduce from northwest to southeast), which has led to the description of a whole series of varieties and forms of this species. These, in our opinion, do not merit special names. However, mention must be made of *C. scabiosa* var. *malenocephala* Rupr. (in *Beitr. Pflanzenk. Russ. Reichs.* IV [1845] 81), from the northwest of the European part of the USSR (vicinity of Leningrad, Lake Onega), with especially large, long-ciliate appendages almost covering the bracts. This variety resembles *C. alpestris* Hegetschw. (in Hegetschw. and Heer, *Fl. Schweiz.* [1840] 854), found in the Alps and the Carpathians (Tatry), and is close to *C. scabiosa*; however, it can hardly be identified with it. On the limestones of the Velikaya River near Pskov, there are plants with almost entire leaves that approach the next species.

111. *C. integrifolia* Tausch in *Flora*, XI, 31 (1828) 485; Tzvelev in *Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XIX, 435.—*C. scabiosa* var. *integrifolia* Korsch. *Tent. Fl. Ross. Or.* (1898) 242; Kryl. *Fl. Zap. Sib.* XI, 2961, non Lindem. (1872).—*Ic.*: Gmel. *Fl. sibirica*, II (1749) tab. 42, fig. 1.

Perennial. Plants to 100–120 cm high, with short papilliform hairs mixed with crisped hairs and thin arachnoid-hairy-tomentum, green.

505 Stems solitary or fewer, upright, more or less branched in upper part. Leaves undivided and entire, oblong; lower and middle ones gradually narrowed toward base into rather long petiole, acuminate or subobtusate, upper ones sessile or subsessile, sometimes with 1–2 small lobes at base of lamina. Involucre 12–20 mm in dia and 17–22 mm long, glabrous or finely arachnoid-hairy-tomentose; appendages of outer and middle involucre bracts thin-coriaceous, obtuse, triangular, 1.8–4.0 mm long (excluding border decurrent on bracts), blackish-brown or almost black, with brownish cilia 0.8–1.5 mm long, usually lacking apical spine. Florets pink, peripheral ones slightly large. Achenes 3.5–4.5 mm long, sparsely short-hairy; pappus 4–5 mm long, usually with brownish-gray tinge, scale-like inner pappus bristles 1/6–1/4 as long as largest outer pappus bristles. Flowering June to September.

Birch forests, glades, meadows; up to mid-montane zone.—*European Part*: Volga-Kama (southeastern part), Trans-Volga (eastern part); *Western Siberia*: Ob Region (southwestern part), Upper Tobol. Endemic. Described from Siberia. Type in Berlin.

Note. A distinct Ural-Siberian race, possibly a mutant but with a very well marked range. A quite large number of specimens is available in the Herbarium of the Botanical Institute of the Academy of Sciences of the USSR.

112. *C. ossethica* Sosn. in Addenda XXVII, 614; in Fl. Gruzii, VIII (1952) 568, diagn. georgica.—*C. glehnii* auct. non Trautv.: Grossh. Fl. Kavk. IV (1934) 218 p. p.—*C. buschiorum* Sosn. ex Grossh. Opred. Rast. Kavk. (1949) 500; diagn. rossica, non *Psephellus buschiorum* Sosn. (1948).

Perennial. Plants to 80–100 cm high, with short papilliform hairs mixed with crisped hairs and thin arachnoid-hairy-tomentum, weakly scabrous, green. Stems solitary or few, upright, simple or with few lateral branches. Leaves pinnately parted or lobed, lower ones quite long-petiolate, upper ones sessile or subsessile, sometimes some of them entire, with 2–5 lateral segments on each side, oblong, entire or more or less toothed, terminal segment usually larger than laterals. Involucre 19–23 mm in dia and 14–25 mm long, glabrous or subglabrous; appendages of outer and middle involucre bracts thin-coriaceous, obtuse-triangular, 2.0–3.5 mm long (excluding border decurrent on bracts), blackish-brown, with whitish cilia 2–3.5 mm long, with very short (to 1.0–1.5 mm long) cusp; innermost bracts with almost round, deeply fimbriate appendages. Florets pink, peripheral ones slightly large. Achenes 5–6 mm long, sparsely short-hairy; pappus 4.5–6.0 mm long, scale-like inner pappus bristles 1/3–2/5 as long as largest outer pappus bristle. Flowering July to September.

Meadows, stony slopes; in mid- and upper montane zones.—
Caucasus: Ciscaucasia (southern part), Dagestan (southern part), Eastern Transcaucasia (northern and western parts), Western Transcaucasia
 506 (northern and eastern parts), Southern Transcaucasia (northern part), Talysh. Endemic. Described from southern Ossetia. Type in Tbilisi.

Note. It is an ecogeographical race very similar to *C. scabiosa* L., and replaces this northern species in the upper montane zone of the Caucasus. It also considerably resembles *C. glehnii* Trautv. and is linked to this species through populations with intermediate characters.

113. *C. apiculata* Ldb. Ind. Sem. hort. Dorpat. (1824) 3; DC. Prodr. VI, 581.—*C. scabiosa* auct. non L.: MB. Fl. taur.-cauc. II (1808) 350 p. p.; Grossh. Fl. Kavk. IV, 218 p. p.; Kryl. Fl. Zap. Sib. XI, 2960 p. p.—*C. scabiosa* var. *apiculata* (Ldb.) Ldb. and var. *coriacea* Ldb. Fl. Ross. II, 2 (1845) 701; Schmalh. Fl. II, 126.—*C. coriacea* auct. fl. Ross. non Waldst. and Kit.—*C. pseudocoriacea* Dobrocz. in Bot. Zhurn. Akad. Nauk URSR, IV, 3–4 (1948) 78 and Vozn. Rosl. URSR, 576.—**Exs.:** Fl. exs. reip. Bohem.-Sloven. No. 891 (sub *C. scabiosa* L.); Fl. polon. exs. No. 843 (sub *C. scabiosa* var. *adpressa* Ldb.).

Perennial. Plants to 80–100 cm high, with short papilliform hairs mixed with crisped hairs and thin arachnoid-hairy-tomentum, weakly scabrous, green. Stems solitary or few, upright, branched mostly in upper part. Leaves pinnately parted or lobed, sometimes partly entire, lower ones rather long-petiolate, upper ones sessile or sub-sessile; lateral segments oblong to almost linear, entire, more or less toothed or lobed; terminal segment usually not larger than laterals. Involucre 11–17 mm in dia and 17–22 mm long, glabrous or thinly arachnoid-hairy-tomentose; appendages of outer and middle involucral bracts thin-coriaceous, obtusely triangular, very small (0.5)0.8–1.5(1.8) mm long (excluding very narrow, to 0.5 mm wide, margin decurrent on bracts), blackish-brown, with darker cilia 0.5–1.2 mm long, usually terminating in spine to 2 mm long; appendages of innermost bracts almost round, membranous, brownish, fimbriate-ciliate. Florets various shades of pink; peripheral ones slightly large. Achenes 3.5–4.5 mm long, sparsely short-hairy; pappus 3.5–4.5 mm long, inner pappus bristles 1/7–1/5 as long as largest outer pappus bristles. Flowering June to September.

Steppes, scrubs, meadows, old fields, up to mid-montane zone.—
European Part: Upper Dniester (southern part), Volga-Kama (southeastern part), Upper Volga (southern part), Upper Dniester, Middle Dnieper, Volga-Don, Trans-Volga, Bessarabia, Black Sea Region, Lower Don, Lower Volga (northern part), Crimea; *Caucasus*: Ciscaucasia, Dagestan; *Western Siberia*: Upper Tobol, Irtysh, Altai.

General distribution: Central Europe, Mediterranean, Balkans. Described from Crimea (between Simferopol and Belogorsk). Type in Leningrad.

Note. Apparently, in the synonymy of this species it is also necessary to include *C. fritschii* Hayek, described from southeastern Europe (in Denkschr. Math.-naturw. Klasse Akad. Wien, LXXII [1901] 623; Taf. II, fig. 9; *Centaurea-Art. Österr.-Ung.* 39), and *C. spinulosa* Rochel (fl. Banat. rar. [1828] 76, Tab. 36), which differ from *C. apiculata* only by having weaker (on the average) leaf pubescence of leaves. Plants with longer spines at the tips of the appendages of the involucre bracts, often identified as *C. spinulosa* and in reality very similar to typical specimens of this species, are scattered almost throughout the range of *C. apiculata*, but are especially widespread in the Podolsk Upland, Donetsk Ridge, and Ciscaucasia. They hardly merit recognition as a separate ecogeographical race. *C. apiculata* is closely linked through intermediate populations with *C. scabiosa*, *C. adpressa*, *C. ossethica*, and *C. pseudoscabiosa*, as a result of which the morphological boundaries between all these species are not all that distinct. Possibly, it would be better to treat them as subspecies of a single polymorphic species.

C. apiculata often forms hybrids with *C. orientalis* L. (cf. note to that species) and with *C. pseudomaculosa* Dobroc.

114. **C. adpressa** Ldb. Ind. Sem. hort. Dorpat. (1824) 3; Grossh. Opred. Rast. Kavk. 500; Kryl. Fl. Zap. Sib. XI, 2962.—*C. scabiosa* auct. non L.: MB. Fl. taur.-cauc. II, 350 p. p.—*C. scabiosa* var. *angustata* Ldb. Fl. alt. IV (1833) 48.—*C. scabiosa* var. *adpressa* (Ldb.) DC. Prodr. VI (1837) 580; Ldb. Fl. Ross. II, 2, 701; Schmalh. Fl. II, 126; Grossh. Fl. Kavk. IV, 218.—*C. rigida* Andr. in Rogowicz. Obozr. (1869) 303, nom nud. non Willd. nec Russ.—**Exs.:** Hayek, Cent. exs. crit. fasc. II, No. 63.

Perennial. Plants to 80–100 cm high, with short papilliform hairs mixed with crisped hairs and thin arachnoid-hairy-tomentum, weakly scabrous, green. Stems solitary or few, upright, branched mostly in upper part. Leaves pinnately parted or lobed, sometimes some of them entire, lower leaves quite long-petiolate, upper ones sessile or subsessile; lateral segments oblong to linear, usually entire, terminal segment larger than laterals. Involucre 9–15 mm in dia and 15–22 mm long, thinly arachnoid-hairy-tomentose or glabrous; outer and middle involucre bracts with small (to 1 mm long) dark brown or brownish apical appendage and few, very short (to 0.5, less often to 1 mm long), brownish cilia along margin, sometimes almost lacking appendages and cilia, terminating in very short (to 1 mm) spinule; innermost involucre bracts with almost round, fimbriate appendage. Florets various shades of pink, peripheral ones almost not enlarged. Achenes

4–6 mm long, sparsely short-hairy; pappus almost as long. Flowering June to September.

Steppes, stony slopes, sands, old fields, meadows; up to mid-montane zone.—*European Part*: Volga-Don (southern part), Trans-Volga (occasionally), Bessarabia, Black Sea Region, Lower Don, Lower Volga, Crimea; *Caucasus*: Ciscaucasia, Dagestan, Eastern Transcaucasia (northwestern part); *Western Siberia*: Upper Tobol (southern part), Irtysh (southern and eastern parts); *Soviet Central Asia*: Aralo-Caspian (northern part), Lake Balkhash Region, Dzhungaria-Tarbagatai, Tien Shan, Syr-Darya. *General distribution*: Balkans, Dzhungaria-Kashgaria. Described from Odessa Region of Ukrainian SSR. Type in Leningrad.

Note. This species replaces the previous one in the zone of arid steppes and semideserts; however, in the mountains of Soviet Central Asia, it is found in comparatively mesophytic communities.

Hybrids of this species with *C. orientalis* L., *C. reflexa* Lam., and *C. salonitana* Vis. are known.

115. *C. pseudoscabiosa* Boiss. and Buhse. in Nouv. Mém. Soc. Nat. Mosc. XII (1860) 131; Grossh. Opred. Rast. Kavk. 500.—*C. scabiosa* var. *spinulosa* (Rochel) Boiss. Fl. or. III (1875) 656 p. p.—*C. spinulosa* auct. non Rochel: Grossh. Fl. Kavk. IV (1934) 218 p. p.—**Exs.**: GRF No. 4400.

Perennial. Plants to 80–100 cm high, with short papilliform hairs mixed with crisped hairs and thin arachnoid-hairy-tomentum, weakly scabrous, green. Stems solitary or few, upright, branched mostly in upper part. Leaves pinnately parted or lobed, sometimes some of them entire, lower leaves quite, long-petiolate, upper ones sessile; lateral segments oblong to almost linear, entire, less often short-lobed; terminal segment usually not larger than lateral ones. Involucre 12–18 mm in dia and 18–25 mm long, finely arachnoid-hairy-tomentose or glabrous; outer and middle involucre bracts usually pectinate-ciliate almost to middle (cilia 1.2–2.5 mm long) but with very narrow (to 0.5 mm wide), decurrent part of appendage (or without it), with small obtusely triangular blackish-brown apical appendage (excluding decurrent part) to 1.5–2 mm long, terminating in recurved spinule or spine (1.5)2–6(8) mm long; appendages of innermost, oblong involucre bracts almost round, pectinate-fimbriate. Florets various shades of pink, peripheral ones almost not enlarged. Achenes 5.0–6.5 mm long, sparsely short-hairy; pappus 6–8 mm long, scale-like inner pappus bristles 1/4–1/3 as long as longest outer pappus bristles. Flowering June to August.

Stony slopes, steppes, scrubs; up to mid-montane zone.—*Caucasus*: Eastern Transcaucasia (southwestern part), Southern Transcaucasia

(eastern part). *General distribution*: Asia Minor, Armenia and Kurdistan, Iran-Afghanistan (north-western part). Described from Iran (in the region of Tabriz). Type in Geneva; isotype in Leningrad.

Note. This species is very close to *C. apiculata* Ldb.; however, the larger achenes and the well separated range permit us to consider it as a separate, more southern, ecogeographical race. Populations intermediate between these species are known from Dagestan and many areas of Azerbaidzhan. It is also linked through intermediate forms with *C. glehnii* Trautv., which, being a more alpine and, correspondingly, more mesophilic race, often replaces *C. pseudoscabiosa* in the mid-montane zone.

116. *C. glehnii* Trautv. in Tr. Peterb. Bot. Sada, IV, 1 (1876) 382 p. p.; Boiss. Fl. or. Suppl. (1888) 314 p. p.; Grossh. Fl. Kavk. IV, 218 p. p. and Oprod. Rast. Kavk. 500.

Perennial. Plants 50, less often to 70 cm high, with short papilliform hairs mixed with long crisped hairs and fine arachnoid-hairy-tomentum, weakly scabrous, green. Stems solitary or few, upright, branched in upper part. Leaves pinnately parted, lobed, or some of them undivided; lower leaves quite long-petiolate, upper ones sessile or subsessile; lateral segments broadly ovate to almost linear, usually entire; terminal segment often larger than lateral ones. Involucre 12–23 mm in dia and 14–25 mm long, glabrous or finely arachnoid-hairy-tomentose; appendages of outer and inner involucre bracts thin-coriaceous, obtusely triangular, 2–3.5 mm long (excluding border decurrent on bracts), blackish-brown, with whitish or brownish 1.5–3.5 mm long cilia along margin, terminating in recurved spinule or 2–6 mm-long spine; appendages of innermost bracts almost round, fimbriate. Florets pink, peripheral ones almost not enlarged. Achenes 5–6 mm long, sparsely short-hairy (hairs longer only near hilum); pappus 7–8 mm long, usually with brownish-gray tinge, scale-like inner pappus bristles 1/6–1/4 as long as longest outer pappus bristle. Flowering June to August.

Stony slopes, meadows; mostly in mid-montane zone.—*Caucasus*: Southern Transcaucasia. *General distribution*: Armenia and Kurdistan. Described from Armenian ASSR (between Leninakan and village of Mastara). Type in Leningrad.

Note. Apparently split up into several morphologically very weakly separated ecogeographical races more or less approximating the closely related species *C. ossethica*, *C. pseudoscabiosa*, and *C. apiculata*. The most typical of them is the very low-growing (usually to 30 cm high) race distributed in the region of Lake Sevan and Aragats Mountain.

Populations approaching this species have been placed tentatively in *C. apiculata*, also known from montane Dagestan.

Series 2. Carduiformes Tzvel.—Biennials or short-lived monocarpic perennials with strongly thickened string-like root. Appendages of involucre bracts with more than 5 mm-long apical spine.

117. *C. carduiformis* DC. Prodr. VI (1837) 590; Boiss. Fl. or. III, 659; Grossh. Fl. Kavk. IV, 219 and Opred. Rast. Kavk. 500.—*C. glehnii* var. *bicolor* Trautv. in Tr. Peterb. Bot. Sada, IV, 1 (1876) 382.

510 Biennial. Plants to 70–80 cm high, with short papilliform and longer crisped hairs, mixed with finely arachnoid-hairy tomentum, more or less scabrous, green or somewhat grayish. Stems solitary or few, upright, usually with few lateral branches. Leaves pinnately parted, lobed or some of them undivided, lower leaves rather long-petiolate, upper ones sessile or subsessile; lateral segments oblong to almost linear, entire or more or less irregularly toothed; terminal segment usually not larger than lateral ones. Involucre 15–27 mm in dia and 20–27 mm long, terminating in brownish or dark-brown, thin-coriaceous triangular appendages and then in attenuate recurved spine, 6–16 mm long in middle involucre bracts, shorter in outer ones, spines up to 1.5 mm thick at base, flat or convex above, with few stiff cilia along margin near base; appendages of innermost bracts round or kidney-shaped, long-fimbriate. Florets usually pale pink, peripheral ones not enlarged. Achenes 4–5 mm long, more or less hairy; pappus 6–8 mm long, often with brownish-gray tinge, scale-like inner pappus bristles 1/6–1/4 as long as largest outer pappus bristles. Flowering May to August.

Stony slopes, steppes, up to mid-montane zone—*Caucasus*: Western Transcaucasia (southern part), Southern Transcaucasia (western part). *General distribution*: Asia Minor (northeastern part), Armenia and Kurdistan, Iran (northwestern part). Described from northwestern part of Turkey. Type in Paris.

Note. Like the previous species, it splits up into several, still inadequately studied, narrowly endemic ecogeographical races, differing in the length of the spine and cilia on the involucre bracts, size of the capitula, color of the florets, and shape and pubescence of the leaves. Possibly some of these races are the ones described by C. Koch from northeastern Turkey as species: *C. recurvata* C. Koch (in *Linnaea*, XXIV (1851) 428), *C. bicolor* C. Koch (op. cit. 428), and *C. albiflora* C. Koch (op. cit. 430). However, in the absence of the type material of these species and also of *C. carduiformis*, it is difficult to say anything definite in this regard. On the border with Turkey, one can find still another species close to *C. carduiformis*, *C. cyrtolepis* Ldb. (*Fl. Ross.* II, 2 (1845) 709), differing from it by having larger (20–40

mm wide) capitula, spines strongly broadened at the base, and stems woolly tomentose at the base.

118. *C. sintenisiana* Gand. in Bull. Soc. Bot. France LXV (118) 37.—*C. carduiformis* DC. var. *sintenisiana* (Gand.) Iljin ex Tzvel. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX (1959) 437, pro syn.—**lc.**: Czer. in Fl. Turkm. VII (1960) Plate XLIII.

Biennial. Plants to 70–80 cm high, with short papilliform and longer
511 crisped hairs mixed with fine arachnoid-hairy tomentum, more or less scabrous, green. Stems solitary or few, upright, usually with few lateral branches. Leaves as in previous species, but their terminal segment usually larger than lateral ones. Involucre 15–28 mm in dia and 20–28 mm long (excluding spines), glabrous or subglabrous; outer and middle involucral bracts in upper part pectinate-ciliate, with whitish cilia 2–5 mm long, terminating in brownish thin-coriaceous appendages and then in recurved spine, spine 15–40 mm long in middle bracts, shorter in outer, 1.5–3 mm thick at base, above more or less concave, grooved, with sparse stiff cilia along margin; appendages of innermost bracts almost round, long-fimbriate. Florets pink, peripheral ones not enlarged. Achenes as in previous species. Flowering May to July.

Stony slopes, rocks; up to mid-montane zone.—*Soviet Central Asia*: mountainous Turkmenia. *General distribution*: Iran-Afghanistan (northern part). Described from Kopetdag (in Kyzyl-Arvat region). Type in Paris; isotype in Leningrad.

Note. In Iran, it is linked with *C. carduiformis* through a series of intermediate populations (or narrowly endemic ecogeographical races?).

Section 4. Stereophyllae (Tzvel.) Tzvel. comb. nova.—*Centaurea* sect. *Acrocentron* subsect. *Stereophyllae* Tzvel. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX (1959) 437.—Florets pale pink, less often pale yellow; involucral bracts with broadly lanceolate, weakly decurrent, ciliolate, brownish, apical appendage, usually terminating in short spine; pappus double, 1/3–1/2 as long as achenes.

Type of section: *C. stereophylla* Bess.

119. *C. stereophylla* Bess. Enum. pl. Volhyn. (1822) 35; DC. Prodr. VI, 580; Boiss. Fl. or. III, 656; Schmalh. Fl. II, 127; Grossh. Opred. Rast. Kavk. 500; Sosn. in Fl. Gruzii, VIII, 567.—*C. scabiosa* var. *stereophylla* (Bess.) Ldb. Fl. Ross. II, 2 (1845) 701.—**lc.**: Fedtsch. and Fler. Fl. Evrop. Ross. (1910) Fig. 1047; Prod. Fl. Roman. I (1923) 1095.

Perennial. Plants 80–100 cm high, with short and rather stiff, papilliform hairs mixed with thin arachnoid-hairy-tomentum, scabrous,

dark green. Stems solitary or few, upright, branched mostly in upper part. Leaves pinnately lobed or parted, sometimes some of them undivided and entire; lower leaves rather long-petiolate, upper ones sessile; lateral segments or lobes oblong, entire, obtuse, but usually with short cusp; terminal segment usually larger than lateral ones. Involucre 9–14 mm in dia and 15–22 mm long, thinly arachnoid-hairy-tomentose or subglabrous; appendages of outer and middle involucral bracts thin-
 512 long, short decurrent on bracts, with lighter colored, to 1.0–1.5-mm-long cilia along margin, usually with up to 2 mm-long spinule at apex; appendages of innermost bracts almost round, membranous, short-pectinate-fimbriate. Florets pale pink, less often whitish or light yellow; peripheral ones not enlarged. Achenes 3.5–5.0 mm long, sparsely short-hairy; pappus 1.5–2.5 mm long, usually with brownish-gray tinge; scale-like inner pappus bristles $1/5$ – $1/3$ as long as largest outer pappus bristles, but almost indistinguishable in thickness. Flowering June to August.

Steppes, old fields, up to lower montane zone.—*European Part*: Bessarabia, Black Sea Region, Crimea (doubtful record); *Caucasus*: Ciscaucasia (doubtful record). *General distribution*: Central Europe (southeastern part), Balkans (northern part). Described from Podolsk Uplands of Ukrainian SSR. Type in Leningrad.

Note. This species, together with the similar Balkan species *C. rumelica* Boiss., occupies a very isolated position in the subgenus *Lopholoma*, and with respect to a series of distinguishing characters, approaches other subgenera. Quite possibly these species have originated as a result of hybridization of *C. orientalis* with some species of the subgenus *Acrolophus*, which would seem to be confirmed by the presence of both pale pink and light yellow florets in plants within the limits of a single species. This is not found in other groups of the genus *Centaurea* L. The reports of *C. stereophylla* from Crimea and Ciscaucasia apparently are erroneous and relate to the widely distributed hybrid *C. orientalis* L. \times *C. apiculata* Ldb.

Subgenus 15. Acrolophus (Cass.) Dobrocz. in Bot. Zhurn. Akad. Nauk URSR, VI, 2 (1949) 64, 69.—*Acrolophus* Cass. in Dict. Sc. nat. L. (1827) 253.—Capitula small- or medium-sized; appendages of involucral bracts decurrent on bract margin, scarious or semicoriaceous, at apex with soft or prickly cusp, pectinate-fimbriate, less often with small teeth; corolla purple or pink; achenes oblong, pappus double as long as or often shorter than achene, sometimes absent. Biennials, less often, perennials with arachnoid-hairs; stems strongly branched; basal and lower cauline leaves pinnately incised.

Type of subgenus: *C. maculosa* Lam.

A well-separated group, which Soviet authors have recognized as a separate genus (S.A. Nevski) or subgenus (D.N. Dobroczaeva). It apparently is closest to the subgenus *Phalolepis* (Cass.) Dobroc. (hybrids between them are common).

Subgenus *Acrolophus* (Cass.) Dobroc. includes quite numerous montane-xerophytic, petrophytic, psammophytic, and steppe or forest-steppe species, widely distributed in the northern Mediterranean and in the forest-steppe, steppe, and semidesert zones of Eurasia. As also in the subgenus *Phalolepis* (Cass.) Dobroc., there are no forest species among them. Both subgenera are clearly differentiated into geographical races, which aggregate into series. The racial composition of *Acrolophus* (Cass.) Dobroc. has been studied especially in the Ukrainian SSR (works of E.M. Lavrenko, Yu. D. Kleopov, D.N. Dobroczaeva, and the author), and in the Caucasus (investigated by T.A. Dumbadze). However, it is far from completely known for the whole territory of the Soviet Union. Considerable difficulty arises in the intensive investigation of the systematics of the subgenus because of the profusion of interseries and partly intersectional hybrids, that can be distinguished readily in nature but not always in herbaria.

We could not form a clear idea of *C. pseudovina* Illar. (in *Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, XVIII [1957] 308), described by N.B. Illarionova from this group of species. In her opinion, this species is closer to *C. lavrenkoana* Klok., differing by having a shorter (1–1.5 mm) pappus, shorter fimbriae, and a less-developed cusp of the appendages of the involucre bracts. The reported differences do not transcend the limits of variation of the characters in *C. lavrenkoana* Klok. Authentic specimens of *C. pseudovina* Illar., except for a single shoot, could not be found in the Herbarium of the V.L. Komarov Botanical Institute in Leningrad. The species described from the Tarkhankut Peninsula in Crimea also requires collection of new material for definitive clarification. Without herbarium material, we could not include this species in the present treatment, more so because its available description is almost entirely contained in our description of the southern Ukrainian *C. lavrenkoana* Klok.

1. Involucre ovate or oblong-ovate, rarely almost cylindrical, often dichromatic, with more or less colored tips of bracts and appendages; involucre bracts with 3–7 veins; appendages of involucre bracts, except central thick part, scarious with soft apical cusp and fimbriae 2.
- + Involucre cylindrical or ovoid-cylindrical, usually monochromatic, yellowish; involucre bracts with 1–3 veins; appendages of involu-

- cral bracts coriaceous, with prickly cusp and stiff fimbriae 18.
2. Involucral bracts with 5–7 veins; appendages of involucral bracts pectinate-fimbriate, lacking distinct scarious auricles at base, black or brown. Steppe plants 3.
- + Involucral bracts with 3–5, rarely 7 veins; appendages of involucral bracts fimbriate, with more or less distinct scarious auricles at base, less often irregularly toothed, only in central thick part weakly colored. Plants on sands or stony outcrops 6.
3. General inflorescence corymbose; appendages of outer and middle involucral bracts including fimbriae black. Western species not reaching Dnieper 120. **C. rhenana** Boreau.
- 514 + General inflorescence paniculate; appendages of involucral bracts brownish, less often almost black, but with ochreous fimbriae (only in the Caucasian *C. kubanica* Klok.) 4.
4. Involucre oblong-ovate, 10–11 mm long and about 7 mm wide; appendages of outer and middle involucral bracts with 4–6 pairs of fimbriae, light brown. Terminal lobe of leaves narrowly linear, 1.0–1.5 mm wide 123. **C. micranthos** Gmel.
- + Involucre ovate or broadly ovate, much larger; appendages of outer and middle involucral bracts with 6–10 pairs of fimbriae dark brown to almost black. Terminal lobe of leaves linear or oblong, to 4–5 mm wide 5.
5. Basal leaves bipinnate. General inflorescence broadly paniculate; appendage of outer and middle involucral bracts dark brown; peripheral florets to 15 mm long; mature achenes brown, with pappus 1–1.5 mm long. Plants of plains and steppes 121. **C. pseudomaculosa** Dobrocz.
- + Basal leaves pinnate, with lobed segments. General inflorescence oblong-paniculate; appendages of outer and middle involucral bracts almost black, with ochreous fimbriae; peripheral florets 20–21 mm long; mature achenes blackish with pappus 2.3 mm long. Plants of montane steppe 122. **C. kubanica** Klok.
6. Involucre oblong-ovate to ovate-conical; appendages of involucral bracts with soft fimbriae, usually with well-developed scarious auricles below or margin entirely irregularly toothed; pappus always well-developed, as long as achene or slightly shorter, rarely much shorter (in *C. odessana* Prod.). Plants exclusively on sands (obligate psammophytes) 7.
- + Involucre oblong-ovate to almost cylindrical; appendages of involucral bracts with few stiff fimbriae, with inconspicuous scarious auricles below; pappus always shorter than achene, often greatly underdeveloped. Lithophilous plants 12.
7. Involucre 12–15 mm long; appendages of middle involucral bracts

- with 6–8 pairs of fimbriae, lacking distinct scarious auricles at base. Very rare plants; known only from sands of Savran River in Odessa Region 129. **C. savranica** Klok.
- + Involucre 9–12 mm long; appendages of middle involucre bracts with fewer fimbriae and with well developed scarious auricles at base or lacking distinct border, entirely irregularly toothed 8.
8. Appendages of outer and middle involucre bracts fimbriate, central thick part of appendage light reddish-brown or yellowish-brown with small dark purple spots at base 9.
- + Appendages of outer and middle involucre bracts irregularly toothed, often divided; central thick part of appendage yellowish, lacking small spots 10.
- 515 9. Stems, especially in lower part, and leaves white-arachnoid-hairy-tomentose; pappus noticeably to much shorter than achene. Plants of coastal sands 127. **C. odessana** Prod.
- + Stems and leaves not densely woolly-arachnoid-hairy; pappus as long as achene or very slightly shorter. Plants of river sands 128. **C. borysthénica** Gruner.
10. Involucre ovate-conical, 9–11 mm long, 6–8 mm in dia; stems sharply scabrous above, along ribs 124. **C. majorovii** Dumb.
- + Involucre oblong-ovate, narrower; stems entirely glabrous or less often weakly scabrous above, along ribs 11.
11. Involucre 9–12 mm long, 5–6 mm in dia; stems rather densely arachnoid-hairy, somewhat thick, with short floriferous branches; leaves along margin scabrous from conical tubercles 125. **C. sophiae** Klok.
- + Involucre 9–11 mm long, 3.5–5 mm in dia. Stems not densely arachnoid-hairy, glabrous above, somewhat thin, with long floriferous branches; leaves smooth on margin 126. **C. arenaria** MB.
12. Middle involucre bracts with 3 veins; pappus 1.5–2.5 mm long, much shorter than achene but well-developed. Plants of steppe regions of plains 13.
- + Middle involucre bracts with 3–7 veins; pappus not longer than 1.5 mm, more or less reduced. Plants of Crimea-Caucasus 14.
13. Involucre 10–12 mm long, 5–6 mm in dia, ovate-cylindrical. Stems and leaves weakly arachnoid-hairy 130. **C. besseriana** DC.
- + Involucre 8–11 mm long, 3–5 mm in dia, almost cylindrical with conical base. Stems and leaves rather densely arachnoid-hairy 131. **C. lavrenkoana** Klok.
14. Pappus entirely absent or not longer than 0.5 mm. Plants of Crimea 15.
- + Pappus to 1.0–1.5 mm long. Plants of Caucasus 16.
15. Capitula all solitary at tips of branches 3–12 cm long; involucre

- 10–12 mm long, 5–6 mm in dia 132. *C. steveniana* Klok.
- + Capitula partly sessile or subsessile, aggregated, partly solitary at tips of branches up to 4.5 cm long; involucre about 9 mm long, 3.5–4.0 mm in dia 133. *C. koktebelica* Klok.
16. Basal and lower cauline leaves bipinnate, with incised second-order segments. Involucre 11–13 mm long, 6–8 mm in dia; middle involucre bracts with 5–7 veins. Achenes 3.3–4.0 mm long 136. *C. gulissashvili* Dumb.
- + Basal and lower cauline leaves with undivided second-order segments. Involucre 10–11 mm long, 5–6 mm in dia; middle involucre bracts with 3–5 veins. Achenes not more than 3.2 mm long ... 17.
17. Stems with dense prickly bristles on ribs. Outer and middle involucre bracts with 5 veins; their appendages with cusp 0.9–1.5 mm long and 5–6 pairs of fimbriae to 1.5–2 mm long. Pappus about 1.5 mm long 135. *C. ovina* Pall.
- + Stems scabrous on ribs due to scattered acute tubercles. Outer and middle involucre bracts with 5 inconspicuous veins; their appendages with cusp about 0.5 mm long and 4–5 pairs of fimbriae about 1 mm long 134. *C. vicina* Lipsky
18. Leaves with narrowly linear or linear, less often oblong-lanceolate or obovate, terminal lobe 1–4 mm wide. Capitula solitary at tips of short branches or partly aggregated; apical spine of appendages more or less elongate; pappus much shorter than achene or often not developed. Weeds 19.
- + Leaves, at least cauline, with large terminal lobe or lyrate. All capitula aggregated in dense clusters of 5–10 at tips of main branches; apical spine of appendages very short; pappus not shorter than achene. Plants of mountains 22.
19. Capitula often solitary, partly aggregated in small clusters; apical part of middle involucre bracts with appendage arcuately recurved outward and downward 140. *C. squarrosa* Willd.
- + Capitula solitary, less often in lax clusters; upper part of middle involucre bracts not recurved 20.
20. Involucre 10–15 mm long, 4–6 mm in dia; appendages of outer and middle involucre bracts with cusp 0.5–2.0 mm long and 3–9 pairs of fimbriae 0.4–1.7 mm long. Achenes about 3.5 mm long with pappus 2.5–3.0 mm long 139. *C. caspia* Grossh.
- + Involucre shorter and narrower; appendages of outer and middle involucre bracts with cusp to 4 mm long and 3–7 pairs of fimbriae, half as long as cusp. Achenes up to 3 mm long, with pappus inconspicuous or lacking 21.
21. Stems and leaves scatteredly arachnoid-hairy. Capitula solitary at

tips of very short or somewhat longer branches. Involucre 8–10 mm long, 2.5–5.0 mm in dia; prickly cusp of appendages weakly recurved outward. Florets pale pink or whitish, rarely light purple 137. *C. diffusa* Lam.

+ Stems and leaves rather densely arachnoid-hairy. Capitula usually more or less clustered at tips of second-order branches. Involucre 10–12 mm long, 3–3.5 mm in dia; prickly cusp of appendages strongly divaricate and in lower part of involucre more or less recurved. Florets purple 138. *C. aemulans* Klok.

22. Stems entirely smooth but leaves white-arachnoid-tomentose. Appendages of outer and middle involucre bracts with 2–4 pairs of fimbriae 141. *C. albida* C. Koch

+ Stems sharply scabrous above along ribs, leaves not densely arachnoid-floccose. Appendages of outer and middle involucre bracts with 4–7 pairs of fimbriae 142. *C. aggregata* Fisch. and Mey.

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Section 1. Maculosae (Hayek) Dumb. in Dokl. Akad. Nauk Arm. SSR, V,2(1946) 48.—Sect. *Acrolophus c) Maculosae* Hayek, Centaur.-Art. Österr.-Ung. (1901) 4, 81.—Plants of steppes and forest-steppes, weakly arachnoid-hairy. Involucre bracts with 5–7 veins; appendages of involucre bracts pectinately fimbriate, lacking scarious auricles, black or brown (thus, involucre bicolorous); pappus shorter than achenes.

120. *C. rhenana* Boreau, Flore du Centre de la France, ed. 3 (1857) 355; Hayek, Centaurea-Art. Österr.-Ung. (1901) 85; Dobroc. in Vozn. Rosl. URSR, 581.—*C. maculosa* ssp. *rhenana* Gugler in Ann. hist.-nat. Mus. Nat. Hung. VI (1908) 164, 265; Hegi, Ill. fl. VI, 2, 970.—*lc.*: Hayek, loc. cit. Taf. VIII, fig. 4; Hegi, loc. cit., fig. 600 (a-b).—*Exs.*: Fl. exs. reip. Bohem.-Sloven. Nos. 638, 888.

Biennial. Stem upright, 30–80 cm high, ribbed, scabrous, especially above along ribs, including leaves weakly arachnoid-hairy, branched from middle; branches leafy to base of capitula, long, equaling stem. Leaves pinnately and bipinnately incised to linear or narrowly linear acuminate lobes 1.5–3 mm wide, scabrous, punctate-glandular; lower leaves petiolate, middle and upper ones sessile, apical leaves often undivided, linear, 1–1.5 cm long. General inflorescence corymbose; capitula solitary at tips of branches. Involucre ovate, about 14 mm long, 9–10 mm in dia; involucre bracts green, ochraceous in upper part, with 5 conspicuous veins; appendages of outer and middle involucre bracts black, triangular, bordering tip of bract, regularly fimbriate, with 6–8 fimbriae on each side, 1.0–1.5 mm long, black or dark brown, longer than tail-like tip of appendages; inner bracts

oblong-lanceolate with ovate or triangularly lanceolate, toothed, brown appendage surpassing middle bracts. Florets pink; peripheral florets sterile, to 15 mm long. Mature achenes black with white ribs, 2.5–3.0 mm long; pappus 1.5–2.0 mm long, white. Flowering July to September.

Steppe slopes and stony outcrops, mostly limestones.—*European Part*: Upper Dnieper, Upper Dniester (south), Middle Dnieper (west, up to southern Bug in southeast and Pripyat River in northeast). *General distribution*: Central Europe (up to Rhine in west and Danube in south). Described from France (Rhine Valley). Type in Paris(?).

Note. To the east of the Rhine, this species replaces the westernmost race of *C. maculosa* Lam. s. str. According to the studies of Hayek (1901), Briquet (1902), Prodan (1930), D.N. Dobroczaeva (1949, 1950), and others, *C. rhenana* Boreau differs clearly from *C. maculosa* Lam. 518 by having sparser arachnoid hairs on the stem and leaves, a larger involucre, a darker color of the appendages and fimbriae on the involucre bracts, and a much better developed pappus. In *C. maculosa* Lam., the fimbriae on the appendages of the involucre bracts are lighter in color and more numerous (to 10 on each side), and much lighter than the undivided blackish part of the appendage.

121. ***C. pseudomaculosa*** Dobrocz. in Bot. Zhurn. Akad. Nauk URSR, VI, 2 (1949) 73; in Vizn. Rosl. URSR, 582.—*C. maculosa* auct. fl. Ross. p. p. non Lam.—*C. maculosa* ssp. *rhenana* Iljin in Fl. Yugo-Vost. VI (1936) 432.

Biennial. Root string-like, strong. Stem, upright, 30–70 cm high, ribbed-sulcate, with leaves sharply scabrous and not densely arachnoid-hairy; lower branches not reaching stem tip, upper ones sometimes even surpassing it. Basal and lowermost cauline leaves petiolate, bipinnately incised with 1–4 mm-wide, linear, acuminate, terminal pinules; others sessile, middle ones pinnately incised; apical leaves often undivided, oblong-lanceolate, 1.5–2.0 cm long; all leaves with profuse punctate glands on surface. General inflorescence broadly paniculate; capitula solitary at tips of densely leafy, relatively long or very short branches. Involucres ovate, 12–14 mm long, 10–13 mm in dia; involucre bracts green, with 5 prominent veins on outer side; outer bracts ovate, middle ones oblong-ovate, inner bracts oblong-lanceolate; appendages of outer and middle bracts dark brown, 2.5–3.0 mm long (including cusp), regularly fimbriate, short-decurrent on margin in upper part of bract, lacking distinct scarious auricles at base; fimbriae 6–9 on each side of appendage, somewhat lighter colored than its central part, 2.5–3.0 mm long; appendages of inner bracts ovate or oval, short-fimbriate or irregularly toothed. Florets pink, to 15 mm long. Achenes about 3 mm long, brown, with light colored ribs; pappus 1.0–1.5 mm long. Flowering July to August.

Forb-feather grass steppes, steppe slopes, stony, mostly limestone outcrops, edges and glades of steppe forests, sometimes as weed in fields.—*European Part*: Middle Dnieper (east), Volga-Don, Trans-Volga, Volga-Kama (south), Black Sea Region (north), Lower Don (north), Crimea (?); *Western Siberia*: Upper Tobol (western part). Endemic. Described from vicinity of Makaevka in Donbass. Type in Kiev.

122. **C. kubanica** Klok. in Addenda XXVII, 615.—*C. maculosa* auct. fl. cauc. p. p. non Lam.—*C. rhenana* Dumb. in Dokl. Akad. Nauk Arm. SSR, V, 2 (1946) 48, non Boreau.

519 Biennial. Stems solitary, upright, 10–110 cm high, ribbed-sulcate, along ribs especially above scabrous from conical tubercles, with very weakly arachnoid-hairy leaves in lower part, branched from below middle or above, with upward-spreading branches. Basal leaves withering by flowering time, petiolate, pinnately incised with more or less incised segments; cauline leaves short-petiolate (lowermost) to sessile, 1–8 cm long, pinnate with 1–11 pairs of lateral, undivided or incised segments in lower leaves, beneath and along margin sharply scabrous from spiniform bristles; terminal segment of leaves linear or oblong, 2–27 mm long, 0.3–5.0 mm wide, acute and somewhat prickly; cauline leaves sessile with undivided or divided auricles, apical leaves undivided, oblongly linear, acute, bent. General inflorescence in well developed plants oblong-paniculate; floriferous shoots 0.5–14.0 cm long, not densely leafy. Capitula solitary at tips of these branches. Involucre ovate or broadly ovate, 12–15 mm long, 7–12 mm in dia, distinctly dichromatic; involucre bracts ovate to linear, 3–11 mm long, 1.5–3.2 mm wide, with 5–7 veins, greenish, with fine, sessile, yellow glands; appendages broadly ovate to elliptical (in lower bracts), 1.5–2.5 mm long, 1–4 mm wide; with triangular or ovate-triangular, black (except often greenish part at base), central part in outer and middle bracts, cusp 0.5–1.5 mm long; fimbriae blackish in lower part, ochreous above, filiform at tip, flexuous; appendages of inner bracts elliptical or almost ovate-lanceolate, toothed to entire. Corolla purple-pink, 20–21 mm long in peripheral florets, 14–15 mm in central florets. Achenes oblong, somewhat laterally bent, 2.7–3.2 mm long, 1.2–1.5 mm wide, short and very thin hairy; mature achenes blackish, with yellow longitudinal striations; pappus 1.0–2.3 mm long. Flowering July to August.

Mountain and foothill steppes, scrub.—*European Part*: Lower Volga (near Stavropol), Ciscaucasia, Dagestan. Endemic. Described from Teberda River. Type in Leningrad.

Note. This species undoubtedly differs from the Central European *C. rhenana* Boreau in many characters, which was first noted by D.N.

Dobroczaeva. Apparently, it hybridizes in the contact zone with *C. micranthos* Gmel., producing forms with mixed characters. One such form was described by T.A. Dumbadze under the name *C. micrantha* Gmel. var. *recurvata* Dumb. (*Dokl. Akad. Nauk Arm. SSR*, V, 2 (1946) 47).

123. *C. micranthos* Gmel. *Reise*. I (1770) 135; Hayek, *Centaurea*-Art. Österr.-Ung. (1901) 92; Grossh. *Fl. Kavk.* IV, 221 and *Opred. Rast. Kavk.* 501; Dobroc. in *Vizn. Rosl. URSR*, 582.—*C. maculosa* ssp. *micranthos* (Gmel.) Gugler in *Ann. hist.-nat. Mus. Nat. Hung.* VI (1908) 164, 179, 265; Iljin in *Fl. Yugo-Vost.* VI, 432.—*C. biebersteinii* DC. *Prodr.* VI (1837) 583; Ldb. *Fl. Ross.* II, 2, 703.—*C. maculosa* auct. fl. Ross. p. p. non Lam.—**Exs.**: GRF No. 1115 (sub *C. maculosa* Lam.); Fl. exs. reip. Bohem.-Sloven. No. 890; Hayek, *Cent. exs. crit.* No. 69 (sub *C. maculosa* ssp. *micranthos*).

Biennial (perennial). Stems upright, 20–75 cm high, ribbed-sulcate, branched from base or middle, with leaves scabrous and distinctly arachnoid-hairy, leafy to top. Leaves pinnately and bipinnately incised, with narrowly linear, acuminate terminal lobe, 1.0–1.5 mm wide, pale green from less dense arachnoid-hairy tomentum; lower leaves petiolate, others sessile; apical leaves sometimes undivided, oblong-lanceolate, about 2 cm long. Capitula solitary at tips of stem and numerous branches, forming paniculate inflorescence. Involucre oblong-ovate, 10–11 mm long, about 7 mm wide, somewhat arachnoid-hairy; involucre bracts pale green, outer bracts ovate, middle ones oblong-ovate, with 5 prominent veins on outer side, with brown, triangular, regularly fimbriate apical appendage; fimbriae 4–6 on each side, about 2 mm long; inner bracts oblong-lanceolate, with scarious border, with oval or ovate, short-fimbriate or irregularly toothed apical appendage 1.0–1.5 mm long. Florets pink, peripheral about 15 mm long. Achenes about 3 mm long, blackish, with whitish ribs; pappus about 1 mm long, white. Flowering July to August.

Dry steppes, chalky and clayey outcrops.—*European Part*: Middle Dnieper (south), Bessarabia, Black Sea Region, Lower Don, Volga-Don, Trans-Volga, Crimea; *Western Siberia*: Upper Tobol (west); *Caucasus*: Ciscaucasia. *General distribution*: Central Europe (south-east), Balkans (north). Described from Don. Type missing.

Note. D.N. Dobroczaeva described a form in this species, f. *campestris* Dobroc., which differs from the type by having subsessile capitula aggregated in groups of 3–5 at the tips of the branches. The significance of this form is not clear.

Series 2. Arenariae (Hayek) Dumb. in *Dokl. Akad. Nauk Arm. SSR*, V, 2 (1946) 47.—Sect. *Acrolophus* d) *Arenariae* Hayek, *Centau-*

rea-Art. Österr.-Ung. (1901) 4, 94 p. p.—Plants of river and marine sands. Involucral bracts with 3–5 veins; appendages of involucral bracts whitish-scarious except colored central part, with irregular fine teeth or fimbriae but with distinct fine-toothed auricles at base. Pappus almost as long as achene or slightly shorter, less often much shorter.

124. *C. majorovii* Dumb. in Dokl. Akad. Nauk Arm. SSR, V, 2 (1946) 47.—*C. arenaria* auct. fl. Ross. p. max. p. non MB.

Biennial. Stems 1–3, upright, 25–60 cm high, branched from base or middle, sharply scabrous above along ribs, with leaves rather densely arachnoid-hairy. Leaves pinnately or bipinnately incised with oblong-lanceolate or narrowly linear, entire, acuminate lobes, 1–4 mm wide, sharply scabrous, punctate-glandular; basal and lower cauline leaves more or less long-petiolate, middle and upper ones sessile, apical leaves undivided, narrowly lanceolate. Capitula solitary at tips of stems and its short branches. Involucre ovate-conical, 9–11 mm long, 6–8 mm in dia; outer bracts ovate, about 4 mm long, with appendage 1.0–1.5 mm long, 1.5–1.75 mm wide; middle bracts oblong-ovate, 7–8 mm long, 2.5–3 mm wide, with 5 veins on outer side, with broadly ovate apical appendage 2–3 mm long and 2–3.5 mm wide; appendages finely toothed with small broad notch and short cusp in it; central part of appendage narrowly triangular, yellowish, lacking conspicuous spot at base; inner bracts narrow, linear, 9–11 mm long and 1–2 mm wide, with 3 veins on outer side, and oblong-elliptical apical appendage about 1 mm long. Florets pink, peripheral 15–16 mm long, central ones 12–13 mm long. Achenes 3.0–3.5 mm long, blackish with whitish ribs; pappus 2–3 mm long. Flowering July to August.

River, more rarely marine and dry valley sands.—*European Part*: Middle Dnieper (east), Volga-Don (south), Trans-Volga, Black Sea Region (northeast), Lower Don, Lower Volga; *Caucasus*: Dagestan, Eastern Transcaucasia. Endemic. Described from Dagestan sands near village of Kumtorkal. Type in Yerevan.

Note. I compared plants from the sands of the Caspian Coast, particularly from Kumtorkal, with those from the Urals, Volga and Donetsk. However, I could not find appreciable difference among them. Moreover, this species is fairly variable, and I am not fully convinced of its racial uniformity.

125. *C. sophiae* Klok. in Addenda XXVII, 615.

Biennial. Stems about 50–60 cm high, somewhat cylindrical below, blunt-ribbed above, smooth along ribs up to top, rather densely arachnoid-hairy, strongly branched, with upward-spreading branches. Basal leaves few at flowering time; lower cauline leaves pinnately

incised with linear or narrowly linear segments about 1–2 mm wide, along margin scabrous from conical tubercles; apical leaves linear or narrowly linear, 4–15 mm long, 0.5–1.0 mm wide. Capitula solitary at tips of 2.5–9.0 mm long branches. Involucre oblong-ovate, 9–12 mm long, 5–6 mm wide; involucre bracts ovate to linear, 2–8 mm long, 1.2–2.5 mm wide, with 5 veins on outer side, brownish-green like central part of appendage; appendages scarious except in their central part whitish, transversely oval in outer and middle, 1.5–2.0 mm long, 2.5–3.5 mm wide, toothed and finely incised in upper part; appendages oblong-ovate-lanceolate in inner bracts, about 1.5–2.0 mm long, almost entire. Corolla pink, in peripheral florets about 15 mm and in central florets about 13 mm long. Achenes oblong, 3.2–3.6 mm long, 1.2–1.6 mm wide, mature ones olive-dark-brown; pappus 2–3 mm long. Flowering July to August.

522 River sands.—*European Part*: Lower Don. Endemic. Described from riverbank sands of the Don in vicinity of village of Tsimlyanskaya. Type in Leningrad.

Note. This plant was collected only once by S.G. Gorshkova in whose honor I name this species. In its characters it occupies an intermediate position between *C. arenaria* MB. and *C. majorovii* Dumb., clearly differing from both of them.

126. *C. arenaria* MB. in Willd. Sp. pl. III, 3 (1803) 2278 p. p. (non alior.); Fl. taur.-cauc. II, 347; III, 590; DC. Prodr. VI, 581; Ldb. Fl. Ross. II, 2, 702; Schmalh. Fl. II, 128 p. p.—*C. wolgensis* DC. Prodr. VI (1837) 581; Ldb. Fl. Ross. II, 2, 702.

Biennial. Stems usually few, upright or ascending, 25–80 cm high, relatively thin, angular, smooth on faces, less often noticeably scabrous above on branches, less densely arachnoid-hairy below, glabrous above, branched from below middle, with upward-spreading branches. Basal and lower cauline leaves petiolate, bipinnately incised, weakly arachnoid-hairy, smooth; terminal lobe of leaves mostly linear to narrowly linear, sometimes oblong-elliptical, 1–15 mm long, 0.5–1.0 mm wide; apical leaves undivided, narrowly linear. General inflorescence rather lax paniculate-corymbose; capitula solitary at tips of relatively long (2–13 cm) and thin, weakly leafy floriferous branches. Involucre oblong-ovate, 9–11 mm long, 3.5–5.0 mm in dia; involucre bracts ovate to linear, 2–10 mm long, 0.8–2.0 mm wide with 5 veins; appendages round-ovate to oblong-elliptical (in inner bracts), 1.2–2.0 mm long, 0.7–2.0 mm wide, scarious except central yellowish part, whitish with inconspicuous cusp 0.1–0.3 mm long, toothed or irregularly fimbriate, fimbriae up to 0.6 mm long, with entire, decurrent auricles below. Corolla pink, about 15 mm long in peripheral florets. Achenes

oblong-linear, 2.8–3.7 mm long, 1.2–1.4 mm wide, finely hairy; pappus 2–4.2 mm long, pappus hairs often yellowish. Flowering July to August.

Sands, often coastal.—*European Part*: Lower Volga; *Caucasus*: Dagestan, Eastern Transcaucasia (Apsheron Peninsula); *Soviet Central Asia*: Aralo-Caspian. Endemic. Described from lower reaches of Kuma River. Type in Leningrad.

Note. Marschall-Bieberstein referred to this species also Ukrainian plants from Dnieper, reporting them in his third volume of the *Flora* as a separate, unnamed variety, later described by L. Gruner as a separate species, *C. borysthenica* Gruner. According to Bieberstein, it differs from typical *C. arenaria* MB. by having much larger, ovate involucre and finely divided leaves. The type of this species in Bieberstein's herbarium has the label: "Ex deserto cumano a. 1803," and agrees fully with the description of the typical form of the species.

523 The characters of the species indicated by Bieberstein and the type specimen do not come at all close to those of the southeastern plant, for which the name *C. arenaria* MB. was established. Apparently, the latter must be named *C. majorovii* Dumb. at least if the Caspian race, to which this name directly belongs, and the Donetsk race do not differ.

However, Ledebour and De Candolle distinguished our plant from *C. arenaria* MB and even referred it to a separate section, which was treated by Cassini as the separate genus *Spilacron* (*S. crupinoides* Cass. in *Dict. Sc. nat. L.* 238). The reason for such a separation lies in that in some of the specimens of this species examined by Cassini and Ledebour the achenes were entirely lacking the inner pappus, which consists of short, apically connate scales. In the other specimens collected from the same locality, which did not differ in any way from the former, the pappus was normal and double.

Plants from the more southern localities (for example, the Apsheron plants) differ somewhat from the Volga-Dagestan plants by having branches that are scabrous on the sides and probably also other characters.

127. **C. odessana** Prod. in *Contrib. bot. Cluj.* I, 17 (1928) 11; Klok. in *Nauk. Zap. KDU*, VII, 6, 69; Dobrocz. in *Vizn. Rosl. URSR*, 582.—*C. arenaria* auct. fl. ucr. p. min. p. non MB.

Biennial. Stems upright, 30–70(100) cm high, 3–5 (7) less often solitary, rather thick (2.0–5.5 mm thick) at base, branched from base or middle, with leaves arachnoid-white-tomentose especially below, like leaves beneath. Basal and lower cauline leaves more or less long-petiolate, bipinnately incised, with narrowly linear, acuminate, lobes

1.5–4.5 mm wide; apical leaves undivided, sessile like middle. Capitula solitary at tips of stem and its rather long branches, with 1–2 apical leaves. Involucre oblong-ovate, 10–12 mm long, 4.5–6.5 mm in dia, arachnoid-hairy; outer involucral bracts ovate, 3.0–4.5 mm long, about 2.5 mm wide, with appendages up to 2 mm long, having short cusp and 3–4 fimbriae on each side; middle bracts oblong-ovate, 5.5–8.0 mm long, 2.0–3.5 mm wide, with appendages 1.5–2.5 mm long and as wide, having short cusp and 4–5(6) regular fimbriae on each side; inner bracts linear, 9.0–10.5 mm long, 1.5–2.0 mm wide, with appendages about 1.5 mm long, undivided part of appendages grayish-reddish brown, fimbriae of lighter color than central part and longer than its width. Florets pink. Mature achenes 3–4 mm long, blackish; pappus 1.0–2.5(3.0) mm long, shorter than achenes. In other characters, it resembles *C. borysthenica* Gruner. Flowering July to September.

Coastal sands.—*European Part*: Black Sea Region (only along coast of Black and Azov seas, from Vilkov at estuary of Danube to vicinity of Zhdanov). Endemic. Described from vicinity of Odessa. Type in Cluj.

128. *C. borysthenica* Gruner in Bull. Soc. Nat. Mosc. XLI (1866) 426; Kleopov in Vozn. Kiiivsk Bot. Sadu, IX, 74, rest.; Klok. in Nauk. Zap. KDU, VII, 6, 62; Dobrocz. in Vozn. Rosl. URSR, 582.

524 Biennial. Stems upright, 25–120 cm high, solitary or 2–5, branched from base or middle, cylindrical below, ribbed-sulcate above, scabrous along ribs, not entirely densely woolly-arachnoid. Basal and lower cauline leaves petiolate, pinnately or bipinnately incised with oblong or oblong-ovate terminal lobe, terminating short cusp; middle and upper leaves sessile, pinnately incised, with linear, acuminate lobes, sometimes with 1–2 teeth at base; apical leaves undivided, linear or narrowly linear; all leaves scabrous from small, sharp bristles and with dense punctate glands. Capitula solitary at tips of stems and branches, subtended by 1–2 leaves shorter than involucre. Involucre oblong-ovate, 9–12 mm long, 5–6 mm in dia, weakly arachnoid-hairy; outer involucral bracts ovate, 3–6 mm long, 2.5–3.0 mm wide, with apical appendage bearing short cusp and 3 short fimbriae on each side; middle bracts oblong-ovate, 6–9 mm long, about 3 mm wide, with (3) 5 prominent purple veins on outer side; appendages of middle bracts about 2 mm long and 2.5–3.5 mm wide, with cusp up to 1 mm long and 4–5 parallel fimbriae on each side, rather broad at base, with irregularly small toothed, scarious border; central part of appendages of middle and outer bracts triangular or ovate-triangular, yellowish-brown at base with more or less distinctly dark purple spots; inner bracts linear or

narrowly linear, 10–11 mm long, 1.0–2.5 mm wide, with 3 conspicuous veins on outer side, with scarious border and apical appendage, bifid, 1.5–2 mm long and about 1 mm wide, with short cusp in its deep notch, both appendage lobes toothed or with 2–3 short fimbriae. Florets light purple; corolla of peripheral florets about 16 mm long, of central florets about 12 mm long. Achenes 2.5–3.5 mm long, blackish, with whitish ribs; pappus as long as achene or slightly shorter. Flowering June to September.

River sands, rarely on granite outcrops (distinct form).—*European Part*: Upper Dnieper (south), Middle Dnieper (west), Black Sea Region (west). This species is endemic to sands of Dnieper Basin and Southern Bug. Described from vicinity of Aleksandrovsk (now Zaporozhy). Type in Leningrad.

Note. The unique form reported from the granite out crops along the Southern Bug deserves attention; it has distinct spots on the appendages of the involucre bracts.

129. *C. savranica* Klok. in *Nauk. Zap. KDU*, VII, 6 (1948) 67 (ucrainice), 80 (latine); *Dobroc. in Vozn. Rosl. URSR*, 582.

525 Biennial. Stems upright or ascending at base, 30–60 cm high, solitary branched from below or above middle; branches few, ribbed-sulcate from base, distinctly tetraquetrous above, sharply scabrous along ribs, all whitish-arachnoid-hairy throughout. Basal leaves to 12 cm long, with petiole 4–6 cm long, bipinnately incised with linear or narrowly linear, acuminate, terminal lobe; lower cauline leaves also bipinnately incised, short-petiolate, with linear auricles at base of petioles, middle sessile, pinnately incised, auriculate; apical leaves undivided, linear, 5–10 mm long; terminal lobe of pinnately incised leaves oblong-obovate, oblong or linear, 0.8–4.5 mm wide, with obtuse, triangular cusp; all leaves grayish from arachnoid pubescence and sharply scabrous from thin bristles. Capitula solitary, at tips of stem and short branches 1–3 cm long or subsessile, subtended by 1–2 apical leaves. Involucre oblong-ovate, 12–15 mm long, 5–6 mm in dia, characteristically dichromatic from dark purple involucre bracts and dull colored appendages; outer involucre bracts ovate, about 3 mm long, their appendages cuspidate, longer than 3–4 short fimbriae on each side; middle bracts with 5 veins on outer side, oblong-ovate, 7–10 mm long, 2.5–3.0 mm wide, their appendages to 2 mm long and 2.7 mm wide, decurrent on margin, short-cuspidate, with parallel arcs of very regular, 6–8 fimbriae on each side, appressed to bract; scarious auricles below last row of fimbriae not distinct; inner involucre bracts with 3 veins on outer side, narrowly linear, 9–12 mm long, 0.75–2.0 mm wide, with bifid appendage 1.0–1.5 mm long and as wide having short cusp in notch between lobes. Florets pink. Achenes 2.75–

3.5 mm long, olive-brown with whitish rib; pappus 2.0–2.75 mm long, shorter than achenes. Flowering July to August.

River sands.—*European Part*: Middle Dnieper (Odessa Region, village of Puzhaikovo on Savran River). Endemic. Type in Kiev.

Note. So far plants are known only from the reported locality.

Series 3. Ovinæ Dumb. in Dokl. Akad. Nauk Arm. SSR, V, 2 (1946) 48, ampl. Klok.—Sect. *Acrolophus* d) *Arenariae* Hayek, Centaurea-Art. Österr.-Ung. (1901) 4, 94 p. p.—Lithophilous xerophytes. Involucre oblong-ovate to almost cylindrical, 3–6(8) mm in dia, usually considerably narrower and longer than in plants of preceding series. Involucral bracts with 3, less often 5 veins; bract appendages fimbriate with indistinctly toothed, scarious auricles below crest of fimbriae; pappus considerably shorter than achenes, more or less reduced.

Apparently, a composite series subject to further division. Its Transcaucasian species are distinguished by more ovate involucre and stiff fimbriae on the appendages.

- 526 130. *C. besseriana* DC. Prodr. VI (1837) 585; Ldb. Fl. Ross. II, 2, 705; Klok. in Nauk. Zap. KDU, VII, 6, 72; Dobrocz. in Vozn. Rosl. URSR, 582.—*C. arenaria* var. *besseriana* Schmalh. Fl. II (1897) 129.

Biennial. Stems 1–3, upright or often ascending, 20–45 cm high, branched from base or middle, ribbed-sulcate, tetraquetrous above, along ribs sharply scabrous, with leaves weakly arachnoid-hairy. Basal leaves rather long-petiolate, bipinnately incised with narrowly linear to almost filiform terminal lobe; lower cauline leaves short-petiolate, pinnately or bipinnately incised with lobes to 2 mm wide; apical leaves undivided, narrowly linear. Capitula solitary at tips of stems and short branches, with 1–2 subtending leaves. Involucre ovate cylindrical, 10–12 mm long and 5–6 mm in dia, weakly arachnoid-hairy; outer involucral bracts ovate, 3.0–3.5 mm long, their appendages about 2 mm long, terminating in cusp and on each side bearing upto 6 fimbriae shorter than acute; middle bracts oblong-ovate, 6–8 mm long with 3 less prominent veins on outer side, their appendages 2.0–2.5 mm long, with short cusp and below it with 4–6 regular fimbriae on each side, scarious below fimbriae, with finely toothed auricles; central part of appendages triangular, brownish-yellowish, with dark purple spots at base along veins; inner bracts narrowly linear or linear, to 10 mm long and 2 mm wide, with 1–3 veins on outer side, their appendages oblong, 2.0–2.5 mm long, narrowed at apex and terminating in very short cusp in shallow notch between two lobes. Florets light purple; corolla of peripheral florets 15–17 mm long, of central florets 10–12 mm

long. Achenes (2.5)2.75–3.25 mm long; pappus 2.0–2.5 mm long, shorter than achenes. Flowering June to August.

Limestones and loessic slopes, also on granite outcrops.—*European Part*: Middle Dnieper (southwest), Bessarabia, Black Sea Region (west). Endemic. Described from Podolye. Type (cotype) in Kiev.

131. *C. lavrenkoana* Klok. in *Nauk. Zap. KDU*, VII, 6 (1948) 73 (ucrainice), 81 (latine); *Dobrocz. in Vizn. Rosl. URSR*, 582.—*C. ovina* auct. fl. ucr. non Pall.

527 Biennial. Stems 1–3, upright, 25–65 cm high, branched above or below middle, sharply scabrous above along ribs, with leaves rather densely arachnoid-hairy. Basal leaves petiolate, 8–14 cm long, bipinnately incised; lower cauline leaves short-petiolate, pinnately or bipinnately incised, others sessile, pinnately incised; apical leaves undivided; terminal lobe of pinnately incised leaves linear or narrowly linear, acuminate; all leaves acutely scabrous and punctate-alveolate. Capitula solitary at tips of stems and very many branches, 2–5 mm long or to 2 cm long, with 1–2 linear, subtending leaves. Involucre oblong (almost cylindrical), conical at base, 8–11 mm long, 3–5 mm in dia, arachnoid-hairy, often dark purple in upper part, with regularly fimbriate apical appendages; central part of appendage narrowly triangular, blackish or dark brown, narrowed into terminal more or less recurved, short cusp; lateral fimbriae lighter in color brownish-yellowish; middle bracts oblong-ovate or linear, 4.0–7.5 mm long, 1–2 mm wide, with 1.5–3.0 mm long and as wide appendages terminating in short, weakly recurved cusp, with regular, 4–7 long fimbriae on each side and in addition 2–3 short fimbriae below; inner bracts narrowly linear or linear, 7–10 mm long, 0.75–1.25 mm wide, with apical appendage 1.5–2.0 mm long and 0.5–1.0 mm wide, terminating in cusp to 1 mm long; all bracts three-veined. Florets pink. Achenes 2.5–3.0 mm long; pappus 1.5–2.0 mm long. Flowering June to August.

Chalk, limestone and shale outcrops.—*European Part*: Black Sea Region (east), Lower Don (west). Endemic. Type in Kiev.

Note. This species was first noticed by V.M. Czernyaev, who designated it in the herbarium as a separate chalk variety of *C. ovina* Pall. or *C. tenuiflora* DC.

132. *C. steveniana* Klok. in *Addenda XXVII*, 616.—*C. caprina* auct. fl. taur. non Stev.

Biennial. Stems to 80 cm high, more or less cylindrical and glabrous below, ribbed, and scabrous above along ribs from fine spinous bristles, with leaves arachnoid hairy more or less strongly branched with divaricate but mostly upward-spreading branches. Basal and lower

cauline leaves petiolate, bipinnately incised, densely setose beneath spinous bristles with 0.2–0.3 mm long; terminal leaf lobe oblong-linear, oblong-lanceolate or obovate, to 20 mm long and 3–4 mm wide; middle leaves sessile, pinnately incised, with 1–3 pairs of undivided or lobed (submedian leaves) segments. Capitula solitary at tips of branches 3–12 cm long. Involucre oblong-ovate, (8) 10–12 mm long, 5–6 mm in dia; involucre bracts ovate to linear, 3.0–9.5 mm long with 1.0–2.5 mm wide appendages; with 3–5 veins; appendages round to elliptical (in inner bracts), 1.2–2.7 mm wide, with rather soft cusp 0.2–1.2 mm long; appendages of inner bracts with very short cusp not exerted from apical notch, outer and middle bracts with 2–5 pairs of regular whitish fimbriae, about 0.5–2 mm long and wide, more or less toothed or irregularly incised scarious auricles below; inner bracts except central part with scarious finely toothed auricles separated by notch, central part of appendage ovate-lanceolate, reddish-brown or dull purple. Florets pinkish-purple; corolla of peripheral florets about 14 mm long, of central florets 11–12 mm long. Achenes 2.5–3.0 mm long and 1.0–1.4 mm wide, whitish, without or with strongly reduced pappus about 0.5 mm long. Flowering June to August.

Coastal shell sands and rubble slopes.—*European Part*: Crimea (southern coast). Endemic. Described from Eupatoria. Type in Kiev.

Note. This plant is known by the name *C. caprina* Stev. However, the authentic specimens of the latter species, collected by Christian Steven and preserved in the herbarium of the V.L. Komarov Botanical Institute of the Academy of Sciences of the USSR, markedly differ by having a much longer and stiffer, recurved cusp of the appendage and in the over-all habit are more similar to *C. diffusa* Lam. These, evidently, are a hybrid form of *C. steveniana* × *C. diffusa* with a predominance of characters of *C. diffusa* Lam. It is not possible to identify it with our species, which is quite widespread on the southern coast.

133. *C. koktebelica* Klok. in Addenda XXVII, 617.

Biennial. Stems few, upright, 25–70 cm high, almost cylindrical at base, ribbed-sulcate above, acutely scabrous along ribs from conical tubercles, rather densely floccose-arachnoid-hairy when young, later glabrescent, divaricately branched from base, branches numerous. Basal and lower cauline leaves petiolate, pinnately incised to parted, arachnoid-hairy to villous, sharply scabrous beneath and along margin from spinous bristles; terminal lobes (segments) of leaves 2–15 mm long, 1–4 mm wide, acuminate or tiny-cuspidate; middle leaves pinnately divided with linear or narrowly linear, acuminate or cuspidate lobes; apical leaves undivided, linear or narrowly linear, cuspidate, recurved like lobes of middle leaves. Capitula some sessile, others subsessile,



aggregated, often solitary at tips of branches to 4.5 mm long. Involucre oblong ovate, about 9 mm long, 3.5–4 mm in dia; involucre bracts 530 oblong-ovate to narrowly linear, 2.5–8.5 mm long, with appendages 0.8–1.7 mm wide and 1–5, mostly 3, veins, green at flowering; middle and inner bracts usually purple, their appendages round, 1.5–2.5 mm long, 1.5–3 mm wide, cuspidate; cusp, 0.5–1.3 mm long and (in middle involucre bracts) with 4–6 pairs of regular fimbriae 1–1.5 mm long, with weakly developed toothed scarious auricles at base below fimbriae; central undivided part of appendage triangular, yellowish, often with dark, reddish-brown-purple spot at base; at fruiting entire involucre brownish-yellow. Florets purple; corolla of peripheral florets 12–13 mm long, of central florets, 9–10 mm long. Achenes 3.1–3.2 mm long, about 1.5 mm wide, olive-reddish-brown, with strongly reduced pappus 0.1–0.2 mm long. Flowering August to October.

Wormwood steppes.—*European Part*: Crimea (east). Endemic. Described from vicinity of village of Planersky. Type in Leningrad.

134. *C. vicina* Lipsky. in Tr. Peterb. Bot. Sada, XIII (1894) 312.

Biennial. Stems 35–60 cm high, ribbed, scabrous along ribs from scattered sharp tubercles, densely arachnoid-pubescent, white-tomentose below, divaricately branched, with long upward-spreading branches. Basal and lowermost cauline leaves petiolate, bipinnately incised, with linear terminal lobes; middle cauline leaves sessile, pinnately parted, with 3–5 pairs of lateral segments; segments narrowly linear, revolute, sharply scabrous beneath and along margin; floriferous branches 2.5–11.0 cm long, 5–25, weakly leafy. Involucre oblong-ovate, about 10 mm long and 6 mm in dia, whitish-yellowish, arachnoid-hairy; outer and middle involucre bracts oblong-ovate, 3–7 mm long including appendage, 1.5–3 mm wide, and with 3 inconspicuous veins; appendage broadly ovate, 1.5–2.5 mm long and 2–3.5 mm wide, with cusp to 0.5 mm long, with toothed, scarious auricles at base, fimbriate above with 4–5 fimbriae on each side to 1 mm long; central part of appendage triangular, yellowish, with inconspicuous dull reddish-brown spots at base; inner bracts linear, about 8 mm long, 1–1.5 mm wide, with oblong-lanceolate appendages 1.2–1.5 mm long. Florets purple pink; corolla to 15 mm long. Achenes oblong-cuneate, 2.3–2.6 mm long, 1–1.2 mm wide, blackish, with yellowish ribs; pappus 0.3–1.0 mm long, undeveloped. Flowering June to August.

Stony slopes.—*Caucasus*: Western Transcaucasia (in Novorossiisk region). Endemic. Described from Novorossiisk. Type missing (?).

135. *C. ovina* Pall. in Willd. Sp. pl. III, 3 (1803) 2292; DC. Prodr. VI, 585; Schmalh. Fl. II, 122 p. p.; Grossh. Opređ. Rast. Kavk.

501.—*C. intacta* Ldb. Fl. Ross. II, 2 (1845) 705; Grossh. Fl. Kavk. IV, 219.

Biennial. Stems 1–3, upright, about 50–75 cm high, sharply ribbed, deeply sulcate, sharply scabrous along ribs from spinous bristles, more densely arachnoid-hairy, branched from about middle with upward-spreading branches and divaricate branchlets of second and third order. Basal and lowermost cauline leaves petiolate, bipinnately incised, grayish from villous arachnoid pubescence, sharply scabrous beneath; terminal lobes oblong-linear to oblong-obovate, to 15 mm long and 0.8–2.0 mm wide, acuminate; middle cauline leaves sessile, pinnately parted with 2–6 segments or divided with small, shortly linear lateral lobes and oblong; terminal lobe to 3–4 mm wide; apical leaves undivided, linear, to 20 mm long and about 1 mm wide. Floriferous branches 2–14 cm long; capitula solitary at tips of branches. Involucre oblong-ovate, 10–11 mm long, 5–6 mm wide; outer and middle involucre bracts ovate or oblong, 3–8 mm long including appendage, 1.5–2.5 mm wide, greenish-yellowish, with 3–5 veins, their appendages broadly ovate to triangular, 2–3 mm long, 2.5–4 mm wide, cuspidate, with spinescent cusp 0.9–1.5 mm long, and thin-scarious toothed auricles at base, fimbriate above, with regular 5–6 fimbria on each side, to 1.5–2 cm long; central part of appendage ovate-triangular, light reddish-brown; inner bracts linear or narrowly linear, 7.5–9.0 mm long, 0.7–1.7 mm wide, with ovate-lanceolate, scarious appendage 1.5–2.0 mm long, 1.0–1.5 mm wide, lacking cusp and fimbria. Florets light purple; corolla of peripheral florets about 15 mm long, of central florets about 12 mm long. Achenes oblong, about 3.0–3.2 mm long and 1.3 mm wide, pappus about 1.5 mm long. Flowering June to August.

Stony montane slopes.—*Caucasus*: Dagestan, Eastern Transcaucasia. Endemic. Described from eastern Georgia. Type lost.

Note. Apparently an aggregate species, requiring further study. Plants included in this species exhibit a fairly variegated picture of variation in all characters, only partly explained by hybridization.

136. *C. gulissashvili* Dumb. in Dokl. Akad. Nauk Arm SSR, V, 2 (1946) 48.

Biennial or short-lived perennials. Root string-like, woody, 7–15 mm in dia. Stems 1–5, upright, 25–80 cm high, obtuse-ribbed and sulcate, scabrous along ribs from obtuse tubercles, arachnoid-tomentose below, sparsely arachnoid-hairy above, branched almost from base, with long spreading branches. Basal and lowermost cauline leaves 10–20 cm long, petiolate, bipinnately incised with incised second order segments, arachnoid-tomentose, especially on petiole or sparsely arachnoid-hairy, sharply scabrous beneath and along margin of lobes from

- 532 spinous bristles; terminal lobes of leaves ovate-triangular to oblong-elliptical or lanceolate, to 7 mm long and 2.0–3.5 mm wide, obtuse or sub-obtusely acuminate; middle cauline leaves sessile, pinnately incised with lobed auricle at base and oblong-linear or lanceolate, acuminate segments; apical leaves linear or linearly lanceolate, acute; all leaves punctate-glandular. General inflorescence obpyramidal; capitula solitary at tips of less densely leafy branches 2–17 cm long, about 17–22 mm long including florets. Involucre oblong-ovate, 11–13 mm long, 6–8 mm in dia, dichromatic; involucre bracts yellowish-brownish, outer ones with appendages, about 3–4 mm long; appendage weakly demarcated from bract, lanceolate, yellowish-brown with 2–3 pairs of stiff, whitish fimbriae and larger cusp; middle bracts ovate, 4–7 mm long, 3–3.5 mm wide; with 5–7 veins, and scarious border, their appendages broadly ovate, about 3–4 mm long, 4–5 mm wide with about 0.7–2 mm long cusp, 4–7 pairs of regular fimbriae, 1.5–2.5 mm long, and with scarious, toothed or irregularly incised auricles, at base; tips of appendages cuspidate, recurved; central part of appendage dark reddish-brown. Florets about 15 mm long. Achenes oblong, 3–3.4 mm long, 1.2–1.5 mm wide, olive-brown (mature), with pappus 1.1–1.5 mm long. Flowering July to September.

Stony slopes and sands.—*Caucasus*: Southern Transcaucasia. *General distribution*: Probably in Armenia and Kurdistan. Described from Stepanavan (gorge of Dzoraget River). Type in Yerevan.

Note. *C. demetrii* Dumb. (op. cit.), according to the authentic description and the key in *Opredelitel Rastenii Kavkaza* [Keys to the Plants of the Caucasus] by A.A. Grossheim, differs from *C. gulissashvili* Dumb. by having much larger capitula. We did not see the specimens of this species and could not form a definite opinion about it. This species has been described from the Dagestan plains.

Series 4. Cylintraceae (Hayek) Dumb. in Dokl. Akad. Nauk Arm. SSR, V, 2 (1946) 50.—Sect. *Acrolophus* 1) *Cylintraceae* Hayek, Centaurea-Art. Österr.-Ung. (1901) 4, 106.—Involucre cylindrical, 2.5–3.5 mm in dia; appendages of involucre bracts lanceolate, pectinate-fimbriate, terminating in stiff spine, often more or less recurved; pappus usually very short or undeveloped.

137. *C. diffusa* Lam. Encycl. meth. I (1783) 675; DC. Prodr. VI, 586; Ldb. Fl. Ross. II, 2, 706; Boiss. Fl. or. III, 650; Schmalh. Fl. II, 29; Grossh. Fl. Kavk. IV, 220; Iljin in Fl. Yugo-Vost. VI, 433; Dobroc. in Vozn. Rosl. URSR, 582.—*C. parviflora* Bess. Enum. pl. Volhyn. (1822) 35, non Desf.—**lc.**: Hayek, Centaurea.-Art. Österr.-Ung. Taf. VIII, fig. 7.—**Exs.**: GRF No. 421; Fl. exs. reip. Bohem.-Sloven. Nos. 637, 889; Fl. exs. austro-hung. No. 234.

533 Biennial. Stems upright or ascending at base, 15–50 cm high, ribbed-sulcate, strongly branched from base with divaricate branches, with leaves acutely scabrous and weakly arachnoid-hairy. Basal and lower cauline leaves petiolate, bipinnately incised into narrowly linear, acuminate lobes, other leaves sessile; middle cauline leaves pinnately incised; apical leaves undivided, linearly lanceolate, 1–3 mm wide. Capitula solitary at tips of very many branches, 0.5–1.0 or 2.0–3.5 cm long leafy to capitula. General inflorescence paniculate. Involucre ovate-cylindrical 8–10 mm long, 2.5–5 mm in dia; outer and middle involucre bracts greenish or yellowish, with distinct keel in middle and 2 lateral veins on outside; appendages of involucre bracts decurrent on scarious margin, in form of hard brownish triangles with 4–6 stiff fimbriae on each side 1–2 mm long, cuspidate (spiny); spine 3–4 mm long, somewhat recurved; fimbriae and spine yellowish or reddish-brown; inner bracts dull green, linear, with scarious border, and oblong, obtuse or acuminate, entire or irregularly toothed scarious appendage. Florets dull pink or whitish, less often light purple. Achenes 2.5–3.0 mm long, brownish, glabrous; pappus scarcely noticeable, consisting of fewer hairs, or absent. Flowering July to September.

Open places, on stony slopes and coastal sands, as weed.—*European Part*: Middle Dnieper, Bessarabia, Black Sea Region, Volga-Don (south), Lower Don, Crimea; *Caucasus*: all regions? Often introduced in north and other regions not mentioned above. *General distribution*: Balkans-Asia Minor. As introduced plant in many regions of southern and Central Europe. Native of Asia Minor. Described from western Europe. Type in Paris.

Note. Very readily hybridizes with many species. Hybrids are known with *C. micranthos* Gmel., *C. majorovii* Dumb., *C. lavrenkoana* Klok., *C. sterilis* Stev., *C. margarita-alba* Klok., *C. protomargaritacea* Klok., *C. paczoskyi* Kotov ex Klok., and others. Some of these hybrids have been described by me as separate species, which is indicated in the corresponding places in the treatment of this subgenus and the subgenus *Phalolepis* (Cass.) Dobrocz.

138. *C. aemulans* Klok. in Addenda, XXVII, 617.—*C. squarrosa* auct. fl. taur. non Willd.

Biennial. Root string-like, vertical, strong. Stem solitary, upright, 30–60 cm high, cylindrical in lower part with thin ribs and furrows, ribbed and deeply sulcate above especially on branches, more or less densely setose along ribs with spinous bristles, rather densely arachnoid-hairy, with leaves arachnoid-tomentose below, branched from base, with numerous strongly divaricate branches. Basal and lowermost cauline leaves petiolate, with pinnately parted or partly undivided

534 segments; terminal lobes oblong, oblong-lanceolate, or obovate, 3–15 mm long, 1–4 mm wide, narrowed at apex into short fine cusp, densely setose along margin and beneath with spinous bristles 0.2–0.3 mm long; middle and upper leaves sessile, pinnately parted, with oblong or linearly lanceolate lobes, attenuate into prickly cusp, their terminal lobe larger than lateral ones, sometimes oblong-obovate; apical leaves at tips of branches oblong-linear or narrowly linear, 1.5–2 mm long and 0.3–0.4 mm wide (below capitulum). Capitula more or less clustered at tips of second-order branches, subsessile or peduncles not surpassing involucre, less often to 2 cm long. Involucre almost cylindrical, 10–12 mm long, 3–3.5 mm in dia, stramineous, weakly arachnoid-hairy; involucre bracts oblong to narrowly linear, with appendage 2.5–10 mm long, 0.5–1.5 mm wide, and 1–3 inconspicuous veins; appendages 2–6 mm long, with apical spine 0.7–4.0 mm long and 3–7 pairs of stiff fimbria 0.3–1.7 mm long; prickly cusp of appendages deflexed and in outer bracts more or less recurved. Corolla purple, pale on withering, 10–12 mm long. Achenes 2.3–2.5 mm long, 0.9–1.1 mm wide, glabrous, lacking pappus. Flowering July to October.

Wormwood steppes and as weed in open places.—*European Part*: Black Sea Region (Melitopol), Crimea (eastern part). *General distribution*: Not determined. Possibly it is endemic to Crimea. Described from vicinity of village of Planersky (Koktebel). Type in Leningrad.

Note. This plant differs quite clearly from *C. diffusa* Lam. by having strongly crowded capitula, longer involucre, and longer and stiffer, mostly recurved apical spines on the appendages, as well as persistently purple florets. Because of these differences, Crimean flora specialists have considered it to be *C. squarrosa* Willd. The latter species was reported for Crimea by S.S. Stankov in the second edition of *Opredelitel* [The Keys] (1957) 419, apparently in place of our species, since *C. squarrosa* does not grow in Crimea.

139. ***C. caspia*** Grossh. Fl. Kavk. IV (1934) 219; *Opred. Rast. Kavk.* 500; Dumbadze in *Dokl. Akad. Nauk Arm. SSR*, V, 2, 50 (latine).

Biennial. Stem 20–40 cm high, ribbed above, scabrous along ribs from conical tubercles, entirely villous-arachnoid-hairy, divaricately branched. Basal and lower cauline leaves petiolate, bipinnately parted, with linear or oblong to oblong-lanceolate, obtuse, or subobtuse, acuminate, terminal lobe 1.5–7.5 mm long, 0.4–2 mm wide, arachnoid-hairy, sharply scabrous beneath and along margin; cauline leaves sessile, auriculate, bipinnately incised and (in upper part) pinnate, lobes linearly lanceolate to narrowly linear, 1.5–9.0 mm long and 0.5–1.5 mm wide, acuminate or subobtusely cuspidate. Capitula solitary at tips of rather short (to 5 cm long) branches. Involucre ovate-cylindrical,

535 10–15 mm long, 4–6 mm in dia, almost monochromatic, villous-arachnoid; involucre bracts oblong-ovate to narrowly linear appendages 2.5–13.0 mm long, with 1.0–1.7 mm wide with 3 veins, greenish; appendages of outer and middle bracts ovate to round, 1.5–4.0 mm long, 1–4 mm wide, with 0.5–2.0 mm long cusp, fimbriate, with regular, like cusp yellowish fimbriae 0.4–1.7 mm long, 3–9 on each side, more or less recurved; central thick part of appendage triangular, ochreous; appendage of inner bracts ovate-lanceolate, 1.5–3.0 mm long, 0.4–2.5 mm wide, toothed. Corolla purple-pink, of peripheral florets 18–19 mm long, of central florets 15–16 mm long. Achenes oblong, about 3.5 mm long, 1.2 mm wide, brown; pappus 2.5–3.0 mm long. Flowering June to July.

Coastal sands.—*Caucasus*: Dagestan, Eastern Transcaucasia, Talysh (all along Caspian Coast). *General distribution*: Possibly found in northern part of Iran. Described from Dagestan. Type in Baku (?).

Note. A unique species, maybe not even belonging to this series.

Series 5. Squarrosae Klok.—Sect. *Acrolophus* m) *Squarrosae* Hayek, *Centaurea*-Art. Österr. Ung. (1901) 5 p. p. nomen.—Weakly differing from the preceding series. Capitula partly aggregated in small clusters at tips of branches; appendages of involucre bracts much stiffer, arcuate at tip.

140. *C. squarrosa* Willd. Sp. pl. III, 3 (1803) 239; Grossh. Fl. Kavk. IV, 220 and Opred. Rast. Kavk. 500; Dumbadze in Dokl. Akad. Nauk Arm. SSR, V, 2, 50.—*C. virgata* var. *Squarrosa* Boiss. Fl. or. III (1875) 651.—*Acrolophus Squarrosus* (Willd.) Nevski in Tr. Bot. Inst. Akad. Nauk SSSR, Ser. 1, 4 (1937) 291.

Biennial. Stems solitary or few, upright, about 35–70 cm high, ribbed-sulcate, scabrous along ribs, quite densely arachnoid-hairy, divaricately branched almost from base or middle. Basal and lower cauline leaves petiolate, bipinnately incised, not persisting at flowering time; middle leaves sessile, auriculate, pinnately incised with 1–5 pairs of lateral segments, arachnoid-hairy, very weakly or strongly scabrous beneath and along margin from undeveloped bristles, leaf lobes divergent, linear to oblong-lanceolate 2–18 mm long, 0.5–2.2 mm wide, obtusely acuminate or cuspidate; apical leaves undivided, oblong-linear to obovate, 1–22 mm long, 0.4–3.7 mm wide. Capitula numerous, at tips of short branches to 1.5–4 cm long or partly often sessile and crowded at tips of branches. Involucre oblong-ovate to almost cylindrical, 9–11 mm long, 2.5–3.5 mm in dia, usually dichromatic, mottley, arachnoid-hairy; involucre bracts oblong-ovate to linear, 2–10 mm long, 0.8–2 mm wide, yellowish or pale purple, with 3

536 often inconspicuous veins; appendages of involucre bracts broadly ovate to oblong-elliptical (in inner bracts), 1.5–3.5 mm long, 1–4 mm wide, at apex (in outer and middle) with yellow, prickly cusp 0.5–2 mm long, and on sides with stiff, yellowish fimbriae to 1.2–1.7 mm long, 4–6 on each side; central part of appendage lanceolate, very thick, yellowish or often dull to dark purple; cusp on middle appendages recurved; appendages of inner bracts semi-membranous, finely toothed. Florets pink or pinkish-purple; corolla 9–14 mm long. Achenes 2.4–4.2 mm long, 1.3–1.7 mm wide, olive-dark-brown with yellowish stripes on ribs; pappus 1.0–2.7 mm long. Flowering June to August.

Stony slopes and weedy places.—*Caucasus*: Dagestan, Eastern and Southern Transcaucasia, Talysh; *Soviet Central Asia*: mountainous Turkmenia, Pamiro-Alai, Tien Shan. *General distribution*: Asia Minor, Armenia and Kurdistan, Iran, Afghanistan. Described from “the East”. Type in Berlin.

Note. This species is highly variable and probably is an aggregate. T.A. Dumbadze described four varieties from the Caucasus, which, however, do not have their own ranges.

Series 6. Aggregatae Dumb. in Dokl. Akad. Nauk Arm. SSR, V, 2 (1946) 50.—Sect. *Acrolophus* m) *Squarrosae* Hayek, Centaurea-Art. Österr.-Ung. (1901) 5 p. p. nomen.—Montane xerophytes; leaves lyrate or pinnately incised, with large terminal lobe; capitula in dense clusters of 5–10 at tips of primary branches; involucre almost cylindrical; pappus not shorter than achenes.

The Iranian species differ sharply from the other members of the subgenus.

141. **C. albida** C. Koch. in Linnaea, XXIV (1851) 433; Grossh. Fl. Kavk. IV, 219 and Opred. Rast. Kavk. 500; Dumbadze in Dokl. Akad. Nauk Arm. SSR, V, 2, 50.—*C. aggregata* var. *albida* Boiss. Fl. or. III (1875) 653.—**Exs.**: Fl. cauc. exs. No. 223.

Biennial, perennial. Stems few or solitary, upright, 20–70 cm high, ribbed, smooth, with leaves entirely white-arachnoid-tomentose, branched above middle, with upward-spreading branches. Basal and lower cauline leaves petiolate, bipinnately incised or sometimes pinnately parted; terminal lobe of leaves oblong or oblong-obovate, 3–20 mm long, 1.5–5 mm wide, attenuate into short, triangular cusp; middle cauline leaves pinnately parted to almost lyrate, with large, oblong-elliptical terminal lobe, like lower cauline leaves scabrous or setose beneath and along margin; terminal lobe smooth, oblong, 2–5 mm long, 0.8–1.5 mm wide, obtusely cuspidate, like lobes of middle leaves. Capitula usually all sessile, aggregated in dense clusters of 5–10 at

537 tips of branches. Involucre ovate, cylindrical, weakly narrowed toward apex, 11–12 mm long, 3–3.5 mm in dia, monochromatic, reddish-brown-yellowish; involucre bracts ovate to linear, 2–9 mm long, 1.0–1.5 mm wide; with 3 prominent veins, greenish or yellowish, weakly arachnoid-hairy; appendages 1.0–2.5 mm long, 1–4 mm wide, outer and middle ones with acute angled, reddish-brown, triangular, central part and short (0.4–0.7 mm long) but rather thick cusp and 2–4 pairs of regular yellow fimbriae. Corolla light-purple, 12–13 mm long. Achenes oblong, 2.5–3.0 mm long, 1.2–1.5 mm wide, olive-brown; pappus 2.5–3.5 mm long. Flowering June to August.

Stony mountain slopes.—*Caucasus*: Western Transcaucasia (south). Specific localities from beyond USSR unknown. *General distribution*: Armenia and Kurdistan. Described from former Artvin District. Type in Leningrad.

142. **C. aggregata** Fisch. and Mey. in DC. Prodr. VI (1837) 585; Grossh. Fl. Kavk. IV, 219 and Opred. Rast. Kavk. 500; Dumbadze in Dokl. Akad. Nauk Arm. SSR, V, 2, 50.

Biennial, perennial. Stems solitary or few (2–8), upright or almost ascending, 40–100 cm high, ribbed-sulcate, sharply scabrous along ribs in upper part, less densely floccose-arachnoid-hairy, branched mostly above middle but often also from below. Basal and lower cauline leaves petiolate, pinnately incised, with large, oblong elliptical, terminal lobe and similar or oblong, much smaller lateral lobes, white-tomentose beneath when young, later glabrescent, green; cauline leaves mostly lyrate with very large terminal lobe and small oblong to linear lateral lobes, scabrous-setose on both sides and with traces of arachnoid-tomentum disappearing by flowering time; apical leaves smooth, oblong, at apex attenuate into very short, triangular cusp, as also many lobes of lower leaves. Capitula sometimes solitary on short branches, mostly aggregated at tips of primary branches, in dense clusters of 3–10, and then sessile. Involucre oblong-ovate or cylindrical, 10–13 mm long, 3–4 mm in dia, monochromatic, reddish-brown-yellow or mottley; involucre bracts ovate to linear, 2.7–10.5 mm long (including appendage), 1–2 mm wide, with 3 prominent veins, greenish, yellowish, or inner ones often pale purple; appendages broadly ovate (in outer bracts) to round and oblong-lanceolate (in inner bracts), 1.5–3.0 mm long, 0.7–5 mm wide, light yellow or often reddish brown in outer and middle bracts, with short, somewhat thick cusp 0.4–0.7 mm long and pectinate, 4–7 pairs of regular fimbriae along margin 0.5–2 mm long; appendage of inner bracts scarious, toothed. Corolla light-purple, of peripheral florets 14–16 mm long, of central florets 11–12 mm long.

538 Achenes 2.5–2.9 mm long, 1.3–1.4 mm wide, light reddish-brown, with whitish ribs; pappus 2.5–2.9 mm long. Flowering July to August.

Stony slopes and meadows; in mid-montane zone—*Caucasus*: Southern Transcaucasia. *General distribution*: Iran. Described from bordering regions of Iran. Type in Leningrad.

Subgenus 16. Phalolepis (Cass.) Dobroc. in Bot. Zhurn. Akad. Nauk URSR, VI, 2 (1949) 63.—*Phalolepis* Cass. in Dict. Sc. nat. L (1827) 248.—*Centaurea* sect. *Phalolepis* (Cass.) DC. Prodr. VI (1837) 568. p. p.—Capitula mostly quite large; involucre bracts coriaceous with large, round, entire or weakly toothed appendages; corolla pink, purple, light yellow, or white; pappus as long as achene, slightly longer, or much shorter. Biennials. rarely perennials; leaves arachnoid-hairy, simple, pinnately or bipinnately incised.

Type of subgenus: *C. alba* L.

1. Appendages [of involucre bracts] not sharply differentiated into central thick part and scarious border (former gradually merging into latter); pappus more or less as long as achene, much longer, or slightly shorter. Obligate psammophytes of steppe zone of European part of USSR (one species in this zone found on granite outcrops) 2.
- + Appendages [of involucre bracts] more or less sharply differentiated into central thick coriaceous part with all veins passing through it and thin scarious, entirely transparent border; pappus always much shorter than achene (usually half or less). Lithophilous plants of mountains of Crimea and Caucasus 14.
2. Involucre 8–10 mm long; appendages of middle involucre bracts cuspidate. Achenes 2.0–2.5 mm long with distinctly shorter pappus. Growing on granite outcrops 143. *C. pseudoleucolepis* Kleop.
- + Involucre much larger (if not so large, then its middle bracts not cuspidate); achenes also with larger pappus. Growing on sands... 3.
3. Appendages of involucre bracts silky-lustrous, almost entirely opaque, and translucent only along margin 4.
- + Appendages of involucre bracts with oily or micaceous luster, mostly transparent and thin, thick only at base 6.
4. Corolla creamish, almost white, never pink; achenes lenticular, whitish, not blackening at maturity 145. *C. margaritacea* Ten.
- + Corolla purple or pink, sometimes very pale but only in individual specimens; achenes almost tetraquetrous, blackening at maturity
..... 5.
- 539 5. Involucre globose, 15–20 mm in dia, appendages of involucre bracts bright white; corolla purple, bright
.....

- 146. **C. margarita-alba** Klok.
- + Involucre somewhat oblong, 11–16 mm long, to 15 mm in dia. appendages of involucre bracts yellowish to light orange; corolla pink, pale 144. **C. proto-margaritacea** Klok.
6. Appendages large, to 10 mm long and wide, very thin, scarios, dorsally carinate and cuspidate; narrow band of opaque tissue of appendage extending along keel up to very tips; all or at least some appendages incurved at apex, forming unique, divergent valves, but flattened below 7.
- + Appendages small, less thin, keel and cusp not developed or inconspicuous; opaque tissue of appendage triangular, basal but not reaching up to apex; appendages more or less converging and not incurved at apex, forming valves 8.
7. Corolla creamish, almost white; involucre large, upto 25 mm in dia, with spreading appendages; stem sharply scabrous above 148. **C. appendicata** Klok.
- + Corolla pink; involucre smaller, up to 16–17 mm in dia, mostly with somewhat flat appendages; stem smooth above 147. **C. konkai** Klok.
8. Corolla pink or pale purple; appendages, at least in inner involucre bracts, dichromatic, with dark purple basal spot; stem more or less scabrous above along ribs 9.
- + Corolla creamish, almost white or (in one species) light yellow; appendages usually monochromatic, yellowish or light yellow; stem smooth above 12.
9. Appendages yellowish, stiff, strongly convex, almost hemispherical, with dark inconspicuous spot at base or entirely monochromatic, corolla pale pink to almost white 149. **C. proto-gerberi** Klok.
- + Appendages whitish or greenish softer and less convex, almost all with well-developed dark basal spot; corolla brighter 10.
10. Involucre about 10–13 mm long and 6–10 mm in dia; appendages of middle involucre bracts elliptical, greenish, plants tall (up to 100 cm or more) with slender, virgate stems and long lower leaves divided into very long, narrow segments 152. **C. breviceps** Iljin
- + Involucre longer, appendages of middle involucre bracts more or less round, not greenish. Plants shorter with much thicker branches and smaller leaves with shorter, equally broad lobes or segments 11.
- 540 11. Involucre subglobose, 12–15 mm long, 10–16 mm in dia; achenes 4–5 mm long, light brown at maturity, not blackening 150. **C. donetzica** Klok.

- + Involucre ovate or oblong-ovate, 15–18 mm long, 10–14 mm in dia; achenes 3.5–3.7 mm long, blackening at maturity 115. **C. pineticola** Iljin.
- 12. Involucre 15–27 mm long, 15–25 mm in dia, often compressed globose; involucreal appendages weakly convex and entirely covering bracts, large, in central florets about 6–7 mm long and 8–9 mm wide 155. **C. dubjanskii** Iljin
- + Involucre smaller and not compressed above; involucreal appendages strongly convex and not entirely covering bracts, smaller and not wider than long 13.
- 13. Corolla creamish; appendages of involucreal bracts yellowish, all monochromatic. Mature achenes blackish; pappus somewhat shorter than achene, 3–4 mm long 154. **C. gerberi** Stev.
- + Corolla light yellow; appendages of involucreal bracts darkish yellow, middle and inner often with purple spot at base. Mature achenes whitish; pappus much longer than achene, 4.5–7.0 mm long 153. **C. paczoskyi** Kotov. ex Klok.
- 14. All appendages of involucreal bracts with more or less developed cusp; capitula fewer (to 10 per stem). Plants of Crimea 15.
- + Middle and inner involucreal bracts with appendages entirely lacking cusp; capitula more numerous. Plants of Caucasus (and one eastern Crimean species) 17.
- 15. Involucre ovate to oblong-ovate, 10–14 mm long, 6–10 mm in dia; stem to 100 cm high. Plants of foothills or southern coast but not alpine, usually biennial 158. **C. sterilis** Stev.
- + Involucre ovate or broadly ovate to globose, much larger; stem to 35 cm high. Perennial alpine plants 16.
- 16. Involucre ovate or broadly ovate, 14–16 mm long, 10–14 mm in dia; appendages of middle involucreal bracts about 3–4 mm long, with large ovate-triangular dark reddish-brown basal spot 157. **C. vankovii** Klok.
- + Involucre broadly ovate or subglobose, 16–22 mm long, 12–21 mm in dia; appendages of middle involucreal bracts about 10 mm long, with oblong-lanceolate light reddish-brown dorsal spot 156. **C. semijusta** Juz.
- 17. Involucre 9–10 mm long and 4–6 mm in dia; appendages of middle involucreal bracts 2.5–3.0 mm long 164. **C. alexandri** Bordz.
- + Involucre and appendages much larger 18.
- 18. Appendages distinctly toothed to almost fimbriate; achenes 3.5–4.5 mm long. Plants of eastern Crimea and Western Transcaucasia 19.

- 541 + Appendages entire or at places indistinctly toothed; achenes 2.5–3.0 mm long. Plants of Eastern and Southern Transcaucasia 21.
19. Segments or terminal lobes of basal and divided cauline leaves to 6 mm wide, linear- or oblong-lanceolate. Involucre 10–16 mm in dia, yellowish, with monochromatic (lacking dark basal spots) appendages; appendages of middle involucre bracts 5–6 mm long. Plants of eastern Crimea 159. *C. sarandinakiae* Illar.
- + Segments or terminal lobes of divided leaves 0.5–3.0 mm wide, narrowly linear to linear-lanceolate. Involucre 8–12 mm in dia, whitish or yellowish-light reddish-brown (predominant color); appendages of involucre bracts with dark (reddish-brown) basal spots; appendages of middle bracts 3–4 mm long. Plants of Western Transcaucasia 20.
20. Involucre whitish 160. *C. novorossica* Klok.
- + Involucre yellowish-light-reddish-brown or reddish-brown-light yellow 161. *C. georgica* Klok.
21. Segments or lobes of basal and lower cauline leaves linear-lanceolate, about 1.5–2.0 mm wide; segments of middle cauline leaves 1–3 mm wide. Involucre compressed, ovate, 12–13 mm long, 11–13 mm in dia 163. *C. transcaucasica* Sosn. and Grossh.
- + Segments of basal and lower cauline leaves pinnatifid, ovate in outline with oblong-ovate (and obovate) lobes, 1.5–5.0 mm wide; segments of middle cauline leaves oblong, 1–5 mm wide. Involucre broadly ovate to subglobose, 11–14 mm long, 10–15 mm in dia, not compressed 162. *C. latiloba* Klok.

Section 1. Pseudophalolepis Klok. in Addenda XXVII, 618; Dobroc. in Bot. Zhurn. Akad. Nauk URSR, VI, 2 (1949) 63, 65 (ucrainice).—Exclusively biennials. Appendages of involucre bracts almost entirely membranous or scarious with small, triangular thicker part at base, less often with narrow band in middle, lacking distinct dark spot, less often with spots, thicker part of appendage indistinctly separated from scarious part; pappus more or less as long as achene, less often slightly longer or much shorter; stems more or less strongly branched; corolla pink, pale purple, creamish or sometimes light yellow.

Type of section: *C. gerberi* Stev.

A palaeopontic relict section, native exclusively to the steppe zone of eastern Europe. Except for one, all the known species of this section are obligate psammophytes; one species grows on granite outcrops. All species appear to be rare and more or less narrowly endemic plants.

542 *Series 1. Pseudoalbae* Dobrocz. in Ukr. Bot. Zhurn. XIX, 1 (1962) 43, descr.; in Bot. Zhurn. Akad. Nauk URSR, VI, 2 (1949) 63, nomen.—Capitula smaller; appendages of involucre bracts transparent, toothed-fimbriate, dorsally carinate, and with small, soft cusp; pappus shorter than in members of other series.

Only one species belongs to this series. It differs sharply from all other members of the section and approaches section *Phalolepis* in some characters.

143. *C. pseudoleucolepis* Kleop. in Izv. Kievsk. Bot. Sada, IV (1926) 26; Dobrocz. in Vozn. Rosl. URSR, 578.

Biennial. Stem upright, about 50 cm high, strongly branched above middle, with leaves weakly arachnoid-hairy. Leaves pinnately and bipinnately incised with narrowly linear, acute, terminal lobe; lower leaves long-petiolate, middle and upper ones sessile, uppermost leaves with larger, narrowly lanceolate, central lobe and 2 small lateral lobes at base. Capitula small, solitary at tips of quite long, leafy branches, forming lax paniculate inflorescence. Involucre ovate, 8–10 mm long, 7–8 mm in dia with conical base [obconical]; involucre bracts yellowish-green, with scarious border; appendages of outer and middle bracts round, convex, transparent, thicker in middle up to tip, opaque, very short-cuspidate; inner bracts with ovate, scarious, apical appendages. Corolla pale pink. Achenes 2.0–2.5 mm long, dark brown, with whitish ribs; pappus shorter than achene, 1.0–2.5 mm long. Flowering July to August.

Granite outcrops.—*European Part*: Black Sea Region (only in Azov Region, in “Kamennye mogily” reserve of Ukrainian Academy of Sciences, former Rozov District, Zaporozhye Region). Endemic. Described from locality mentioned above. Type in Kiev.

Note. This species and the unique yarrow, *Achillea glaberrima* Klok, growing together with it, are strictly endemic to the reserve, covering an area of about 4 km². Both probably were distributed widely at sometime in the Ukrainian low hills area of the Azov uplands but persisted only in the indicated locality, thanks to the more favorable moisture conditions.

Series 2. Margaritaceae Klok.—Appendages of involucre bracts yellowish or lustrous white, silky, almost entirely opaque, transparent only along margin, and with irregular small teeth, convex, with prominent dorsal keel, incurved at apex. Stem tall, very strongly branched.

543 All three species of this series are known only from sands of the lower reaches of the Southern Bug River. The series is undoubtedly relictual, becoming extinct.

144. *C. proto-margaritacea* Klok. in Tr. Inst. Bot. KhDU, I (1936) 81, 102; Dobrocz. in Vizn. Rosl. URSR, 578.—*C. klokovi* Oppermann ex Klok. op. cit.

Biennial. Stem upright, 45–80 cm high, strongly branched, with leaves rather weakly arachnoid-hairy, smooth. Leaves pinnately and bipinnately incised (lower), with narrowly linear to almost filiform lobes, uppermost leaves narrowly linear, undivided, subtending capitula. Capitula solitary, at tips of leafy branches. Involucre short-elliptical or subglobose, 11–16 mm long, 11–15 mm in dia; appendage of involucre bracts yellowish or light orange, membranous, almost entirely opaque, transparent only along margin at base, round or elliptical, to 5–6 mm long and 4–5 mm wide; appendages of middle and inner bracts with dark spot at base, usually convex at flowering time, incurved. Corolla pink to almost white (creamish). Achenes 2.8–4.0 mm long, usually about 3.5 mm, blackish with whitish ribs; pappus to 3 mm long, always distinctly shorter than achenes. Flowering July to September.

Sands.—*European Part*: Black Sea Region (only on sands of Bug estuary below Nikolaev). Endemic. Described from vicinity of Nikolaev. Type preserved in Kharkov; cotype in Leningrad.

Note. We have already expressed the opinion (1936) that this species is a progenitor of both of the following members of this series.

145. *C. margaritacea* Ten. Syll. Fl. Napol. Add. 3 (1831) 628; Klok. in Tr. Inst. Bot. KhDU, I, 84, 100; Dobrocz. in Vizn. Rosl. URSR, 578.—*C. splendens* Lang. and Szovitz in sched, non L.—**Exs.:** Lang and Szovitz, Herb. ruth. No. 115 (sub *C. splendens* L.).

Biennial. Stems upright, 50–120 cm high, strongly branched, with leaves densely arachnoid-hairy, ribbed above and sharply scabrous on ribs. Leaves mostly pinnately incised with narrowly linear lobes 1–2 mm wide; lower leaves bipinnately incised with oblongly linear terminal lobe to 3.5 mm wide; uppermost leaves undivided, linear, subtending capitulum, usually shorter than involucre. Capitula solitary at tips of leafy branches. Involucre compressed-globose, 15–18 mm long and 20–22 mm in dia, yellowish; appendages of involucre bracts round, 6–7 mm long, 7–9 mm wide, silky, yellowish, almost opaque, only at base along margin transparent, translucent with irregular small teeth, dorsally distinctly carinate, terminating in soft, very short cusp in shallow notch at tip of appendage; appendages more or less convex at flowering time, incurved, forming acute head; appendages of middle bracts more or less lacerate. Corolla light creamish, almost white. Achenes 3.5–4.25 mm long, lenticular, whitish or light brown, mono-

chromatic, not blackening at maturity; pappus to 4.5 mm long, somewhat longer than achene or as long. Flowering July to August.

Sands.—*European Part*: Black Sea Region (only on right bank sands of Southern Bug River above Nikolaev). Endemic. Described from vicinity of Nikolaev, evidently from specimens distributed by Lang and Szovitz.

Type probably in Naples; cotypes in various places.

Note. This very rare species has not been found by anyone since P.A. Oppermann, who collected it in 1928 and 1931 between the villages of Solonikh and Pristen. In 1955, D.N. Dobroczaeva conducted an extensive search at this locality but was unable to find it and considered that possibly it was already extinct.

146. *C. margarita-alba* Klok. in Tr. Inst. Bot. KhDU, I (1936)81, 100; Dobrocz. in Vozn. Rosl. URSR, 578.—*C. margaritacea* auct. non Ten.: Schmalh. Fl. II (1897) 121 p. min. p.; Iljin in Izv. Glavn. Bot. Sada SSSR, XXVI, 1 (1927) 4.

Biennial. Root string-like, rather strong. Stem upright, 45–85 cm high, strongly branched above middle, with leaves floccose-arachnoid-hairy, smooth, scabrous only below capitula. Leaves mostly pinnately incised with filiform or narrowly linear lobes to 1 mm wide; lower leaves bipinnately incised with wider lobes, uppermost ones narrowly linear, undivided or with 1–2 teeth at base, subtending capitulum. Capitula solitary at tips of branches. Involucre globose, 15–20 mm wide; involucre bracts coriaceous, yellowish, entirely covered by appendage; appendages larger, to 6–8 mm long, and 8–10 mm wide, membranous, opaque and transparent only along margin at base, pearl-white, silky-lustrous, lacking dorsal keel but with distinct longitudinal vein in middle and often with small triangular ochreous basal spot (more prominent in inner bracts), with fine teeth, with less conspicuous notch at apex, and short soft cusp; most appendages at flowering time involute at apex resembling acute head. Corolla purple. Achenes 3.5–4.0 mm long, blackish with whitish ribs and base; pappus 3–4 mm long, as long as achene or slightly shorter. Flowering July to September.

Sands.—*European Part*: Black Sea Region (only on left bank sands of Southern Bug River in immediate environs of Nikolaev). Endemic. Described from vicinity of Nikolaev (nursery). Type preserved in Kharkov; cotypes in Kiev and Leningrad.

Note. A very rare plant with unusually ornamental involucre. It is in extreme need of *in situ* protection (almost extinct!) and introduction into cultivation. It hybridizes with *C. diffusa* Lam.; one such hybrid form is described by I.K. Paczoski as a separate species, *C. hypanica* Pacz.

545 *Series 3. Appendicatae* Klok.—Appendages of involucre bracts large, scarios, with oily luster, mostly transparent and thin, thick only at base but with narrow band of opaque tissue, reaching apex, with small ochreous or dark purple spot at base, dorsally with inconspicuous keel and with short cusp, not convex in involucre, somewhat flat or incurved at apex as acute valve.

Two endemic Dnieper species belong to this also very distinctive and relictual series.

147. *C. konkae* Klok. in Tr. Inst. Bot. KhDU, I (1936) 93, 100; Dobrocz. in Vozn. Rosl. URSR, 579.

Biennial. Stem about 50 cm high, branched above, with leaves quite weakly arachnoid-hairy, smooth. Leaves pinnately incised with linear lobes to 3.5 mm wide; lobe smooth, along margin sharply scabrous or scabrously serrate from short, acute, upright bristles. Capitula solitary at tips of leafy branches. Involucre subglobose, 15–16 mm long, and to 17 mm in dia; appendages of involucre bracts round (inner) to obreniform (middle and outer); outer appendages large, 6–7 mm long, 8–10 mm wide, with or lacking indistinct spot on dorsal side, spot well-developed in middle and inner appendages, oblong-triangular, ochreous or dark purple, from base extending upward along midrib, except middle thick narrow part; all appendages parchment-like scarios, thin, transparent, dorsally carinate, terminating in distinct soft cusp in apical notch, with irregular small teeth; in involucre at flowering time appendages more or less appressed to bracts and entirely covering them, some outer appendages incurved. Corolla pale purple, 14–16 mm long in central bisexual florets. Achenes 3.5–5.0 mm long, dark brown, with whitish ribs; pappus 4.25–5.5 mm long, often distinctly longer than achenes, but sometimes even shorter. Flowering July to September.

Sands.—*European Part*: Black Sea Region (on left bank of Dnieper from Dnepropetrovsk to Zaporozhye). Endemic. Described from Velikie Kuchugury in floodplain of Konka River. Type preserved in Kharkov; cotype available in Leningrad.

Note. For the most part the range of this species is inundated. The species is preserved, however, on the island that has been formed and, possibly, is still above Dnepropetrovsk (in Dnepropetrovsk, there are collections from the vicinity of the villages of Kurilovka.

148. *C. appendicata* Klok. in Tr. Inst. Bot. KhDU, I (1936) 94, 101; Dobrocz. in Vozn. Rosl. URSR, 579.

546 Biennial. Stems upright, 60–90 cm high, branched above middle with upward-spreading branches, with leaves distinctly arachnoid-hairy,

ribbed above, sharply scabrous along ribs from short bristles and tiny tubercles. Leaves mostly pinnately incised, with narrowly linear lobes 1–3 mm wide, sharply scabrous, especially along margin; lower leaves bipinnately incised, with somewhat broader terminal lobe; upper leaves linear, undivided, with white-scarious, aristate tip, subtending capitulum. Capitula solitary at tips of branches. Involucre globose, 22–27 mm in dia; involucre bracts yellowish, not entirely covered by appendages; appendages more or less round, outer and middle ones round-rhombic, 10–12 mm long, 6.5–10.5 mm wide; inner and adjacent middle ones dorsally with oblong-triangular, ochreous-purple or less often purple spot, transparent above spot, thin-scarious, yellowish with greenish or ochreous tinge; outer appendages lacking distinct spot; all appendages with irregular small teeth, dorsally with indistinct keel, terminating in soft short cusp in apical notch; appendages more or less conically convolute, divergent with acute tips. Corolla pale yellowish or creamish, larger than other species, to 20 mm in central bisexual florets and to 25 mm long in peripheral sterile florets. Achenes 4.5–5.0 mm long, olive-brown with whitish ribs; pappus 5–7 mm long, distinctly surpassing achenes, white. Flowering July to August.

Sands.—*European Part*: Black Sea Region (only on right bank sands of Dnieper, below Zaporozhye). Endemic. Described from “Lysaya Gora” [Bald Mountain] 7 km below Belenkoe wharf. Type preserved in Kharkov; cotypes in Leningrad and Kiev.

Note. A very rare and unique species needing protection as a monument of nature.

Series 4. Gerberianae Klok.—Appendages of involucre bracts smaller, with triangular, thicker, opaque part only at base, lacking dorsal keel and cusp; convex, margins not convolute at apex, monochromatic, lacking distinct dark basal spots.

A very widely distributed series.

149. **C. proto-gerberi** Klok. in Tr. Inst. Bot. KhDU I (1936) 89, 102; Dobroc. in Vozn. Rosl. URSR, 578.

Biennial. Stem 30–90 cm high, branched from below middle or less often above middle, with upward-spreading branches, with leaves more or less densely arachnoid-hairy, sharply scabrous below capitula from conical tubercles like apical leaves. Cauline leaves pinnately or 547 (lowermost) bipinnately incised, their terminal lobe narrowly linear or linear but somewhat broadened at apex, to 2 mm wide; apical leaves undivided, subtending, not surpassing capitulum. Involucre broadly ovate to subglobose, about 14–15 mm long; appendages of involucre bracts strongly convex, stiff, yellowish, oblong-elliptical to round-

triangular, with almost flat margins; largest appendages (in middle bracts) about 5 mm long and 5–6 mm wide, lacking conspicuous dark spots at base in upper third, indistinct spot sometimes only on appendage of inner bracts. Corolla pale pink to almost white or light creamish. Achenes 4–5 mm long, at maturity brownish or blackish, with pappus about 4–5 mm long. Flowering July to August.

Open (not pine forest) sands.—*European Part*: Lower Don (along left bank of lower course of Donets River). Endemic. Described from Lugansk Region (village of Petropavlovka). Type in Kiev.

Note. In all characters, this species is intermediate between *C. donetzica* Klok. and *C. gerberi* Stev., and can be distinguished with difficulty from them, although they differ quite sharply from each other. We have expressed the opinion (1936) that *C. proto-gerberi* Klok. is a progenitor species from which both *C. donetzica* Klok. and *C. gerberi* Stev. have originated.

150. *C. donetzica* Klok. in Tr. Inst. Bot. KhDU, I (1936) 86, 101; Dobroc. in Vozn. Rosl. URSR, 578.—*C. margaritacea* auct. nonnull. fl. ucr. p. p. non Ten.

Biennial. Stems solitary or many, 30–50 cm high, branched from below middle, with leaves more or less arachnoid-hairy above, especially below capitula, scabrous, on ribs covered with acute tubercles. Leaves (except uppermost) pinnately incised with narrowly linear to almost filiform lobes 0.25–2.0 mm wide; basal and lower cauline leaves bipinnately incised, with lobes to 4 mm wide; all leaves stiff and acutely scabrous along margin, especially upper leaves; apical leaves subtending capitulum, undivided, narrowly linear, usually with white scarious tips. Capitula solitary at tips of branches; involucre at flowering time globose or somewhat oblong, 12–15 mm long, 10–16 mm in dia; appendages of involucral bracts elliptical, middle ones 5–6 mm long, 4–5 mm wide, inner ones much smaller; all basally with reddish-ochreous triangular spot along midrib, more conspicuous in inner bracts, surrounded by stiffer and thicker, less transparent, middle part in form of white triangle, very distinctly separated from transparent scarious border, whitish like central part, with characteristic micaceous luster; all appendages weakly convex, spatulate, not entirely covering bracts. Corolla pink, often pale, 14–19 mm long in central bisexual florets. Achenes 4–5 mm long, at maturity light brown, with pappus 4.0–5.5 mm long; pappus bristles thicker. Flowering June to August.

548 Sands.—*European Part*: Lower Don (along Donets, from mouth of Oskol River to Lisichansk District on pine sands). Endemic. Described from vicinity of village of Kremennoe at mouth of Krasnaya River. Type preserved in Kharkov; cotypes in Kiev and Leningrad.

151. *C. pineticola* Iljin in Izv. Glavn. Bot. Sada SSSR, XXVI, I (1927) 34, 35; in Majeovski, Fl. ed. 8, 617.

Biennial. Stems solitary or 2, upright or basally assurgent, 25–65 cm high, branched from about middle, with upward-spreading branches, with leaves not densely arachnoid-hairy, smooth below, scabrous above along ribs from tiny conical tubercles. Basal and lowermost cauline leaves petiolate, about 5–10 cm long, pinnately and bipinnately incised, with linear or oblong, obtuse or subobtusely acuminate segments or conical lobes, to 2–2.3 mm long and 0.7–4 mm wide, rather densely setose beneath and along margin; middle cauline leaves 3–9 cm long, sessile, pinnately incised with 3–8 pairs of lateral segments, scabrous-setulose beneath and along margin, segments linear and subobtusely acuminate to oblong-spatulate, 3–24 mm long, 1.0–3.5 mm wide; apical leaves subtending capitulum, undivided, linear or narrowly linear, about 10–15 mm long, cuspidate. Capitula solitary at tips of variously long branches, usually numerous. Involucre ovate or oblong ovate, 15–18 mm long, 10–14 mm in dia; appendages of involucre weakly convex, more or less round to oblong-ovate (inner), lustrous, whitish, translucent with more or less distinct (especially in appendages of outer bracts) ovate-triangular, dark purple, basal spot, somewhat toothed; lacking cusp, appendages of middle bracts about 4–6 mm long. Corolla 14–18 mm long, light purple. Achenes 3.5–4.7 mm long, whitish, more or less blackening at maturity with pappus 3.2–5.0 mm long. Flowering June to August.

Pine sands.—*European Part*: Volga-Don (known only from Khrenovsk pine forest in former Bobrovsk District of Voronezh Region). Endemic. Described from above locality. Type in Leningrad.

152. *C. breviceps* Iljin in Izv. Glavn. Bot. Sada SSSR, XXVI, I (1927) 35; Klok. in Tr. Inst. Bot. KhDU, I, 90; Dobrocz. in Vozn. Rosl. URSR, 578.—*C. leucolepis* Ldb. Fl. Ross. II, 2 (1845) 689 p. min. p. non DC.—*C. margaritacea* auct. fl. ucr. p. p. non Ten.

549 Biennial. Stem usually solitary, upright, 50–100 cm (and more) high, branched from middle or below, less often from above with more or less numerous divaricate branches, arachnoid-hairy with leaves, smooth below, more or less scabrous above along ribs. Basal and lower cauline leaves petiolate, to 15–20 cm (and more) long, pinnately and bipinnately incised with filiform narrowly linear or less often linear lanceolate, obtuse segments; terminal lobe 5–8 mm long, 0.5–3.0 mm wide, smooth along margin and beneath like upper leaves (very rarely leaves rather densely setulose and with sharp tubercles.—f. *asperula* Klok. op. cit.); cauline leaves sessile, pinnately incised, mostly with almost filiform segments 0.5–1.0 mm wide; apical leaves sub-

tending capitula, filiform or narrowly linear, about 5–10 mm long, acuminate. Capitula solitary, at tips of more or less elongated branches. Involucre ovate, about 10–13 mm long and 6–10 mm in dia; appendages of involucre bracts convex, elliptical, weakly lustrous, greenish-whitish or yellowish, translucent, with small oblong triangular reddish-brown-purple basal spot, scarcely toothed or entire lacking cusp; appendages of middle bracts 4–5 mm long and 3.5 mm wide. Corolla 10–14 mm long, pale purple. Achenes 3–4 mm long, ochreous or dark brown, with ribs whitish at maturity; pappus 2.5–3.8 mm long, slightly shorter than achene. Flowering June to August.

Open sands, sandy steppes.—*European Part*: Black Sea Region (only along left bank of Dnieper in lower-most course, on famous lower Dnieper sands). Endemic. Described from Aleshka (now Tsyurupinsk). Type in Leningrad.

Note. It is the most characteristic representative of the endemic Lower Dnieper psammophilous flora.

153. **C. paczorskii** Kotov ex Klok. in Tr. Inst. Bot. KhDU, I (1936) 92, 101, descr.; Kotov in Dnevn. Vsesoyuzn. Sezda Bot. (1926) 101, 102, nomen seminudum; Dobrocz. in Vizn. Rosl. URSS, 578.—*C. gerberi* auct. non Stev.: Iljin in Izv. Glavn. Bot. Sada SSSR, XXVI, 1 (1927) 36, 39, p. min. p. quoad formam chersonicam.

Biennial. Stems solitary or 2, upright or ascending at base, 30–50 cm high, with leaves more or less arachnoid-hairy, branched from above or below middle; branches upward spreading, more or less distinctly scabrous below capitula, along ribs from conical subobtuse or acute tubercles. Leaves (except uppermost) pinnately incised or (basal and lowermost cauline) bipinnately incised with narrowly linear to almost filiform, often involute lateral segments or terminal lobes, 0.3–1.5 mm wide; terminal lobe noticeably or considerably larger than lateral ones; sometimes to 4 mm wide; apical leaves subtending capitulum, undivided; narrowly linear, to 35 mm long, awned. Capitula solitary at tips of mostly short secondary branches. Involucre subglobose at flowering time, 15–18 mm long, 15–19 mm in dia; appendages of involucre bracts strongly convex, not covering bracts entirely, darkish yellow, oily lustrous, round, except inner elliptical, to 6 mm long, weakly toothed, lacking cusp; middle and inner appendages often (but not always) dichromatic, with oblong triangular, dark purple basal spot. Corolla about 16–17 mm long, light yellow. Achenes 3.5–5.0 mm long, whitish, not blackening at maturity; pappus 4.5–7.0 mm long, always considerably surpassing achene. Flowering June to August.

Open sands, sandy steppes.—*European Part*: Black Sea Region (only on left bank sands of Ingulets River—a right tributary of Dnieper).

Endemic. Described from Ingulets River (vicinity of village of Novogrednevka). Type in Leningrad.

154. *C. gerberi* Stev. in Bull. Soc. Nat. Mosc. XXIX, 2 (1856) 391, in textu; Iljin in Izv. Glavn. Bot. Sada SSSR, XXVI, 1, 36, No. 5, excl. specimina chersonica; Klok. in Tr. Inst. Bot. KhDU, I, 90; Iljin in Majevski, Fl. ed. 8, 617.

Biennial. Stems 1–3, upright or basally somewhat ascending, 30–75 cm high, branched from above or below middle, with upward spreading branches, with leaves not densely arachnoid-hairy, smooth or almost smooth above along ribs. Leaves (excluding uppermost) 2–11 cm long; basal (usually absent at flowering time) and lowermost cauline leaves petiolate, bipinnately incised or with incised segments, others sessile, pinnately incised; lateral segments or terminal lobes narrowly linear to linear lanceolate, 3.5–30.0 mm long, 0.5–2.5 mm wide, acuminate; terminal lobe somewhat larger than laterals; apical leaves subtending capitulum, undivided, narrowly linear, about 10–15 mm long. Capitula solitary at tips of short or reduced branches, often partly aggregated. Involucre ovate or broadly ovoid to subglobose, 11–16 mm long, 9–14 mm in dia; appendages of involucre bracts strongly convex, not entirely covering bracts, more or less round or ovate (inner), with oily lustre, light yellow, lacking distinct, dark, basal, spots, weakly toothed, outer appendages indistinctly cuspidate, in middle bracts about 3–4 mm long. Corolla yellowish (creamish), about 12–15 mm long. Achenes 3.5–4.5 mm long, whitish, at maturity turning black; pappus 3–4 mm long. Flowering June to September.

Open hummocky sands and sandy steppes.—*European Part*: Lower Don, Lower Volga, Trans-Volga (south); Volga-Kama (south). Endemic. Described from Volga. Type in Helsinki.

Note. It is the most widespread species of the series and the entire section *Pseudophalolepis* Klok.

155. *C. dubjanskii* Iljin in Izv. Glavn. Bot. Sada SSSR, XXVI, I (1927) 36; in Majevski, Fl. ed. 8, 617; Klok. in Tr. Inst. Bot. KhDU, I, 86.

551 Biennial. Stems solitary or few, upright or weakly ascending from base, with leaves not densely and [or] sparsely arachnoid-hairy, smooth along ribs, even below capitula. Leaves (except uppermost) 3.5–16.0 cm long; basal and lowermost cauline leaves petiolate, bipinnately incised, their lateral segments or terminal lobe mostly narrowly linear to linear-lanceolate, 5–25 mm long and 0.5–1.5 (3.0) mm wide, acuminate; terminal lobe slightly larger than laterals, to 40 mm long and 3 mm wide; apical leaves subtending capitulum, narrowly linear, about

20–30 mm long and 1–1.5 mm wide, with whitish scarios tips. Capitula solitary at tips of short branches. Involucre subglobose, often compressed above, wider than long, 15–27 mm long, 15–25 mm in dia; appendages of involucre bracts not strongly convex, entirely covering bracts, all more or less round, light yellow, with oily lustre, lacking dark basal spots, weakly toothed, lacking cusp; appendages of middle bracts about 6–7 mm long and 8–9 mm wide, of inner ones to 5 mm long and as wide. Corolla about 16–18 mm long, yellowish. Achenes 4.5–5.2 mm long, blackening at maturity; pappus 3.5–5.0 mm long. Flowering June to August.

Hummocky sands.—*European Part*: Volga-Don (known from vicinity of villages of Bereznyak and Kazansaya, from sands along Khopyor River near Borisoglebsk). Endemic. Described from vicinity of village of Bereznyak of former Boguchar District. Type in Leningrad.

Note. A very rare and relict species requiring special protection as a monument of nature.

Section 2. Phalolepis.—Sect. *Euphalolepis* Dobroc. in Bot. Zhurn. Akad. Nauk URSR, VI, 2 (1949) 64, 65, nomen.—Biennial or, less often, perennial plant; appendages of involucre bracts sharply differentiated into thick, completely opaque, central part with 5 veins traversing through it and completely transparent, scarios border; pappus always much shorter (most often half as long) than achene; stems more or less branched (not strongly in all species); corolla purple.

Type of section: type of subgenus.

An eastern Mediterranean section, represented in the USSR only in Crimea and the Caucasus by two endemic series.

Series 1. Steriles Klok.—Relatively weakly branched perennials, less often biennials with fewer (to 10) capitula; all appendages of involucre bracts with distinct cusp. Endemic. Crimean mountain series.

156. *C. semijusta* Juz. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIV (1951) 43.

Perennial. Plants positively perennial with quite thick woody root. 552 Stems to 10, ascending from prostrate base, 25–35 cm high, weakly branched, with 1–3 branches, 9–24 cm long, more or less densely arachnoid-tomentose and weakly scabrous or almost smooth below, sparsely arachnoid-hairy and scabrous-setulose above along ribs. Basal and lower cauline leaves 4–12 cm long, petiolate, bipinnately incised, arachnoid-hairy, like all other, leaves densely setulose, their terminal lobe oblong- or linear lanceolate, 7–15 mm long, 1.5–4.0 mm wide;

middle and upper cauline leaves pinnately incised to undivided, with large, to 5–7 mm wide, terminal lobe, often almost lyrate. Capitula solitary at tips of long branches, but numerous on entire plant, larger than all other Crimean species of the section. Involucre broadly ovate to subglobose, 16–22 mm long and 12–21 mm in dia, lustrous from large scabrous appendages entirely covering involucre bracts; involucre bracts with small teeth, and soft cusp about 1–3 mm long; middle bracts with round appendages about 10 mm long; inner bracts with broadly ovate, smaller appendages; all appendages dorsally often with distinct oblong-lanceolate, light reddish-brown spot, central part of appendages membranous, weakly thickened but with 5 distinct veins. Corolla purple. Achenes oblong, narrowed toward base, 4–5 mm long, thinly hairy, blackening at maturity; pappus 1.5–2.0 mm long. Flowering July to August.

Stony mountain slopes and on screes.—*European Part*: Crimea (known only from Chatyrdag Mountain). Endemic. Described from indicated locality. Type in Leningrad.

157. *C. vankovii* Klok. in Addenda, XXVII, 618.—*C. nikitensis* Illar. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVIII (1957) 305 p. p. quoad pl. jalicam.

Perennial. Stems 2–10, ascending, about 30–35 cm high, more or less branched, more densely arachnoid-hairy, and smooth below, sharply scabrous above along ribs. Basal and lower cauline leaves 4–10 cm long, petiolate, pinnately incised, with undivided or partly 2–3-fid segments, arachnoid-hairy, setulose beneath, like others scabrous-finely serrate; lateral lobes of leaves mostly linearly lanceolate, 9–25 mm long, 1.0–2.5 mm wide, cuspidate; terminal lobe somewhat larger than lateral ones; upper leaves at base 3-parted with shortened lateral lobes and large terminal lobe to 3 mm wide; apical leaves below capitulum smooth, linear, 5–15 mm long, 1 mm wide, almost smooth above, sharply scabrous beneath. Capitula solitary at tips of short branches. Involucre ovate or broadly ovate, 14–16 mm long, 10–14 mm in dia; appendages of involucre bracts round or broadly ovate with ovate triangular, dark reddish-brown central part and yellowish, scarious margin; margin toothed or almost fimbriate; appendages of middle bracts about 3–4 mm long, with shallow notch at apex and soft cusp 0.5–0.7 mm long, almost not exerted from it, with large dark reddish-brown spot below, extending beyond thick central part of appendage; appendage of outer bracts with more distinct cusp but in inner bracts lacking it; corolla light purple; achene oblong, 4.0–4.2 mm long, thinly hairy, with pappus 1.5–1.8 mm long, turning black at maturity. Flowering June to July.

Stony mountain slopes.—*European Part*: Crimea (mountains; known from Ai-Petri Mountain and “yaila” above it, Stavri-Kai, Uch-Kosh Gorge). Endemic. Described from Ai-Petri “yaila.” Type in Leningrad.

Note. As indicated above, N.B. Illarionova referred some plants of this species to *C. nikitensis* Illar. Unfortunately, the type specimen of the latter is missing in Leningrad. There are topotypes from the vicinity of the Uchan-su-Waterfall, which we refer to *C. sterilis* Stev. They conform to the characters given in the authentic description, according to which the involucre in *C. nikitensis* Illar. is ovate, 12–13 mm long and 9–12 mm in dia, while the achenes are 3–3.5 mm long. Such measurements are entirely characteristic of *C. sterilis* Stev., but the alpine race replacing the latter is characterized by larger measurements. Moreover, *C. vankovii* Klok. is a perennial plant, whereas *C. nikitensis* Illar. has been described as biennial.

158. *C. sterilis* Stev. in Bull. Soc. Nat. Mosc. XXIX 2 (1856) 390; Boiss. Fl. or. III, 622; Schmalh. Fl. II, 121; Fedtsch. and Fler. Fl. Evrop. Ross. 1019.—*C. alba* MB. Fl. taur.-cauc. II (1808) 353, non L.—*C. leucolepis* Ldb. Fl. Ross. II, 2 (1845) 689, p. p. non DC.—*C. stankovii* Illar. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVIII (1957) 305.—*C. nikitensis* Illar. ibid. 304, p. max. p.—**Exs.**: Dorfler. Herb. norm. No. 4152.

Biennial, perennial. Plant biennial or short-lived (flowering in second year but also in third year). Stems upright, ascending, branched from base or sometime (under unfavorable conditions) procumbent, solitary or few (2–3), 10–95 cm high, more or less branched, angular, with leaves more or less distinctly arachnoid-hairy, acutely scabrous along ribs from erect, small, thickish bristles and only at base almost smooth. Basal and lower cauline leaves about 6–12 mm long, with distinctly developed or relatively long petiole and pinnately incised lamina, individual (middle) segments 2–3-fid; segments of terminal lobes of leaves linear-lanceolate, 5–32 mm long, 1–3 mm wide, cuspidate; petiole and leaf lobes arachnoid pubescent and rather densely covered with small, thickish bristles about 0.3–1.1 mm long; middle and upper leaves sessile, weakly lobed to undivided, scabrous, finely setose along margin and beneath; uppermost leaves narrowly linear, about 7–13 mm long and 1.0–1.5 mm wide, terminating in short, thin cusp. Capitula few (2–10 per stem, less often more), at tips of long primary or short second order branches, with florets about 16–18 mm
554 long. Involucre ovate to oblong-ovate, 10–14 mm long, 6–10 mm in dia, weakly arachnoid-hairy; involucre bracts coriaceous, with 5 veins; usually greenish; appendages of involucre bracts with thick, coria-

ceous, central part and sharply demarcated, thin-scarious, and transparent border, more or less toothed, dorsally carinate, continued into thin, 0.4–2.0 mm long cusp; appendages of middle bracts round, 3–6 mm long, with more or less narrow, yellowish or often reddish-brown, triangular central part and whitish or often yellowish border; appendages of inner bracts ovate, smaller, usually with reddish-brown spot in central part. Corolla light purple. Achenes roundish-cuneate, 2.5–3.5 mm long, whitish or light reddish-brown, scatteredly thin-hairy; pappus 0.4–2.0 mm long, consisting of unequal bristles, sometimes almost undeveloped. Flowering June to August.

Stony slopes.—*European Part*: Crimea (common in foothill part and on southern coast). Endemic. Described from Crimea (probably from vicinity of Simferopol). Type in Helsinki.

Note. A highly polymorphic species, it hybridizes readily with *C. diffusa* Lam., *C. ovina* Pall. s. l. and other species of the subgenus *Acrolophus* (Cass.) Dobrocz. These hybrids include the ones described by N.B. Illarionova as separate species—*C. longiaristata* Illar. and *C. iljiniana* Illar. (in the article “Novye vidy roda vasilek flory Kryma” [New species of centaureas in the flora of Crimea], included in the cited volume of *Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR*, 306, 307. It is well known that centaurea hybrids break down and do not produce stable, widely distributed forms; hence these should not be described as hybridogenic species. The difference between the southern coastal populations of this species and the ones from the foothills, to the extent that we could ascertain, is not expressed in systematic characters. Hence, treating these populations as two different species—*C. stankovii* Illar. (described from the Nikitsky Botanical Garden) and *C. nikitensis* Illar. (described from the vicinity of Yalta, near the Uchan-Su Waterfalls)—is useless. All of them, to all appearances, form a single geographic race. The plants collected by S. Grigorev along the Shtangev track near Yalta differ more sharply from the type specimen of *C. sterilis* Stev. by having the leaves strongly divided and the pappus of the achenes up to 4 mm long. The plants collected by S. Dzevanovsky from the Esk stone quarry which are distinguished by completely black achenes also are distinctive. However, the material on these forms is too limited for any final judgment. Plants from the Ai-Petri “Yaila” clearly differ from *C. sterilis* Stev.; they were partly included by N.B. Illarionova along with Steven’s species in the composition of her *C. nikitensis* Illar. They can be considered as an alpine race, altitudinally replacing *C. sterilis* Stev., and are described above as a separate species.

The unique form described by S.V. Juzepczuk from the Baider “yaila,” under the name *C. ninae* Juz. in *Bot. Mat. Gerb. Bot. Inst.*

Akad. Nauk SSSR, XIV (1951) 42, apparently is of hybrid origin (*C. sterilis* Stev. \times *C. maculosa* s. 1.).

555 *Series 2. Transcaucasicae* Klok.—Biennial or less often perennial plants with strongly branched stem and numerous capitula; middle and inner involucre bracts lacking cusp.

A Caucasian (Transcaucasian) series extending into the eastern part of Crimea.

Herbarium material of this series is still very insufficient, and the species composition of the series is far from being worked out.

159. *C. sarandinakiae* Illar. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVIII (1957) 303.

Perennial. Root woody, to 3 cm thick. Stems usually many, ascending, 30–50 cm high, branched with quite many, somewhat procumbent branches, ribbed, with leaves not densely pubescent, smooth below, scabrous or almost smooth above along ribs. Basal and lower cauline leaves about 6–13 cm long, petiolate, pinnately incised, with linearly or oblong-lanceolate segments to 40 cm long and 6 mm wide, finely setose; middle and upper leaves pinnatifid, with smaller lateral lobes and larger terminal lobe, sessile, sharply scabrous or almost smooth above, scabrous-finely serrate along margin and beneath along midrib; apical leaves below capitulum shorter than involucre, undivided, oblong-lanceolate, cuspidate. Capitula solitary at tips of short, second order branches, about 16–20 mm long with florets. Involucre broadly ovate, 12–17 mm long, 10–16 mm in dia, yellowish and lustrous from appendages of involucre bracts entirely covering them; appendages of outer bracts ovate lanceolate, about 4 mm long, with soft cusp to 2 mm long; appendages of middle bracts round, about 5–6 mm long, with small, light yellow triangular, thick part at base and below middle, to 2 mm long, lacking keel and cusp above, with tiny teeth like outer; appendages of inner bracts almost identical. Corolla pale purple. Achenes oblong, narrowed at base, 3.5–4.2 mm long, finely hairy, blackening at maturity; pappus 1.2–2.0 mm long. Flowering July to August.

Stony talus and rocks.—*European Part*: Crimea (known only from Karadag in eastern Crimea). Endemic. Described from Karadag, from Karagach Mountain. Type in Leningrad.

Note. The lone specimen collected by I.I. Sprygin at the Ai-Petri foothills near Miskhor is very distinctive and similar to this species in the structure of the appendages. Most of its leaves are bipinnately incised with long narrow lobes; the appendages of its involucre bracts have distinct light reddish-brown spots; the achenes are blackish and

4.5–4.7 mm long, with a pappus about 2.5 mm long. Apparently it flowers earlier than other species. Possibly it is an introduced plant.

556 *C. sarandinakiae* Illar. shows affinity not to the Crimean but to the Caucasian members of the section.

160. *C. novorossica* Klok. in Addenda XXVII, 619.—*C. sterilis* auct. non Stev.: Grossh. Fl. Kavk. IV (1934) 211; Oprod. Rast. Kavk. 496 and auct. al. fl. cauc.

Biennial. Stems 1–3, upright or ascending from base, 20–70 cm (and more) high, branched, angular, with leaves relatively densely floccose-arachnoid-hairy, almost smooth at base, acutely scabrous above along ribs. Basal and lower cauline leaves petiolate, bipinnately incised, with linear or narrowly linear terminal lobe, often withering before flowering time; middle cauline leaves about 2–6 mm long, sessile, pinnately incised, like other leaves scabrous-finely setose beneath and along margin, weakly scabrous to almost smooth above, with narrowly linear or narrowly linear-lanceolate lateral lobes up to 5 pairs, 5–25 mm long and 0.5–1.5 mm wide; terminal lobe larger, to 32 mm long and 2.5–3.0 mm wide; upper leaves smaller, pinnatifid, apical leaves below capitulum undivided or with basal tooth, linear, 7–12 mm long, 1.2–1.5 mm wide, cuspidate. Capitula solitary at tips of branches, (1–3)7–18 per stem, 17–20 mm long. Involucre ovate or broadly ovate, 12–15 mm long, 8–12 mm in dia, whitish, rather dull, weakly lustrous; appendages of outer involucre bracts round-rhombic, like others finely toothed, with soft cusp; to 1.5 mm long; appendages of middle bracts round, about 3.5–4.0 mm long, somewhat larger than others, with fimbriate margin (even in budding stage), lacking cusp, with reddish-brown or light reddish-brown triangular spot at base of central part not reaching apex; appendages of inner bracts oval, also lacking cusp, with spots. Corolla light-purple. Achenes oblong-cuneate, about 4–4.5 mm long, finely hairy, blackening at maturity; pappus 1.5–3.3 mm long. Flowering June to August.

Stony slopes, as roadside weed.—*Caucasus*: Western Transcaucasia (north, known from vicinity of Taman, Novorossiisk, Gelendzhik and Markotkh Range). Endemic. Described from vicinity of Novorossiisk. Type in Leningrad.

Note. This Novorossiisk species clearly differs from *C. sterilis* Stev. by the absence of the cusp on the appendages of the middle and upper involucre bracts and by the longer, blackened achenes with a well-developed pappus. It apparently approaches the eastern Crimean species *C. sarandinakiae* Illar., from which it also is well distinguished.

The specimens collected by T. Pojarkova from the Markotkh Range differ from all the others by having a lower stature (20–22 cm), fewer

(1–3) capitula on the stem, and somewhat more divided leaves. In these specimens, the involucre is more oblong.

557 161. *C. georgica* Klok. in Addenda XXVII, 619.—*C. pseudodeusta* auct. fl. cauc. p. p. non Hayek.

Biennial. Stems solitary or few, upright, 40–70 cm high, branched from middle or less often above, with more or less procumbent, virgate branches, with leaves not densely arachnoid-hairy, smooth below, sharply scabrous above along ribs. Basal and lower cauline leaves petiolate, bipinnately incised, with linear or linearly lanceolate, narrow, terminal lobe, mostly withering by flowering time; middle cauline leaves 1.5–4.0 cm long, sessile, pinnately incised or some with pinnatifid segments, sharply scabrous along margin and beneath from dense spinules, like upper leaves weakly scabrous above; segments or terminal lobes linear or linear-lanceolate, to \pm 10 mm long, 0.5–1.5 mm wide, terminal lobe larger, up to 2–3 mm wide; apical leaves undivided, linear or narrowly linear, cuspidate. Capitula solitary at tips of long primary branches or short second-order branches, (3)12–30 per stem, 17–19 mm long. Involucre ovate to broadly ovate, about 12–13 mm long and 8–9 mm in dia; yellowish to light reddish-brown or reddish brown to light yellow, lustrous; appendages with yellowish-reddish-brown thick central part and yellowish scarious border, finely toothed to almost fimbriate (lower); appendages of outer bracts broadly ovate, with distinct apical notch having cusp to 1 mm long; appendages of middle bracts round, about 3–4 mm long lacking notch and cusp, of inner bracts oblong-elliptical, smaller, lacking cusp. Corolla light purple. Achenes about 3.7 mm long, brownish-olive when mature; pappus about 1.5 mm long. Flowering June to July.

Stony slopes, in low-montane zone.—*Caucasus*: Western Transcaucasia (known from vicinity of Borzhomi and Gori). Endemic. Described from Borzhomi. Type in Leningrad.

162. *C. latiloba* Klok. in Addenda, XXVII, 620.

Biennial. Stems solitary or few, upright, 20–70 cm high, divaricately branched, with leaves somewhat densely or sparsely arachnoid-hairy, smooth below, sharply scabrous above along ribs from spinules. Basal and lower cauline leaves petiolate, to 8–12 cm long, pinnately incised with ovate, pinnatifid segments, finely setose beneath; terminal lobe oblong-ovate or less often oblong-obovate, 2–15 mm long, 1.5–5.0 mm wide; middle cauline leaves sessile, pinnately incised, 2–4 cm long, sharply setose beneath like upper leaves, finely setose-serrate on margin, with 1–3 pairs of lateral segments oblong, 3–20 mm long and 1–4 mm wide, toward apex usually somewhat broadened and abruptly

558 attenuate into subobtuse tip, middle lobe noticeably distinctly larger than laterals, to 5 mm wide; apical leaves undivided, oblong, 8–25 mm long, 2–6 mm wide, abruptly attenuate into subobtuse tip. Capitula solitary at tips of branches, 7–40 per stem, 16–21 mm long. Involucre broadly ovate to subglobose, 11–14 mm long, 10–15 mm in dia, yellowish or reddish-brown-yellow, lustrous; appendages with light yellow or light reddish-brown, thick, central part and yellowish or yellowish-whitish, scarious border, weakly toothed in apical part or subentire; appendages of outer bracts broadly ovate, emarginate with small inconspicuous cusp in notch; appendages of middle bracts about 5–6 mm long, inner ones elliptical, smaller. Corolla light purple. Achenes about 2.5 mm long, olive-brown; pappus about 1 mm long. Flowering June to July.

Mountain slopes, meadows, as weed in fields.—*Caucasus*: Eastern and Southern Transcaucasia. Endemic. Described from Transcaucasia. Type in Leningrad.

Note. We could not identify this species with *C. schemachensis* Sosn. ex Grossh. to which it approaches by its wide leaf lobes. *C. schemachensis* Sosn. ex Grossh. has been mentioned only in *Opredelitel Rastenii Kavkaza* [Manual of the Plants of the Caucasus] by A.A. Grossheim, and, according to him, differs from other similar Caucasian species by having very large involucre of the capitula, reaching about 20 mm in diameter, which does not agree with our specimens. Specimens identified by D.I. Sosnowsky or A.A. Grossheim could not be found in Leningrad. In the size of the involucre, our specimens do not differ from *C. transcaucasica* Sosn. ex Grossh. and *C. sterilis* auct. fl. cauc. (*C. novorossika* Klok.) referred by A.A. Grossheim to the group of species with smaller, 10–12 mm-wide, involucre. For similar reasons, we also still do not understand *C. daghestanica* Sosn. ex Grossh. (*Opred. Rast. Kavk.* (1949) 496, absque diagn.).

163. ***C. transcaucasica*** Sosn. ex Grossh. Fl. Kavk. IV (1934) 212; *Opred. Rast. Kavk.* 496.

Biennial. Stems 1–4, upright or ascending at base, 40–70 cm (and more) high, branched from middle or slightly below, with upward-spreading branches, less often divaricate, with leaves densely or sparsely arachnoid-hairy, smooth below, sharply scabrous above along ribs from spinules or tubercles. Basal and lower cauline leaves petiolate, about 4–7 cm long, pinnately incised, partly bifid segments, spinulose beneath and along margin; leaf segments or lobes linear-lanceolate, about 1.5–2.0 mm wide; middle cauline leaves sessile, pinnately incised, about 3–5 cm long, mostly with 3 pairs of lateral lobes, sharply scabrous or scabrous-serrate on margin, not setose beneath, quite weakly

559 scabrous, almost smooth above; their lateral lobes linearly lanceolate, about 7–15 mm long, 1.0–2.5 mm wide, middle (terminal) lobe to 22–32 mm long and 2.5–3.0 mm wide; apical leaves undivided, linearly lanceolate, 7–22 mm long, 1.2–3.2 mm wide, cuspidate. Capitula solitary at tips of branches, 10–20 on stem, 17–19 mm long. Involucre short-ovate, more or less compressed, 12–13 mm long and 11–13 mm in dia, yellowish, lustrous; appendages of outer involucre bracts round-rhombic, emarginate, with or lacking small inconspicuous cusp in notch; appendages of middle bracts broadly obovate, 4–6 mm long, entire or weakly toothed, lacking cusp; central thick part of appendage ovately triangular, yellowish or brownish-light-yellow, with inconspicuous, light reddish-brown basal spot or lacking it; appendages of inner bracts oblong-ovate, quite small, lacking cusp. Corolla light purple. Achenes 2.5–3.1 mm long, brownish-olive at maturity, with pappus 0.7–1.0 mm long. Flowering June to July.

Mountain slopes.—*Caucasus*: Eastern Transcaucasia. Endemic. Described from Azerbaidzhan. Type in Leningrad.

Note. The incomplete specimens collected by F. Alekseenko in the vicinity of the village of Khazra on the Samur River are distinguished by a longer pappus, as long as (3 mm) the achenes.

164. *C. alexandri* Bordz. in Fedde, Repert. XXXVI (1934) 306; in Zhurn. Inst. Bot. VUAN, II (1934) 80; Grossh Opred. Rast. Kavk. 495.

Biennial, less often perennial. Stems 1–3, upright, 60–90 cm high, branched from middle or below with upward-spreading branches, more or less densely or sparsely arachnoid-hairy, with leaves smooth below, more or less scabrous above from conical tubercles (and not spines). Basal and lowermost cauline leaves petiolate, about 10–15 cm long, bipinnately incised or with more or less lobed segments, lacking spines or bristles beneath, almost smooth or weakly scabrous, noticeably scabrous along margin from conical tubercles; their terminal lobes linear to linearly- or oblong-lanceolate, cuspidate, 0.5–2.5 mm wide; middle cauline leaves sessile, 1.5–7.5 cm long, bipinnately to pinnately incised, more or less scabrous along margin and beneath; their lobes narrowly linear to linear-lanceolate, lateral lobes to 22 mm long and 1.5 mm wide, middle (terminal) lobes to 32 mm long and 2 mm wide; apical leaves linearly lanceolate, smaller, cuspidate. Capitula solitary at tips of variously long branches, sometimes on very short branches, more or less numerous, 12–14 mm long. Involucre ovate to oblong-ovate, 9–10 mm long and 4–6 mm in dia, yellowish or whitish-yellowish; appendages of outer involucre bracts broadly ovate, with indistinct notch at apex and very small cusp, more or less toothed;

560 appendages of middle bracts round, about 2.5–3.0 mm long, weakly toothed to entire, lacking cusp, central thicker part of appendage ovately triangular, light-yellow or light reddish-brown, with scarcely visible darkening at base (as in outer appendages), of inner bracts ovate, smaller, lacking cusp. Corolla light-purple. Achenes oblong, basally narrowed to oblong-obovate, 3.0–3.3 mm long, brownish-olive at maturity, weakly hairy with pappus 1.5–2.5 mm long. Flowering June to July.

Slopes and rocks, in lower montane zone.—*Caucasus*: Eastern and Southern Transcaucasia. Endemic. Described from Armenia (Megri-Artatsur in gorge of Araks River). Type in Yerevan.

Note. Simultaneously with the species, E.I. Bordzilowsky described *C. alexandri* var. *rhodolepis* Bordz., differing from the type by the dirty-ochreous margins of the appendages of the involucre bracts.

Subgenus 17. **Microlophus** (Cass.) Hayek, *Centaurea*-Art. Österr. Ung. (1901) 2.—*Microlophus* Cass. in Dict. Sc. nat. XLIV (1826) 37 and LIV (1829) 490.—*Piptoceras* Cass. ibid. L. (1827) 469 and LIV (1829) 487.—*Centaurea* sect. *Microlophus* (Cass.) DC. Prodr. VI (1837) 567.—*Centaureum* sect. *Microlophus* (Cass.) C. Koch in Linnaea, XXIV (1851) 418.—Capitula medium-sized, with many florets, rather numerous, solitary at tips of main stem and its lateral branches, often aggregated in lax corymbose or paniculate inflorescence. Involucre ovate, glabrous or subglabrous (with thin glabrescent arachnoid tomentum), 8–20 mm in dia; involucre bracts coriaceous, brownish-greenish lacking or with inconspicuous veins, gradually enlarged from broadly triangular-ovate outer to oblong-lanceolate innermost, acuminate or with short spine, lacking appendages (in species of our flora), less often with small incurved, lanceolate appendage, not decurrent on bract, pectinate-ciliate and terminating in spine or prickle. All florets tubular, heterogeneous; central florets bisexual, peripheral ones not large (usually even smaller), sterile, lacking or with 1–4 staminodes, included in corolla tube; stamen filaments flattened on sides and mostly covered on two sides with crisped papilliform hairs; stigma short-bifid. Achenes about 4–5 mm long, initially sparsely short-hairy; mature achenes glabrous or subglabrous; pappus as long as achene or longer, persistent, double, outer pappus consisting of several irregular rows of bristles scabrous on two sides, gradually elongated from very short outer to middle and inner, 1/6–1/3 as long as outer, consisting of single row of slightly broader, erose-ciliate bristles scarious in upper part. Perennial or biennial herbs lacking underground shoots, with string-like root and upright, strongly branched (often almost from base) stems. Basal rosette and lower cauline leaves usu-

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ally more or less pinnately lobed, others entire or more or less toothed, usually decurrent on stem, short-scabrous with or lacking inconspicuous punctate glands.

Type of subgenus: *C. behen* L.

Of the 8–10 species of this subgenus, distributed mostly in the countries of West Asia and in Iran, three are found in the USSR.

Many authors of the Caucasus flora recognize this subgenus as the separate genus *Microlophus* Cass. In fact, the species belonging here occupy a very distinctive position among the other species of *Centaurea* L. in the USSR flora. However, in West Asia there is a whole range of species occupying a more or less intermediate position between the subgenus *Microlophus* and the other subgenera of this extensive polytypic genus.

1. Capitula aggregated in corymbose inflorescence; apical leaves close to base of capitula and often enveloping them; leaves of basal rosette pinnately lobed, with numerous lateral lobes and terminal lobe as wide as lateral ones 2.
- + Capitula usually not aggregated in corymbose inflorescence; apical leaves not close to base of capitula; leaves of basal rosettes undivided or pinnately lobed, but then with strongly enlarged terminal lobe and few lateral lobes 163. *C. behen* L.
2. Involucres 13–17 mm in dia; subtending apical leaves quite large and wide, often entirely enclosing capitula 166. *C. szovitsiana* Boiss.
- + Involucres 9–13 mm in dia; apical leaves smaller and narrower, usually somewhat removed from base of capitula 167. *C. polyodiifolia* Boiss.

Section 1. *Microlophus*.—*Centaurea* sect. *Microlophus* (Cass.) DC. Prodr. VI (1837) 567 p. p.—Capitula not in corymbose inflorescence; apical leaves not close to base of capitula. Perennial polycarpic plants, covered with very short papilliform hairs; basal and lower cauline leaves undivided or pinnately lobed but then terminal lobe larger than lateral lobes.

Type of section: type of subgenus.

165. *C. behen* L. Sp. pl. (1753) 914; Boiss. Fl. or. III, 682 p. p.; Grossh. Fl. Kavk. IV, 210.—*C. alata* Lam. Encycl. meth. I (1783) 665; MB. Fl. taur.-cauc. II, 342 and III, 586; DC. Prodr. VI, 567; Ldb. Fl. Ross. II, 2, 687.—*C. acuta* Vahl. ex MB. Beschreib. Land. Casp. Meer. (1800) 82 and App. 211, non Lam. (1789).—*C. babylonica* auct. non L.: MB. op. cit. (1800) 82 and App. 211.—*C. bordzilowskii*

- 562 Lonacz. in Tr. Yurev. Bot. Sada, IX (1908) 162.—*Piptoceras behen* (L.) Cass. in Dict. Sc. nat. LIV (1829) 488.—*Microlophus alatus* (Lam.) Cass. ibid. 491.—*M. behen* (L.) Takht. in Takht. and Fedtsch. Fl. Erevana (1945) 326; Grossh. Opred. Rast. Kavk. 494.—*Centaurium behen* (L.) C. Koch in Linnaea, XXIV (1851) 418.—**lc.**: Lonacz. op. cit. 163; Takht. and Fedtsch. Fl. Yerevana, Atlas (1946) Plate 117.

Perennial. Plants to 1.5 m high, covered with very short, papilliform and spiniform hairs mixed with weakly floccose arachnoid-hairs, weakly scabrous; sometimes subglabrous. Stems upright, branched above middle, with numerous capitula usually at different height. Basal and lower cauline leaves very large, with quite long petioles, oblong, undivided or lyrate, with terminal lobe much larger than fewer lateral lobes, irregularly toothed; middle and upper cauline leaves smaller, entire or very weakly toothed, sessile, base of lamina decurrent on stem as broad wings; apical leaves not close to base of capitulum. Involucre 13–17 mm in dia, 23–27 mm long; involucral bracts acute, lacking appendages. Florets yellow. Achenes about 5 mm long, with pappus 6–7 mm long. Flowering July to August.

Stony slopes, meadows, gravel beds, roadsides, sometimes in fields; up to mid-montane zone.—*Caucasus*: Eastern and Southern Transcaucasia; *Soviet Central Asia*: mountainous Turkmenia. *General distribution*: West Asia, Armenia and Kurdistan, Iran. Described from West Asia (Lebanon?). Type in London.

Note. Not having the type material for *C. behen* L. and *C. alata* Lam., I am not at all sure about its complete identify as well as its affinity with the species described by me. Possibly, one of these names refers to one of the two following species.

Section 2. Polypodiifoliae Tzvel. in addenda XXVII, 620.—Capitula aggregated in more or less corymbose inflorescence; apical leaves usually more or less close to base of capitula. Biennial or short-lived(?) monocarpic plant, covered with short papilliform hairs and longer crisped hairs; basal and lower cauline leaves pinnately lobed, their terminal lobe almost of same size as lateral lobes.

Type of section: *C. polypodiifolia* Boiss.

166. **C. szovitsiana** Boiss. Fl. or. III (1875) 683; Grossh. Fl. Kavk. IV, 210 p. p.; Tzvelev in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 29.—*C. behen* auct. non L.: DC. Prodr. VI (1837) 567; Ldb. Fl. Ross. II, 2, 687.—*Microlophus szovitsianus* (Boiss.) Takht. in Takht. and Fedtsch. Fl. Yerevana (1945) 326 p. p.; Grossh. Opred. Rast. Kavk. 495 p. p.

563 Biennial or perennial. Plants to 1 m high, covered with short spiniform and papilliform hairs (mostly along leaf margin) and longer but sparse crisped hairs mixed with some arachnoid hairs, scabrous. Stem upright, strongly branched above middle, with numerous capitula in corymbose inflorescence. Basal and lower cauline leaves quite large, petiolate, pinnately lobed (almost to midrib), with 6–10 oblong, obtuse, lateral lobes and terminal lobe almost as large as lateral lobes; middle and upper cauline leaves numerous, entire or weakly toothed, sessile, base of lamina decurrent on stem as broad wings; apical leaves enveloping capitulum rather large; all leaves distinctly punctately glandular with glands lighter than in preceding species, often with yellowish tinge. Involucre 13–17 mm in dia, 20–25 mm long; involucre bracts acute, lacking appendages. Florets yellow. Achenes unknown. Flowering July to August.

Stony slopes, mountain meadows, often in fields, as weed; mostly in mid-montane zone.—*Caucasus*: Southern Transcaucasia (northeastern part of Nakhichevan ASSR). *General distribution*: Armenia and Kurdistan(?). Described from Nakhichevan ASSR (Kashadara Mountain). Type in Geneva; isotype in Leningrad.

167. **C. polypodiifolia** Boiss. Diagn. pl. or. ser. I, 6 (1845) 126 and Fl. or. III, 683; Tzvelev in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XX (1960) 29.—*C. szovitsiana* auct. non Boiss.: Grossh. Fl. Kavk. IV (1934) 210 p. p.—*Microlophus szovitsianus* (Boiss.) Takht. in Takht. and Fedtsch. Fl. Yerevana (1945) 326 p. p.; Grossh. Opred. Rast. Kavk. 495 p. p.—*M. polypodiifolius* (Boiss.) Agadsh. in Fl. Azerb. VIII (1961) 443.—*Exs.*: Fl. or. exs. No. 24 (sub *C. szovitsiana*).

Biennial or perennial. Plants to 70–80 cm high, short- and sparsely crisped hairy-mixed with some arachnoid hairs, scabrous from spiniform hairs mostly along leaf margin. Stem upright, strongly branched above middle or almost from base, with numerous capitula in corymbose inflorescence. Leaves as in preceding species, somewhat attenuate at apex; apical leaves smaller, at flowering time usually somewhat distant from base of capitulum. Involucre 9–13 mm in dia and 16–20 mm long; involucre bracts acute, lacking appendages. Florets yellow. Achenes about 4 mm long, with pappus about 5 mm long. Flowering July to August. (Plate XXVI).

Stony slopes, mountain meadows and meadow-steppe areas, roadsides; mostly in mid-montane zone.—*Caucasus*: Southern Transcaucasia (western part including area of Lake Sevan). *General distribution*: Asia Minor (eastern part), Armenia and Kurdistan, Iran (western part), Iraq. Described from Iraq. Type in Vienna.

Note. In relation to the preceding species it is a more western ecogeographical race, widely distributed in Armenia. A hybrid of this species with *C. stevenii* MB. is known from the environs of Leninakan (collections of N.N. Tzvelev and S.K. Czerepanov, 1960).

Subgenus 18. **Seridia** (Juss.) Czer. comb. nova.—*Seridia* Juss. Gen. pl. (1789) 173; Cass. in Dict. Sc. nat. XLVIII (1827) 498.—Capitula medium-sized, with many florets, solitary at tips of stems and their lateral branches. Involucre ovate, 10–15 mm in dia, weakly arachnoid-hairy; involucre bracts coriaceous, greenish (yellowing on drying), with inconspicuous veins in upper part, gradually elongated from broadly ovate outer to oblongly lanceolate inner ones; appendages of outer and middle bracts small, not decurrent, coriaceous, pale reddish-brown, with palmately divergent short spines, of which middle spine usually slightly longer and very slightly thicker than others; appendages of innermost bracts very small, membranous, unevenly toothed. All florets tubular, yellow, 1.5 times as long as involucre, heterogeneous; central florets bisexual, peripheral sterile, lacking staminodes and rudiments of style, not enlarged, with 4(5)-fid corolla; stamen filaments flattened, covered with papilliform hairs; style shortly bifid. Achenes oblong or oblong ellipsoidal, 4.5–5.0 mm long, scatteredly hairy; pappus 1/2–2/3 as long as achenes, whitish or weakly ochreous, persistent, double; outer pappus consisting of several irregular [rows of] weakly serrate, scabrous bristles, gradually elongating from outer to inner; inner pappus of single row of bristles, similar to outer pappus bristles but slightly shorter, sometimes pappus almost simple. Perennial herbs with long, thick root, fibrous, branched above, with branched rhizome, and prostrate, at ends of ascending stems; leaves entire, lyrate lobed or divided, petiolate. (Description of the subgenus has been compiled, as is conventional in our *Flora*, only with reference to our species.)

Type of subgenus: *C. seridia* L.

Pending clarification of the true systematic position of *C. stevenii* MB. in the genus *Centaurea* L., I am referring it provisionally to the subgenus *Seridia* (Juss.) Czer. Probably the yellow-flowered perennial species *C. cheirolopha* (Fenzl) Wagenitz, *C. lancifolia* Sieb., *C. hololeuca* Boiss., and *C. stevenii* MB. should be split off in a separate section or even subgenus.

168. **C. stevenii** MB. Fl. taur.-cauc. II (1808) 356; Ldb. Fl. Ross. II, 2, 710; Grossh. Opred. Rast. Kavk. 495.—*Phaeopappus stevenii* (MB.) Boiss. Fl. or. III (1875) 603; Grossh. Fl. Kavk. IV, 206.—**Exs.:** Pl. or. exs. No. 323.

565 Perennial. Root long, thick, vertical or oblique, fibrous, branched above, usually with short-branched rhizome. Stems usually prostrate, at end ascending, 10–40 cm long, with few short branches, sometimes simple, grayish-green or more or less grayish from fine lax arachnoid-hairs often mixed with articulate, somewhat stiff, short hairs. Leaves lanceolate or oblanceolate, acute, subacute, less often subobtuse, petiolate (upper cauline leaves subsessile), entire, lyrate-lobed or parted with oblong, obtuse, entire, small lateral lobes and oblong-elliptical or ovately rhombic larger terminal lobe, with articulate, stiff hairs mixed with few arachnoid hairs, covered with pale, sessile, punctate glands. Capitula solitary, at tips of stems and lateral branches. Involucre ovate, 15–20 mm long and 10–15 mm in dia; involucre bracts from broadly ovate outer to oblong-lanceolate inner; appendages of outer and middle bracts coriaceous, pale reddish-brown, with (3)5–7 palmate, almost equal, small spines; appendages of innermost bracts membranous, unevenly toothed. Florets yellow. Achenes 4.5–5.0 mm long and 2.0–2.5 mm wide; pappus 2.5–4.0 mm long. Flowering June to July.

Herb slopes, mid-montane zone.—*Caucasus*: Eastern and Southern Transcaucasia. *General distribution*: Armenia and Kurdistan (former Kara Region). Described from Georgia. Type in Leningrad.

Note. One specimen of this species is preserved in the Herbarium of the Botanical Institute of the Academy of Sciences of the USSR in Leningrad with the label “Nowotscherkask Pabo.” The lack of new collections from the area of Novocherkassk and generally from Ciscaucasia leads me to assume that in the present case a label mixup has occurred. The report of the occurrence of *C. stevenii* MB. in Dagestan is based on Lagov’s specimens from Derbent. It also is not confirmed by new collections. The hybrid *C. polyodiifolia* Boiss. × *C. stevenii* MB. is known from the vicinity of Leninakan (Armenian SSR, Achinsk District between Ani and Bagravan stations, on the border of a field, 2–3 km from Bagravan Station, 5.VII.1960, No. 847, N. Tzvelev and S. Czerepanov).

Subgenus 19. Rhizocalathium (Tzvel.) Tzvel. comb. nova.—*Centaurea* auct. *Rhizocalathium* Tzvel. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX (1959) 438.—*Centaurea* sect. *Acrocentron**** *Rhizanthae* Boiss. Fl. or. III (1875) 618 and 674 p. p.—Capitula medium-sized sometimes rather large, with many florets, one each in center of rosette of basal leaves on strongly reduced peduncles (often subsessile). Involucre 10–25 mm in dia, broadly ovate, to subglobose, more or less thinly tomentose and also with very short, erect hairs to subglabrous; involucre bracts coriaceous, greenish, with 3–7 quite inconspicuous veins, gradually elongated from broadly ovate outer to

566 lanceolate innermost; appendages of involucre bracts quite large, thin-coriaceous, triangular-lanceolate, less often ovate to suborbicular, often recurved, usually not decurrent on bracts and not surpassing them in width, brownish or of various shades, gradually acuminate-spinescent, pectinately ciliate, with quite long, stiff cilia, with cilia many to 1–2 on each side, sometimes appendages entirely lacking, replaced by short deflexed spine at leaf tip. All florets tubular, various shades of yellow, 1.5–2.0 times as long as involucre, heterogeneous, peripheral florets sterile, not large (usually even smaller than bisexual central florets) with staminodes not exerted from corolla tube; stamen filaments weakly flattened, covered with very short, papilliform hairs; stigma shortly bifid. Achenes 4–6 mm long, sparsely pubescent, mature achenes subglabrous, somewhat lustrous; pappus 1/5–1/3 as long as achenes, persistent, double: outer pappus consisting of many irregular rows of scarious bristles, weakly scabrous on two sides, gradually elongated toward middle and inner; inner pappus of single row of scarious bristles, similar to outer but usually slightly thicker and shorter. Perennial herbs with long, strongly branched rhizome, producing vegetative shoots with rosette of basal leaves and reproductive shoots; leaves with quite long petioles, with leaf glades oblong, more or less divided or lobed, less often entire or subentire, covered with short crisped hairs and inconspicuous punctate, glands.

Type of subgenus: *C. rhizantha* C.A.M.

The seven species of the subgenus, which, except for *C. oltensis*, are very closely related, are distributed in Turkey, Iran, and Transcaucasia, extending also to the montane regions of Turkmenia. Five species are found in the USSR.

In the original diagnosis of the section *Rhizocalathium*, based exclusively on herbarium material, the species belonging here were described as not producing rhizomes. Later observations in nature have shown that this is incorrect; long, strongly branched rhizomes are, on the contrary, a very typical characteristic of the subgenus *Rhizocalathium*, clearly distinguishing it from the subgenus *Lopholoma* in whose species stolons are always absent.

1. Lateral segments of pinnately incised leaves many (8–16 on each side), sinuate-toothed or lobed, almost always narrowed toward base, terminal lobe almost equaling lateral ones; appendages of involucre bracts deflected from involucre, but not recurved, long and wide 171. *C. oltensis* Sosn.
- 567 + Lateral segments of lyrate or pinnately lobed leaves fewer (up to 6–8 on each side), entire, basally usually broadened, terminal lobe almost always larger than lateral ones; appendages of involucre

- bracts recurved, rarely partly ascending 2.
2. Florets light-yellow (pale); leaf blades relatively weakly incised, with few (1–3 on each side) lateral lobes only near base, often partly undivided and entire. Southern Georgia and northern Armenia 171. *C. rhizanthoides* Tzvel.
- + Florets yellow; leaf blades relatively more incised, usually lobed or divided up to half or more than half the length, with 1–8 lobes on each side 3.
3. Appendages of involucre bracts very large, partly ascending, almost covering involucre, to 12 mm long and 2.5–3.6 mm wide (excluding lateral cilia), cilia to 6 mm long, 5–10 on each side; involucre 20–25 mm in dia 172. *C. armena* Boiss.
- + Appendages of involucre bracts smaller, recurved, lateral cilia usually shorter and fewer 4.
4. Leaf blades rather narrow, relatively more incised, with 3–8 lobes on each side; terminal lobe not much longer than lateral ones, usually much shorter than half the blade length. Nakhichevan ASSR
..... 170. *C. grossheimii* Sosn.
- + Leaf blades less incised, with 1–5 lobes on each side; terminal lobe much longer than lateral ones; often nearly half as long as blade
..... 169. *C. rhizantha* C.A.M.

Series 1. Rhizanthae Tzvel.—Involucre bracts with more or less recurved appendage; lateral lobes or leaf segments usually entire.

169. *C. rhizantha* C.A.M. Verzeichn. (1831) 64; DC. Prodr. VI, 594; Ldb. Fl. Ross. II, 2, 710; Sosn. in Fl. Gruzii, VIII, 564; Tzvelev in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX, 439.—*C. sessilis* auct. non Willd. Boiss. Fl. or. III (1875) 676; Grossh. Fl. Kavk. IV, 213 and Opred. Rast. Kavk. 497.—**Exs.**: GRF No. 4398.

568 Perennial. Plants stemless or with strongly reduced (to 5 cm long) stem, green, more or less crisped-hairy. Leaves lyrate or pinnately lobed, rather long-petiolate, with 1–5 lobes on each side, terminal lobe much larger than lateral ones, often hastate or sagittate. Capitula usually solitary, in center of leaf rosette. Involucre 15–25 mm in dia; appendages of involucre bracts lanceolate, recurved, ciliate, usually with 1–6 cilia on each side. Florets yellow. Achenes 4–6 mm long, with whitish pappus 1–2 mm long. Flowering June to July (Plate XXVII, Fig. 2).

Stony slopes, meadows, more moist places of mountain steppes, mostly in mid-montane zone.—*Caucasus*: Eastern Transcaucasia (south-western part), Southern Transcaucasia (southeast of Aragats Mountain), Talysh; *Soviet Central Asia*: mountainous Turkmenia. *General*

distribution: Armenia and Kurdistan, Iran (northern part). Described from Talysh. Type in Leningrad; isotype in Tbilisi.

Note. Apparently, even in the more restricted sense considered by me, this species splits up into many weakly differentiated ecogeographical races, differing mostly by the size and shape of the appendages of the involucre bracts.

From Nakhichevan ASSR, a sterile intergeneric hybrid is known: *C. rhizantha* × *Tomanthea phaeopappa* (Shakhbuz District, stony steppe, 2–3 km northwest of the village of Buzgov, 26.VI.1957, N. Tzvelev and S. Czerepanov).

170. *C. grossheimii* Sosn. in Bot. Zhurn. SSSR, XXXIV, 3 (1949) 288; Grossh. Oprod. Rast. Kavk. 497.—*C. rhizantha* auct. non C.A.M.; Tzvelev in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XIX (1959) 439 p. p.; Karjagin in Fl. Azerb. VIII, 474 p. p.

Perennial. Plants stemless or with strongly reduced stem, green or grayish-green, quite densely crisped-hairy. Leaves pinnately lobed or parted, with 3–8 lobes on each side, terminal lobe not much longer than lateral ones, usually much shorter than half length of leaf blade. Capitula usually solitary, incenter or leaf rosettes. Involucre 15–22 mm in dia; appendages of involucre bracts lanceolate, recurved, ciliate, usually with 3–7 cilia on each side. Florets yellow. Achenes 4–6 mm long, with pappus 1–2 mm long. Flowering June to July.

Stony and rubby limestone slopes, at 1,000–2,000 m.—*Caucasus*: Southern Transcaucasia (Nakhichevan ASSR). Endemic(?). Described from Nakhichevan ASSR (Karagut Massif). Type and isotype in Leningrad; isotype in Tbilisi.

Note. A very weakly separated, more xerophilous and lower montane ecogeographical race associated with limestone massifs of Nakhichevan ASSR.

171. *C. rhizanthoides* Tzvel. in Addenda XXVII, 620.—*C. sessilis* auct. fl. cauc. p. p. quoad pl. Georgiae et Arm. bot.—*C. sessilis* var. *integrifolia* Bordz. ex Grossh. Fl. Kavk. IV (1934) 213.

Perennial. Plants stemless or with strongly reduced stem, green, 569 more or less crisped-hairy. Leaves lyrate, with very long petioles, few (1–3 on each side) lateral lobes only closer to base, often partly undivided and entire. Capitula usually solitary in center of leaf rosette. Involucre 12–20 mm in dia; appendages of involucre bracts lanceolate, recurved, ciliate, usually with 1–5 cilia on each side. Florets light yellow (pale). Achenes 4–5 mm long, with pappus 1–2 mm long. Flowering June to July.

Stony slopes, meadows, pastures; mostly in middle mountain zone.—*Caucasus*: Western Transcaucasia (southern part), Southern Transcaucasia (north of Aragats Mountain and Lake Sevan). *General distribution*: Asia Minor (eastern part), Armenia and Kurdistan. Described from Armenia (Sevan District, meadow-steppe stony slope toward Lake Sevan, 3–4 km northeast of city of Sevan, 13 July 1957, No. 875, N. Tzvelev and S. Czerepanov). Type in Leningrad.

Note. Mass herbarium material, collected by S.K. Czerepanov and me in the summer of 1960 in the region of the Dzhavakhet and Pambak ranges, revealed considerable stability of the morphological characters of this northernmost of ecogeographical races of *C. rhizantha* s. l. *C. rhizantha* s. str. is found also on the slopes of Aragats Mountain, but in the area of Lake Sevan the geographical boundary between the ranges of these two species is still not altogether clear. Near the state border with Turkey, it is possible to find specimens of another similar species—*C. rhizocalathium* (*C. Koch*) Boiss.—in which the appendages of the involucre bracts are reduced to a single spine without lateral cilia.

172. *C. armena* Boiss. Fl. or. III (1875) 676.

Perennial. Plants stemless or with strongly reduced stem, green, more or less crisped-hairy. Leaves lyrate or pinnately lobed, with very long petioles and 1–5 lobes on each side, terminal lobe much longer than lateral ones. Capitula usually solitary, in center of leaf rosette. Involucre 20–25 mm in dia; appendages of involucre bracts lanceolate, very large, often ascending, almost covering bracts, to 12 mm long and 2.5–3.5 mm wide (excluding lateral cilia), cilia 5–10 on each side. Florets yellow. Achenes 5–6 mm long, with pappus 1–2 mm long. Flowering June to July.

Stony slopes.—*Caucasus*: Southern Transcaucasia (Daralgez). *General distribution*: Armenia and Kurdistan. Described from northeastern Turkey. Type in Geneva; isotype in Leningrad.

Note. The specimens available from Daralgez (Ekhegnadzor District, Armenian SSR, 3–4 km northwest of the village of Ortakend, 8 July 1957; Nos. 781 and 785, N. Tzvelev, and S. Czerepanov) are not entirely consistent with the typical plants of this species, differing primarily by the recurved appendages of the involucre bracts, and, possibly, belong to a separate Daralgez ecogeographical race.

570 *Series 2. Oltenses* Tzvel.—Involucre bracts usually with ascending appendages; lateral lobes or segments of leaf blades numerous, more or less sinuately toothed or lobed.

173. *C. oltensis* Sosn. in Zam. po Sist. i Georg. Rast. Tbil. XXI (1959) 60.—*C. ustulata* auct. non DC.: Grossh. Opred. Rast. Kavk. (1949) 497.

Perennial. Plants stemless or with strongly reduced stem, crisped-hairy, mixed with some arachnoid-hairs, green. Leaves pinnately incised, with very long petioles, and 8–16 lobes on each side, unequal, mostly sinuate-toothed or lobate, usually narrowed toward base, terminal lobe almost as long as laterals. Capitula solitary, in centre of leaf rosettes. Involucre 14–20 mm in dia; appendages of involucre lanceolate or broadly lanceolate, divergent from involucre but ascending, with 3–6 stiff cilia on each side. Florets yellow. Achenes 4–6 mm long; pappus about 1.5 mm long, whitish; inner pappus bristles much thicker than outer pappus bristles. Flowering June to July.

Stony limestone slopes of middle mountain zone.—*Caucasus*: Southern Transcaucasia (Karagut Massif in Nakhichevan ASSR). *General distribution*: Armenia and Kurdistan (northwestern part). Described from northwestern Turkey (near Oltu). Type in Tbilisi.

Note. Specimens of this species from the Karagut Massif (from the Herbarium of the Botanical Institute of the Academy of Sciences of Azerbaidzhan SSR) were identified by A.A. Grossheim as "*C. ustulata* DC." However, this latter species (there are isotypes of it in the Herbarium of the Botanical Institute of the Academy of Sciences of the USSR) differs from *C. oltensis* by a whole series of significant characters (structure of the involucre, color of the florets, and others). The great similarity in the structure of the involucre of *C. oltensis* with the hybrid, *C. rhizantha* × *Tomanthea phaeopappa*, mentioned above, prompts me to suggest the possibility of a hybrid origin of the plants of *C. oltensis*, as a result of the hybridization of *C. rhizantha* with some species of the genus *Tomanthea*.

Subgenus 20. *Solstitiaria* (Hill.) Dobroc. in Bot. Zhurn. Akad. Nauk URSR, VI, 2 (1949) 64, 69.—*Solstitiaria* Hill, Veg. Syst. IV (1762) 21.—*Leucantha* S.F. Gray, Nat. Arrang. Brit. Pl. II (1821) 443.—*Mesocentron* and *Triplocentron* Cass. in Dict. Sc. nat. XLIV (1826) 38.—*Verutina* Cass. op. cit. XLIV (1826) 38, LVIII (1829) 8.—*Centaurea* sect. *Mesocentron* (Cass.) DC. Prodr. VI (1837) 592 p. p.; Boiss. Fl. or. III (1875) 619; O. Hoffm. in Pflanzenfam. IV, 5, (1893) 331.—*Centaurea* subgen. *Centaurea* Schmalh. Fl. Yugo-Zap. Ross. (1866) 329 p. p.; Fl. II (1897) 120 p. p.—*Centaurea* subgen. *Calcitrapa* sect. *Mesocentron* (Cass.) Hayek, Centaurea-Art. Österr.-Ung. (1901) 3, 15.—*Calcitrapa* auct. p. p. non Adans.: Lam. Fl. Fr. II (1778) 29; Dostal, Klič. (1958) 734.—Capitula medium-sized, with many florets, solitary at tips of stem and lateral branches, aggregated

in racemose or paniculate-racemose inflorescence. Involucre ovate-conical, 7–12(15) mm in dia; involucre bracts coriaceous, greenish (yellowing on drying), smooth, from ovate outer to oblongly lanceolate and oblong inner; outer and middle bracts with 5(7) palmately divaricate spines, of which central spine usually much longer (up to 30 mm) and thicker than others (2.5–4.0 mm long); inner bracts with small membranous, unevenly toothed appendage. All florets tubular, yellow, heterogeneous; central florets bisexual; peripheral ones sterile lacking staminodes, very slightly shorter than central florets, with 3–5 fid corolla; stamen filaments flattened, covered with papilliform hairs; style short-bifid or not (its branches connate to tip). Achenes oblong-ellipsoidal or oblong obovate, 2.5 mm long, initially scatteredly hairy, mature ones glabrous; pappus as long as achenes, persistent, double outer pappus consisting of many rows of flat, serrate-scabrous bristles, elongated from outer to inner; inner pappus much shorter than outer, of single row of bristles. Biennial herbs; stem upright, branched, narrowly-winged, leafy to tip; cauline leaves sessile, decurrent, with stem arachnoid-tomentose, mostly entire, lower leaves short-petiolate, lyrate-pinnately incised, to undivided and even entire.

Type of subgenus: *C. solstitialis* L.

Of the 17 species of this subgenus growing in southern Europe, northern Africa, and southwestern Asia, only two are found in the USSR.

1. Involucre 13–15(18) mm long and 7–12(15) mm in dia, outer and middle involucre bracts with 5(7) yellow spines, of which central spine is much thicker and longer than others 174. *C. solstitialis* L.
- + Involucre 12–13(15) mm long and 7–8(10) mm in dia, outer and middle involucre bracts with 5(7) usually brownish spines, of which central spine is thin and short, slightly longer than others or almost as long 175. *C. adamii* Willd.

174. *C. solstitialis* L. Sp. pl. (1753) 917; DC. Prodr. VI. 594 p. p.; Ldb. Fl. Ross. II, 2, 710 p. p.; Boiss. Fl. or. III, 685 p. p.; Schmalh. Fl. II, 121; Hayek, Centaurea-Art. Österr.-Ung. (1901) 18; Briquet, Monogr. Centaurees Alpes Maritimes, 158; Fedtsch. and Fler. Fl. Evrop. Ross. 1032 p. p.; O. and B. Fedtsch. Perech. Rast. Turk. IV, 272, excl. syn. *C. adamii* Willd.; Grossh. Fl. Kavk. IV, 210; Opređ. Rast. Kavk. 495; Dobroc. in Vizn. Rosl. URSR, 582; Sosn. in Fl. Gruzii, VIII, 562; Stank. and Tal. Opređ. Vyssh. Rast. ed. 2, 414; Czer. in Fl. Turkm. VII, 274.—*C. sicula* auct. non L.: Guldest. Reise, I (1787) 572 196, nomen.—*C. adamii* auct. non Willd.: MB. Fl. taur.-cauc. II, 355,

III, 593.—?*C. cyanifolia* Poir. in Lam. Encycl. meth. Suppl. II (1811) 158.—*C. solstitialis* ssp. *eu-solstitialis* var. *typica* Gugler in Ann. hist.-nat. Mus. Nat. Hung. VI (1908) 203.—*Solstitiaria solstitialis* (L.) Hill. Veg. Syst. IV (1762) 21.—*S. flava* Hill. Herb. Brit. I (1769) 77.—*Calcitrapa solstitialis* (L.) Lam. Fl. Fr. II (1778) 34.—*C. solstitialis* ssp. *solstitialis*: Dostal, Klič. (1958) 734.—*Cyanus solstitialis* (L.) Baumb. Enum. strip. Transsilv. III (1816) 79.—*Leucantha cyanifolia* S.F. Gray, Nat. Arrang. Brit. Pl. II (1821) 444.—*L. solstitialis* (L.) A. and D. Love in Bot. Notis. CXIV, 1 (1961) 44.—*Seridia solstitialis* (L.) Sweet, Hort. Brit. ed. 1 (1827) 218.—*Triplocentron solstitiale* (L.) Fourr. in Ann. Soc. Linn. Lyon, nov. ser. XVII (1867) 97.—*lc.*: Hill, Herb. Brit. I (1769) tab. 54, fig. 2; Rchb. Ic. Fl. Germ. et Helv. XV (1852) tab. 795, 1–1; Hayek, op. cit. Taf. II, fig. 3; Hegi, Ill. Fl. VI, 2 (1929) fig. 668a; Javorka and Csapody, Iconogr. Fl. Hung. (1933) 545, fig. 3895.—*Exs.*: GRF No. 1879; Fl. cauc. exs. No. 224; Sintenis, It. trans-casp.-pers. 1900–1901, No. 388; Bornm. Pl. exs. Anat. or. 1889, No. 1502; Kotschy, It. cilic.-kurd. 1859, No. 314; Fl. exs. austro-hung. No. 3435; Schultz, Herb. norm. No. 2215; Billot, Fl. Gall. et Germ. exs. No. 266; Fl. exs. reip. Bohem.-Sloven. No. 1181; Rchb. Fl. Germ. exs. No. 316.

Biennial. Whole plant grayish-arachnoid-tomentose. Stem (15)30–100 cm high, erect, ribbed, narrowly-winged, mostly branched from middle and below, with few upward-spreading branches, or simple. All leaves scabrous along margin from small acute spines; lower leaves lyrate-pinnately incised to undivided or even entire, short-petiolate, withering early, their lateral segments triangular, oblong-lanceolate or oblong with remote small teeth or entire, terminating in small cusp, 2–6 on each side; terminal segment rather large, lanceolate, elliptical or almost rhombic, with occasional small teeth or entire; cauline leaves lanceolately linear, usually entire, awned, sessile, long-decurrent on stem. Capitula solitary at tips of stem and lateral branches, aggregated in racemose or paniculate-racemose inflorescence. Involucre ovate-conical 13–15(18) mm long and 7–12(15) mm in dia, weakly arachnoid-hairy; outer and middle involucre bracts with 5(7) palmately spreading yellow spines, of which central spine in middle bracts is stiff, long (12–30 mm), more or less strongly recurved, others thin, short (2.5–4.0 mm long) at base of central spine, 2(3) on each side; middle spine of outer bracts mostly thinner and shorter (4–7 mm long); inner bracts with small membranous, unevenly toothed appendages. Florets yellow. Achenes 2.5 mm long and about 1 mm wide, outermost pappus, others with 5 mm long pappus. Flowering May to September (October).

573 Dry rubbly and clayey slopes, foothills and lower mountains; weedy places.—*European Part*: Bessarabia, Black Sea Region (western half of region), Middle Dnieper (extreme southwest), Volga-Don (vicinity of Kharkov, introduced). Crimea (south); *Caucasus*: entire region; *Soviet Central Asia*: mountainous Turkmenia, Pamiro-Alai (western part). *General distribution*: Iran, Armenia and Kurdistan, Balkans-Asia Minor, Mediterranean, Central Europe (southern part), Atlantic Europe (introduced), North America (introduced). Described from western Europe. Type in London.

Note. The absence of true *C. adamii* Willd. in Bieberstein's herbarium forces me to consider *C. adamii* MB. as a synonym.

175. *C. adamii* Willd. Sp. pl. III, 3 (1803) 2310; DC. Prodr. VI, 594; Hayek, Centaurea-Art. Österr.-Ung. (1901) 16 p. p.; Grossh. Fl. Kavk. IV, 210; Oprod. Rast. Kavk. 495; Sosn. in Fl. Gruzii, VIII, 563; Stank. and Tal. Oprod. Vyssh. Rast. ed. 2, 414.—*C. solstitialis* β . *adamii* (Willd.) Heuff. in Verh. Zool. Bot. Ges. Wien. VIII (1858) 144; Boiss. Fl. or. III, 685, excl. syn. *C. lappacea* Ten.—*C. solstitialis* ssp. *eu-solstitialis* var. *adamii* (Willd.) Gugler in Ann. hist.-nat. Mus. Nat. Hung. VI (1908) 203.—*Seridia adamii* (Willd.) Sweet, Hort. Brit. ed. 1 (1827) 218.—*Calcitrapa adamii* (Willd.) Schur. Enum. pl. Transsilv. (1866) 409.—*C. solstitialis* ssp. *adamii* (Willd.) Dostal, Klič (1958) 734.—**lc.**: Rchb. Ic. Fl. Germ. et Helv. XV (1852) tab. 795, II-2; Hayek, op. cit. Taf. II, fig. 2.

Biennial. Differs from preceding species in insignificant features: involucre much smaller, 12–13(15) mm long and 7–8(10) mm in dia; spines of outer and middle involucral bracts usually brownish and more or less equal; central spine in some middle involucral bracts often slightly thicker and longer (4–7, less often to 10 mm long) than others. Flowering June to August.

Dry slopes, steppes, and weedy places.—*European Part*: Bessarabia, Black Sea Region (environs of Odessa; settlement of Sositskaya), Middle Dnieper (southern Podolia: former Balta District), Crimea (Lake Saks; Kazantin Peninsula); *Caucasus*: Ciscaucasia, Dagestan (vicinity of Khasavyurt), Eastern Transcaucasia. *General distribution*: Balkans (Macedonia and northward), Central Europe (extreme southeast). Described from Georgia. Type in Berlin.

Note. Judging from the herbarium material at our disposal, *C. adamii* Willd. is quite common in Central Ciscaucasia and in the eastern part of Western Ciscaucasia. In Eastern Transcaucasia it is found in the lesser Caucasus in the Kura River basin, reaching in the south-

east as far as the Agdam District of the Azerbaidzhan SSR (village of Kuzanla).

Subgenus 21. *Calcitrapa* (Adans.) Hayek, Centaurea-Art. Österr.-Ung. (1901) 2, 11 p. p.—*Calcitrapa* Adans. Fam. II (1763) 116; Lam. Fl. Fr. II (1778) 29 p. p.; Juss. Gen. pl. (1789) 173; Dostal, Klic (1958) 734 p. p.—*Happophaestum* S.F. Gray, Nat. Arrang. Brit. Pl. II (1821) 443.—*Centaurea* sect. *Calcitrapa* (Adans.) DC. Prodr. VI (1837) 596; Boiss. Fl. or. III (1875) 619; O. Hoffm. in Pflanzenfam. IV, 5 574 (1893) 331.—*Centaurea* subgen. *Centaurea* Schmalh Fl. II (1897) 120 p. p.—*Centaurea* subgen. *Calcitrapa* sect. *Eucalcitrapa* Hayek b) *Carduiformes* Hayek, op. cit. 3.—Capitula medium-sized, with many florets, solitary at tips of lateral branches and reduced branchlets, numerous on plant. Involucre oblongly ovate, ovate or globose ovate, 6–14 mm in dia, glabrous; involucre bracts coriaceous, greenish (yellowing on drying), smooth, from round-ovate outer to oblong-ovate and oblong inner; outer and middle bracts with (3)5–7 palmately spreading spines, of which central spine is much longer (10–30 mm) and thicker than others (3–5 mm long); inner involucre bracts with small, membranous, weakly irregularly toothed appendage. All florets tubular, pinkish-violet, heterogeneous: central florets bisexual; peripheral ones sterile, lacking staminodes, scarcely larger, with 5–6-fid corolla; stamen filaments flattened, covered with papilliform hairs; style weakly bifid. Achenes obovate to oblong-ellipsoidal, 3–4 mm long, initially scatteredly hairy, mature ones glabrescent; pappus absent or shorter than achene, white, persistent, double; outer pappus many-rowed, consisting of flat, serrate-scabrous bristles, elongated from short outer to inner; inner pappus 1/4–1/3 as long as outer, of single row of bristles. Biennial herbs; stems upright, strongly divaricately branched, leafy to tip; cauline leaves sessile, not decurrent, usually pinnately incised, basal and lower cauline short-petiolate.

Type of subgenus: *C. calcitrapa* L.

The subgenus comprises 14–16 species, of which only two grow in our country.

- | | | |
|----|------------------------------|------------------------------|
| 1. | Achenes with pappus | 176. <i>C. iberica</i> Trev. |
| + | Achenes lacking pappus | 177. <i>C. calcitrapa</i> L. |

176. *C. iberica* Trev. in Spreng. Syst. vet. 3 (1826) 406; DC. Prodr. VI, 597; Ldb. Fl. Ross. II, 2, 711; Boiss. Fl. or. III, 690 p. p.; Hayek, Centaurea-Art. Österr.-Ung. (1901) 13; in Fedde, Repert. Beih. XXX, 2, 793 (Prodr. Fl. Balc.); O. and B. Fedtsch. Perech. Rast. Turk. IV, 272; Grossh. Fl. Kavk. IV, 209; Opred. Rast. Kavk. 495; Sosn. in

Fl. Gruzii, VIII, 562; Stank. and Tal. Opred. Vyssh. Rast. ed. 2, 414; Czer. in Fl. Gruzii, VII, 275.—*C. calcitrapa* auct. non L.: MB. Fl. taur.-cauc. II, 356 p. p., III, 594 and auct. al. fl. Cauc. et As. Med.—*C. calcitrapoides* auct. non L.; DC. op. cit. 597 p. p.; Ldb. op. cit. 711 and auct. fl. Cauc. et AS. Med.—*C. calcitrapa* var. *iberica* (Trev.) Schmalh. Fl. II (1897) 122, excl. sun.—*C. pallescens* var. *iberica* f. *genuina* Gugler in Ann. hist.-nat. Mus. Nat. Hung. VI (1908) 209.—*C. pallescens* ssp. *iberica* var. *genuina* (Gugler) Arenes in Compet. Rend. Séances soc. Biogeogr. 237 (1950) 137.—*Calcitrapa iberica* (Trev.) Schur. Enum. Pl. Transsilv. (1866) 409.—*Leucantha iberica* (Trev.) A. and D. Löve in Bot. Notis. CXIV, 1 (1961) 44.—**lc.**: Hayek, Centaurea-Art. Österr.-Ung. (1901) Taf. 1, fig. 4; Javorka and Csapody, 575 Iconogr. Fl. Hung. (1933) 545, fig. 3897.—**Exs.**: GRF No. 1877; Herb. Fl. cauc. No. 296; Hayek, Cent. exs. crit. fasc. I, No. 47; Fl. exs. austro-hung. No. 3436; Schultz, Herb. norm. No. 2652; Sintenis, It. trans-casp.-pers. 1900–1901, No. 961.

Biennial. Stem 20–100 cm high, erect, ribbed, strongly divaricately branched from middle or below, scabrous, pale green, less often grayish-green, usually not densely covered with flexuous articulate hairs, sometimes glabrous. Leaves green, scabrous-floccose or almost scabrous from fine, quite stiff hairs, covered with golden, punctate, sessile glands; basal leaves lyrate-pinnately parted to incised, petiolate, withering early; cauline leaves pinnately incised, sessile, not decurrent on stem, upper ones mostly undivided or subentire, their leaf segments narrowly lanceolate-linear, narrowly lanceolate, oblongly lanceolate or almost oblong, mostly with remote acute teeth, terminating in small, white, thin, cartilaginous cusp. Capitula solitary at tips of lateral branches and reduced branchlets, numerous on plant. Involucre ovate or broadly ovate, 13–16 mm long and 10–14 mm in dia; outer and middle involucral bracts with (3) 5–7 palmately spreading spines, of which central spine is much longer (10–30 mm) and thicker than others (3 mm long); inner bracts with very small, membranous, weakly irregularly toothed appendages. Florets pinkish-violet. Achenes 3–4 mm long, 1.2–1.5(1.7) mm wide; pappus 2.0–2.5(3.0) mm long. Flowering May to August (September).

Along irrigation ditches, banks of mountain streams, roadsides, and wastelands, in foothills and low- sometimes mid-montane zone, less often on slopes and foothill plains.—*European Part*: Crimea (south); *Caucasus*: all regions; *Soviet Central Asia*: mountainous Turkmenia, Amu-Darya, Pamiro-Alai, Syr-Darya, Tien Shan, Lake Balkhash Region (foothill areas of Semirechye), Dzhungaria-Tarbagatai (western part of Dzhungarian Alatau). *General distribution*: Dzhungaria-Kashgaria (Kuldzha), Indo-Himalayas (Kashmir, Punjab), Iran, Arme-

nia and Kurdistan, eastern Mediterranean (Asiatic part), Balkans-Asia Minor. Described from Armenia. Type in Bonn or Bratislava.

177. *C. calcitrapa* L. Sp. pl. (1753) 917; DC. Prodr. VI, 597 p. p. excl. γ . *brevicaulis*; MB. Fl. taur.-cauc. II 356 p. p.; Ldb. Fl. Ross. II, 2, 711; Boiss. Fl. or. III, 689; Schmalh. Fl. II, 122 p. p.; Hayek, Centaurea-Art. Österr.-Ung. 11; in Fedde, Repert. Beih. XXX, 2, 793 (Prodr. Fl. Balc.); Brequet, Monogr. Centaurees Alpes Maritimes, 162; Fedtsch. and Fler. Fl. Evrop. Ross. 1032 p. p.; Stank. and Tal. Opred. Vyssh. Rast. ed. 2, 414.—*C. calcitrapa* var. *eu-calcitrapa* Stojan. and Acht. in Stojan. and Stef. Fl. B'lg. ed. 3 (1948) 1209.—*Rhaponiticum calcitrapa* (L.) Scop. Fl. Carn. ed. 2, II (1772) 136.—*Calcitrapa stellata* Lam. Fl. Fr. II (1778) 34; Dostal, Klic (1958) 734.—*C. hippophaestum* Gaertn. De. fruct. II (1791) 376.—*Hippophaestum vulgare* S.F. Gray, Nat. Arrang. Brit. Pl. II (1821) 443.—**lc.**: Fedtsch. and Fler. op. cit. Figs. 1051 and 1052; Stojan. and Stef. op. cit. Fig. 1253; Hayek, op. cit. (1901) Taf. I, fig. 3; Javorka and Csapody, Iconogr. Fl. Hung. (1933) 545, fig. 3896; Hegi, Ill. Fl. VI, 2 (1929) Taf. 272, fig. 3; fig. 668b, c; Dostal, op. cit. tab. 280, fig. 2496.—**Exs.**: Hayek. Cent. exs. crit. fasc. I, Nos. 45 and 46; Fl. exs. reip. Bohem.-Sloven. No. 1182; Billot, Fl. Gall. et Germ. exs. No. 1902; Schultz., Herb. norm. No. 2757; Todaro, Fl. Sic. exs. No. 913.

Biennial. Stem 15–60 cm high, erect, ribbed strongly divaricately branched from middle or below, quite scabrous, pale green, with leaves covered with more or less scattered, flexuous, articulate hairs, rarely subglabrous. Leaves green, sometimes, mostly in young stage, densely woolly, with golden, punctate, sessile, glands, pinnately incised; basal leaves petiolate, withering early; cauline leaves sessile, not decurrent on stem; upper ones deeply lobed to entire, their segments narrowly lanceolate-linear or narrowly lanceolate with remote acute teeth, less often lobed, terminating in small, white, thin, cartilagineous cusp. Capitula solitary at tips of lateral branches and reduced branchlets, numerous on plant. Involucre oblong ovate, 13–15 mm long and 6–8(10) mm in dia; outer and middle involucre bracts with 5–7 palmately spreading spines, of which central spine is much longer (10–18 mm) and thicker than others (4–5 mm long); inner bracts with small, membranous, weakly irregularly toothed appendages. Florets pinkish-violet. Achenes about 3 mm long and 1.5–1.7 wide; pappus absent. Flowering June to September.

Weedy places and dry slopes.—*European Part*: Crimea (south). *General distribution*: Mediterranean, Atlantic and Central Europe, Balkans-Asia Minor, Madeira Island, Canary Islands, North America (introduced). Described from western Europe. Type in London.

Note. The report (Hooker *f. Fl. Brit. Ind.* III (1882) 385) of the occurrence of *C. calcitrapa* L. in northwestern India (Kashmir and Punjab) is extremely doubtful and needs verification.

Subgenus 22. Tetramorphaea (DC.) Czer. comb. nova.—*Tetramorphaea* DC. in Guill., *Archiv. Bot.* II (1833) 331; *Prodr.* VI (1837) 609.—*Centaurea* sect. *Tetramorphaea* (DC.) Boiss. *Fl. or.* III (1875) 684; O. Hoffm. in *Pflanzenfam.* IV, 5 (1893) 329.—*Centaurea* subgen. *Calcitrapa* sect. *Eucalcitrapa* a) *Tetramorphae* (DC.) Hayek, *Centaurea*-Art. *Österr.-Ung.* (1901) 3.—Capitula quite small, with many florets, enveloped by apical leaves, solitary at tips of short branches, numerous on plant. Involucre ovate, 6–7 mm in dia (without recurved spines), scarcely arachnoid-hairy or glabrous; involucre bracts coriaceous, greenish (yellowing on drying), smooth, from broadly ovate outer to oblongly linear innermost; appendages of outer bracts larger, not decurrent on bract, green, leafy, those of middle bracts white, strongly recurved, long (10–22 mm), stiff spine; appendages of innermost bracts small, membranous, irregularly toothed. All florets tubular, lilac-pink, heterogeneous; central florets bisexual; peripheral ones sterile, lacking staminodes, fewer, not large, with (3)4-fid corolla; stamen filaments flattened, covered with papilliform hairs; stigma weakly bifid. Achenes ellipsoidal-obovate or ellipsoidal, 2.0–2.3 mm long, glabrous, immature ones with occasional hairs; pappus as long as achene or slightly longer, white, persistent, double, outer pappus many-rowed, consisting of irregular rows of fewer, scarcely serrate-scabrous bristles, gradually elongated from outer to inner; inner pappus much shorter than outer, of single row of very small narrow oblong-lanceolate scales smooth or indistinctly erose-toothed above, connate at base in ring. Annual herbs; stems upright, divaricately branched mostly from base, white, leafy to capitula; cauline leaves sessile, broad, amplexicaul-cordate with stem scabrous from flexuous, articulate, long cilia, stiffly, pectinate-ciliate, spinous-toothed, sometimes partly with small teeth, undivided; basal and lower cauline leaves petiolate, usually lyrate divided or lyrate pinnately divided, withering early.

Type of subgenus: *C. bruguieriana* (DC.) Hand.-Mazz.

The subgenus includes two species, which grow in Southern Transcaucasia, Soviet Central Asia, and West Asia (from northwestern India to Mesopotamia inclusively).

178. ***C. belangeriana*** (DC.) Stapf in *Denkschr. Acad. Wien*, I (1885) 66, n. v.; Bornm. in *Beih. Bot. Centralbl.* LIX, Abt. B (1939) 305; Czer. in *Fl. Turkm.* VII, 275.—*C. phyllocephala* var. *persica* Boiss. *Diagn. pl. or. ser.* I, 6 (1845) 134.—*C. phyllocephala* β .



belangeri Boiss. Fl. or. III (1875) 684.—*C. phyllocephala* auct. fl. As. Med. et Cauc. non Boiss.—*C. bruguieriana* var. *belangeri* Parsa, Fl. Iran. III (1943) 687, sphalm. “bruguiera.”—*Tetramorphaea belangeriana* DC. Prodr. VI (1837) 609; Karjagin in Fl. Azerb. VIII, 440.—*T. bruguieriana* auct. non DC.: Grossh. Opred. Rast. Kavk. (1949) 490.—**Exs.:** Sintenis, It. trans-casp.-prs. 1900–1901, No. 360; Bornm. It. Pers.-turc. 1892–1893, Nos. 4079 and 4082.

Annual. Plant (5)10–50 cm high, very strongly divaricately branched usually from base, quite slender, white, with leaves densely or more or less sparsely covered with flexuous, articulate, long cilia. Leaves covered with golden, punctate, sessile glands, acutely scabrous-toothed, sometimes some of them with small teeth; basal and lower cauline leaves larger, to 10(13) cm long (excluding petiole), elliptical or oblongly lanceolate, undivided to lyrate pinnatifid, less often lyrate divided, petiolate, withering early, others smaller, oblongly ovate, mostly undivided, sessile, broadly amplexicaul-cordate. Capitula enveloped by apical leaves, solitary at tips of short branchlets, numerous on plant. Involucre ovate, 9–10 mm long and 6–7 mm in dia (excluding recurved spines); appendages of outer involucre bracts large, green, leafy, of middle bracts white, strongly recurved, long (10–22 mm) stiff spines; appendage of innermost bracts small, membranous, irregularly toothed. Florets lilac-pink. Achenes 2.0–2.3 mm long and 0.8–1.0 mm wide; pappus 2.0–3.0(3.3) mm long. Flowering May to July, (Plate XXIV, Fig. 2).

Dry, sandy, clayey, and stony places, loessic mounds, in foothill plains, foothills, and lower mountains, to 1,200 m; as weed in crop fields, old fields and wastelands, roadsides.—*Caucasus*: Southern Transcaucasia (Nakhichevan ASSR); *Soviet Central Asia*: mountainous Turkmenia, Karakum (southeastern), Pamiro-Alai, Syr-Darya. *General distribution*: Iran, Indo-Himalayas (Punjab, Peshawar). Described from northern Iran. Type in Geneva.

Note. Var. *erecta* Winkl. ex. O. and B. Fedtsch. (*Perech. Rast. Turkm.*, IV, 272), named by Winkler and described by O. and B. Fedtschenko, apparently has no taxonomic significance.

GENUS 1625. *Phalacrachena* Iljin^{1, 2}

Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VII, 3 (1937) 51.

¹Treatment by N.N. Tzvelev.

²From the Greek word *phalacros*—naked, and Latin word *achena*—seed; so named because achenes in the species of this genus lack a pappus.

Capitula heterogamous, medium-sized, with many florets, solitary at tips of stems. Involucre broadly ovate to subglobose, 10–18 mm in dia, glabrous or subglabrous; involucre bracts many-rowed, imbricate, herbaceous, almost coriaceous, with 4–7 weak veins, gradually elongated from broadly ovate outer to oblong innermost; appendage of outer and inner bracts as broad membranous border, more or less decurrent on bracts (sometimes to 1/2 to 1/3 their length), and usually narrower than bracts, brownish, acuminate or short-spinulescent, pectinately ciliate, in innermost bracts larger, oblong-ovate, recurved, almost not decurrent, with small teeth or irregularly ciliate. Receptacle setose, its bristles numerous, whitish. Florets various shades of pink, heterogeneous; central florets (disk florets) tubular, bisexual, 1.5–2.0 times as long as involucre; peripheral florets one-rowed, sterile, large, tubular-infundibuliform, lacking staminodes, with 4–5-lobed corolla; anthers with short basal appendages their apical appendages free above, lanceolate; stamen filaments weakly flattened, densely covered with short papilliform hairs; stigma short- or almost to middle bifid. Achenes oblong, 4–6 mm long, very weakly compressed, weakly arcuate, sparsely hairy only near hilum, mature achenes often entirely glabrous, slightly narrowed at apex and terminating in concave or almost flat areole, lacking pappus, bordered with very weakly developed crown with rounded margin. Perennial herbs with long, more or less branched rhizome, and erect, simple or weakly branched stems; leaves short-petiolate or sessile, entire or more or less pinnately lobed, covered with short papilliform hairs and more or less developed arachnoid-tomentum, usually punctate-glandular.

Type of genus: *P. inuloides* (Fisch. and Schmalh.) Iljin.

The two very distinct species of this small genus, which are quite closely related to the genus *Centaurea* L., are endemics of the USSR and are distributed in the south of the European part of the USSR and in Kazakhstan.

1. Plants to 40–50 cm high, with entire oblong-lanceolate leaves
..... 1. ***P. inuloides*** (Fisch. ex Schmalh.) Iljin
- + Plants to 15–20 cm high, with pinnately lobed sometimes some of
them with undivided leaves 2. ***P. calva*** (Ldb.) Iljin

1. ***P. inuloides*** (Fisch. ex Schmalh.) Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VII, 3 (1937) 51; Grossh. Opred. Rast. Kavk. 501.—*Centaurea inuloides* Fisch. ex Schmalh. Fl. II (1897) 126; Claus in Beitr. Pflanzenk. Russ. Reichs, VIII (1851) 231, nom. nud.—*Phaeopappus inuloides* Fisch. ex Nym. Consp. Fl. Eur. (1878–1882) 418, nom. nud.; Boiss. Fl. or. Suppl. 312, nom. nud.

Perennial. Plants to 40–50 cm high, covered with very short papiliform hairs and spinules, usually with slight mixture of thin arachnoid-tomentum, scabrous. Stems solitary or few, erect, usually simple, with solitary capitulum at tip, less often with few lateral branches. Leaves oblong lanceolate, basally narrowed into short, winged petiole, or sessile, subacute, entire, dark green, with numerous punctate glands. Capitula on more or less thickened, peduncles, leafless at tips. Involucre 12–18 mm in dia and 15–20 mm long; appendages of involucre as broad, triangular border, acuminate, or spinulescent, with 8–10 cilia on each side, in innermost bracts larger, ovate, deflected sideways shortly and irregularly-fimbriate. Florets pink; stigma weakly bifid. Achenes 5–6 mm long, lacking pappus. Flowering May to July.

Alkaline and saline meadows, clayey slopes, old fields.—*European Part*: Black Sea Region, Lower Don, Lower Volga. Endemic. Described from Krasnoarmeisk (former Sarepta.) area. Type in Leningrad.

2. *P. calva* (Ldb.) Iljin in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, VII, 3 (1937) 4.—*Centaurea calva* Ldb. in DC. Prodr. VI (1837) 583; Fl. Ross. II, 2, 703; Kryl. Fl. Zap. Sib. XI, 960.

Perennial. Plants to 15–20 cm high, covered with very short papiliform hairs and thin arachnoid-tomentum, sometimes subglabrous. Stems solitary or few, erect to almost prostrate, strongly shortened, usually simple, with solitary capitulum at tip. Leaves highly variable in shape, usually pinnately lobed with lobes of different lengths and width, often some of them narrowly linear and entire, narrowed toward base into short, winged petiole or sessile, acuminate or with short cartilaginous cusp, from subglabrous, green to grayish-tomentose, with inconspicuous punctate glands. Capitula often surrounded by approximate apical leaves. Involucre 10–14 mm in dia, and 13–16 mm long; appendages of involucre as broad triangular border, short decurrent on bract, acuminate, with 6–10 cilia on each side, lighter in color than appendage; in innermost bracts much longer, ovate, deflected laterally, toothed or irregularly ciliate. Florets pink; stigma bifid almost to middle. Achenes 4–5 mm long, lacking pappus. Flowering May to July (Plate XXVII, Fig. 3).

Sandy and gravelly banks of water bodies, alkaline areas of steppes, clayey and stony slopes.—*Western Siberia*: Upper Tobol (southeastern part), Irtysh (southern part); *Soviet Central Asia*: Aralo-Caspian (northeastern part), Lake Balkhash Region (northern part). Endemic. Described from Eastern Kazakhstan. Type in Leningrad.

Note. In specimens from the northwestern part of the range, often almost all the leaves are entire, with involute margins; possibly these form a distinct ecogeographical race.

GENUS 1626. *Carthamus* L.^{1,2}

Sp. pl. (1753) 830; DC. Prodr. VI (1837) 611.—*Kentrophyllum* Neck. Elem. Bot. I (1790) 155, 86.

582 Capitula homogamous, with many florets, solitary or corymbosely clustered, oval or oblong, 2–6 cm long, 1.5–2.5 cm in dia. Involucre many-rowed; involucre bracts variable, outer leafy, spiny-toothed, sometimes broadened in lower part, appressed or squarrose, twice as long as florets, slightly longer, equal or sometimes even shorter, others scarious, yellowish-green, sometimes with pearly luster on inside; middle bracts oval or ovals lanceolate, inner ones lanceolate; all undivided, spinescent or middle bracts with pectinate-ciliate appendages or crenate-toothed. Receptacle flat, often with long scales or bristles. All florets bisexual, very rarely few outer ones sterile, yellow, stramineous, orange-yellow, red, purple, purple-pink, less often whitish; corolla regular or more or less regular, 5-fid, to 4.5 cm long; limb to 1.2 cm long; stamen filaments free, short, glabrous or hairy above; style branches short, almost connate. Achenes 4-angled-oval, or 4-angled obovate, sometimes with prominent ribs, smooth or, especially in upper part, rugose, glabrous, whitish, sometimes with spot 3–6 mm long, with lateral, often oblique hilum; sometimes pappus in lacking all florets or only in peripherals ones, often consisting of isolated scales or bristles; pappus scales unequal, outermost scales very short, sinuate, whitish, middle longer, sometimes 2–3 times as long as achene, serrate-toothed, acuminate, whitish, ochreous or blackish-purple; innermost scales often reduced, obtuse or acuminate, less often as long as middle or even longer, whitish; bristles ciliate-serrate, all equal or unequal, fragile. Annual plants, less often biennial or perennial. Stem cylindrical, straight, above cymosely or divaricately branched, very rarely prostrate, thick, sometimes slender, often especially in upper part floccose, woolly or even arachnoid-hairy, usually glaucous, ferruginous, sometimes glabrous, whitish, smooth, weakly lustrous, 0.3–1.5 m high. Leaves alternate, sessile, semiamplexicaul, sometimes amplexicaul, lowermost leaves often narrowed into thin petiole; all

¹Treatment by S.A. Shostakovsky.

²The name originates either from the Arabic *kurtum*—the ancient name of dyer's saffron, cultivated in the Orient for its red dye, or from the Greek word *katairo*—cleanse, since the species of this genus are used as a laxative.

leaves coriaceous, less often somewhat stiff, lowermost usually deeply pinnately parted, others pinnately lobed, spiny-toothed, less often subentire, lacking cusp, often glandular, pubescent, sometimes glabrous or subglabrous, smooth, up to 15 cm long and to 5 cm wide.

Lectotype of genus: *C. tinctorius* L.

The genus is exclusively Mediterranean (sensu lato), with its range extending from Soviet Central Asia and western India to the Canary and Madeira islands and from Ethiopia to Central Europe, inclusively. Five species are found in the USSR.

1. Plants glaucous; florets purple-pink 2. ***C. glaucus*** MB.
 + Plants glabrous or pubescent but not glaucous; florets yellow, pale yellow, or red 2.
 2. Plants more or less pubescent (woolly, arachnoid-hairy, glandular) 3.
 + Plants glabrous 4.
 583 3. Achenes always with pappus; outer and inner pappus scales usually distinctly shorter than middle ones. Outer involucre bracts ovate-lanceolate, not widened, subentire. Basal leaves lyrate pinnately parted, with ovate unpaired lobes, spiny-toothed; cauline leaves oval or oblong, pinnately parted, spiny toothed 1. ***C. lanatus*** L.
 + Achenes usually without pappus, less often inner pappus scales longer than outer and middle. Outer involucre bracts lanceolate or oblong, widened above, with long yellowish spines along margin. Leaves oblong or oval, smooth, toothed with thin stramineous spines 3. ***C. oxyacanthus*** MB.
 4. Plants wild; leaves distinctly spiny-toothed; florets light yellow
 4. ***C. gypsicola*** Iljin
 + Plants cultivated or rarely wild; leaves short-spiny-toothed or subentire; florets red, orange-red, less often yellow
 5. ***C. tinctorius*** L.

Section 1. Kentrophyllum (Neck.) Fiori and Paol. Fl. anal. Ital. III (1903–1904) 350.—Annuals or biennials. Plants woolly, arachnoid-hairy, glaucous, mealy, often ferruginous. Florets yellow or purple-pink. Pappus always well-developed, consisting of scales of various forms; outermost scales very short, sinuate, middle longer, acuminate, innermost as long as middle or shorter.

Type of section: *C. lanatus* L.

1. ***C. lanatus*** L. Sp. pl. (1753) 830; Boiss. Fl. or. III, 706; Schmalh. Fl. II, 131; Fedtsch. and Fler. Fl. Evrop. Ross. 1033; Grossh. Fl. Kavk.

IV, 222; Pavlov, Fl. Tsentr. Kazakhst. III, 329.—*C. tauricus* MB. Fl. taur.-cauc. II (1808) 285.—*Kentrophyllum lanatum* DC. Prodr. VI (1837) 610; Ldb. Fl. Ross. II, 714.—*K. tauricum* C.A.M. Verezeichn. (1831) 66.—**Ис.:** Sibth. and Sm. Fl. Gr. IX, tab. 841; Rchb. Ic. Fl. Germ. XV, tab. 746.

Annual, biennial. Plants to 1 m high, woolly, grayish-green, arachnoid- or almost arachnoid-hairy, especially above. Stem erect, solid, cymosely or divaricately branched above. Leaves glandular-glutinous; basal leaves somewhat stiff, lyrate-pinnately parted; cauline leaves coriaceous, almost amplexicaul, oval or oblong, pinnately parted, spiny-toothed with conspicuous veins. Capitula solitary, at tips of on stem and lateral branches, to 3.5–4.0 mm long, 2.0–2.5 cm in dia. Outer involucre bracts leafy, spiny-toothed, ovate-lanceolate, as long as florets or slightly longer; inner ones scarious, lanceolate, undivided or crenate-toothed from middle, spinescent, shorter than florets. Achenes 4-angled-oval, whitish or yellowish, almost lustrous, sometimes punctate or rugose above, to 5 mm long; outermost pappus scales very short, whitish, sinuate; middle ones 2.0–2.5 times as long as achenes, ochreous, serrulate-toothed, acuminate; innermost scales reduced, sometimes (in plants from Soviet Central Asia) as long or almost as long as middle ones, whitish. Flowering July to August.

Pasturelands, arable lands, and fields; common weed.—*European Part:* Bessarabia, Black Sea Region, Lower Don, Crimea; *Caucasus:* All regions, except alpine; *Soviet Central Asia:* Syr-Darya, Tien Shan, Pamiro-Alai, mountainous Turkmenia. *General distribution:* Central Europe (south), Mediterranean, Balkans-Asia Minor, Iran. Described from southern France. Type in London.

Note. *C. lanatus* L. × *C. oxyacanthus* MB. = *C. turkestanicus* M. Pop. (*Tr. Uzb. Univ.*, Vyp. 14, 1941) is a known hybrid. According to M.G. Popov, it differs from *C. lanatus* L. by roundish, four-angled, pale, peripheral achenes without a pappus, with transverse grooves and an almost straight hilum.

2. ***C. glaucus*** MB. Tabl. prov. Casp. (1798) 58; Fl. taur.-cauc. II, 284; Boiss. Fl. or. III, 707; Schmalh. Fl. II, 131; Fedtsch. and Fler. Fl. Evrop. Ross. 1034; Grossh. Fl. Kavk. IV, 221.—*Kentrophyllum glaucum* Fisch. and Mey. ex DC. Prodr. VI (1837) 611; Ldb. Fl. Ross. II, 713.—*K. anatolicum* Boiss. Diagn. pl. or. ser. I, 6 (1845) 113.

Annual. Plants 30–80 cm high, glaucous, grayish-floccose. Stems erect, cymosely branched above. Leaves coriaceous, amplexicaul, oval or oblong-lanceolate, spiny-toothed. Capitula terminal, clustered, to 3 cm long, 1.5–2.0 cm in dia. Outer involucre bracts as long as florets, leafy, spiny-toothed; inner ones shorter than florets, scarious, lanceolate,

undivided, spinescent. Florets purple or purple-pink. Achenes 4-angled, oval, small, whitish, indistinctly transversely rugose above, to 4 mm long; pappus scales ochreous, outermost scales very short, sinuate; middle ones 2–3 times as long as achene, acuminate, serrulate-toothed, gradually thickened; inner scales reduced, fimbriate. Flowering June to September.

Dry places and abandoned fields, common weed.—*European Part*: Crimea; *Caucasus*: all regions, except forest and alpine zones. *General distribution*: Asia Minor, Iran. Described from Eastern Caucasus. Type in Leningrad.

Section 2. Carthamus.—Annual plants. Stem glabrous, smooth, whitish, less often with uppermost ' arachnoid-woolly especially above. Florets light yellow, orange-red, or red. Pappus lacking or consisting of serrulate-ciliate, unequal scales, shorter than achene; sometimes middle scales longer than achene.

Type of section: lectotype of genus.

3. *C. oxyacanthus* MB. Tabl. prov. Casp. (1798) 108; Fl. taur.-
584 cauc. II, 283; DC. Prodr. VI, 612; Boiss. Fl. or. III, 709; Ldb. Fl. Ross. II, 715; Grossh. Fl. Kavk. IV, 221; Pavlov, Fl. Tsentr. Kazakhst. III, 329.

Annuals. Plants to 70 cm high. Stem straight, quite hard, divaricately branched from middle or above, smooth, whitish, glabrous below, pubescent above. Leaves sessile, weakly amplexicaul, somewhat stiff oblong or oval, toothed, with stramineous thin spines, as long as width of leaf, spinescent, with prominent veins, glabrous or especially upper leaves grayish-pubescent, glandular; lower leaves often pinnately parted. Capitula crowded, 2.5 cm long, 1.5 cm in dia. Outer involucre bracts whitish beneath, attenuate toward tip, leafy, with long, light yellow spines as long as florets; inner bracts scarious, lanceolate, undivided, spinescent, sometimes bracts arachnoid-hairy (var. *arachnoideus* Bge.). Florets light yellow. Achenes obovoid, 4 angled, truncate at apex, smooth, weakly lustrous, light yellow, spotted, black, to 6 mm long; pappus lacking or very rarely consisting of few serrulate-ciliate, unequal bristles, shorter than achene. Flowering June to August.

Sandy places and fields, common weed.—*Caucasus*: Ciscaucasia (east), Eastern Transcaucasia; *Soviet Central Asia*: Tien Shan, Pamiro-Alai, mountainous Turkmenia. *General distribution*: Armenia and Kurdistan, Iran. Described from Eastern Ciscaucasia (Beshbarmak Mountain). Type in Leningrad.

4. *C. gypsicola* Iljin in *Izv. Bot. Sada Akad. Nauk SSSR*, XXX, 3-4 (1932) 357; Pavlov, *Fl. Tsent. Kazakhst.* III, 330.

Annual. Plant to 60 cm high. Stem simple or branched, especially above, glabrous, smooth, whitish. Leaves weakly amplexicaul, somewhat stiff, lanceolate or oval, spiny-toothed, with prominent veins, entirely glabrous, somewhat lustrous. Capitula solitary, globose, 2 cm in dia. Outer involucre bracts leafy, spiny-toothed, in upper part almost horizontally spreading, as long as florets; inner ones scarious, oval or lanceolate, yellow, at apex spiny, appressed, shorter than florets, glandular. Florets light yellow. Achenes obovate or oblong-obovate, weakly compressed, weakly 4-angled above, smooth, lustrous, light yellow, speckled gray or speckled-black, to 6 mm long; pappus lacking or sometimes its bristles few, short and finely serrate-ciliate, shorter than achene, unequal. Flowering June to August.

Always on gypsiferous clays and saline soils.—*Soviet Central Asia*: Aralo-Caspian, Lake Balkhash Region (western); *Caucasus*: Southern Transcaucasia (Armenia, near border with Turkey). Endemic? Described from Turkey. Type in Leningrad.

Note. This species, described by M.M. Iljin, was first reported by Schrenk from the specimens collected by Borschov from western Kazakhstan and by Schrenk himself from the Sary-Su River basin.

586 Actually this species and *C. oxyacanthus* MB. are similar to each other in their general appearance, whitish stem, structure of the leaves, involucre bracts, achenes, and pappus. The two species, although readily distinguished in typical cases, were confused for a long time (cf. Iljin, op. cit.). It is also interesting that their ranges, at least within Soviet Central Asia, are sharply demarcated: *C. gypsicola*—endemic to the northern parts of Soviet Central Asia, is found nowhere south of 42°N. Lat., while *C. oxyacanthus* grows only in the southern parts of Soviet Central Asia and nowhere reaches north of 42°N. Here we have not considered the Armenian localities of *C. gypsicola*, which are very interesting but still inadequately studied.

5. *C. tinctorius* L. Sp. pl. (1753) 830; DC. Prodr. VI, 612; Ldb. *Fl. Ross.* II, 715; Boiss. *Fl. or.* III, 709; Fedtsch. and Fler. *Fl. Evrop. Ross.* 1033; Grossh. *Fl. Kavk.* IV, 221; Pavlov, *Fl. Tsent. Kazakhst.* III, 329; Hanelt in *Kulturpflanze*, IX.—**Ic.**: *Rchb. Ic. Fl. Germ.* XV, tab. 746; Fedtsch. and Fler. op. cit. Fig. 1054.

Annual. Plants to 1 m high. Stem erect, cymosely branched above, glabrous, sulcate, white. Leaves sessile, weakly amplexicaul, coriaceous, oval or ovately lanceolate, short-spiny-toothed or subentire, awnless, glabrous, smooth, somewhat lustrous. Capitula solitary, ovate, 3 cm long, 2.5 cm in dia. Involucre bracts shorter than florets; outer

ones broadened toward base, scarious, yellowish-green, in upper part attenuate, green, broadly oval, short-spiny, outer most entirely recurved; inner ones scarious, ovate lanceolate, smooth, spinescent. Achenes obovate, 4-angled, truncate at apex, with prominent ribs, smooth, white, 4.5–7.0 mm long; pappus lacking or very rarely consisting of few, unequal, short, serrulate-ciliate bristles, shorter than achene. Flowering June to July.

In cultivation, sometimes naturalizing in southern regions of European part of USSR (in Ukraine, Lower Volga, Urals), as well as in Caucasus and Soviet Central Asia. Described from southern France. Type in Leningrad.

The following hybrids are known: *C. lanatus* L. × *C. tinctorius* L. (cf. Hanelt, loc. cit.). According to the data of Hanelt, almost all hybrids of these two species are sterile. Another hybrid—*C. oxyacanthus* MB. × *C. tinctorius* L.—has been reported by Popova (Popova in *Zap. Leningr. S.-Kh. Inst. Nov. ed. 2* [1939] 127).

Note. Unknown in the wild. According to recent information (*Kult. Fl. SSSR*, VII, and according to Hanelt), two centers of diversification of forms of *C. tinctorius* are known: 1) India-Soviet Central Asia and West Asia; and 2) Palestine-northeastern Africa. The first should be considered primary and the other secondary. At present, the plant is found in cultivation in many countries, from the Canary and Madeira islands to Tibet, China, and Japan, inclusively. There are also reports of its cultivation in America and Australia.

Economic Importance. The only species of the genus of considerable economic importance. Carthamin is obtained from its flowers, 587 which is used as a red dye for fabrics and without a mordant. Carthamin is a glucoside with the general formula $C_{21}H_{22}O_{11}$. Safflower was a valuable dyeing agent in ancient India, China, Egypt, and also in medieval times in Southern Europe, where the plant was introduced, apparently by Arabs. At present, the dyeing agent of safflower is used in the food industry as a substitute for saffron. Its seeds yield an oil which is closer in properties to the best of the sunflower and hemp oils. The oil is used in cooking, in industry for preparing non-yellowing white enamels, and in perfumery.

GENUS 1627. *Cnicus* L.^{1, 2}

L. Sp. pl. (1753) 826.

Few peripheral florets in capitulum sterile, filiform, not conspicuous, with 2–3-fid corolla, rest bisexual with bilabiate, corolla, one of its lobes narrow, long, with one tooth, and other with 4 short teeth. Basal appendage of anthers scarious, long; stamen filaments densely papillate. Style branches short, obtuse, mostly oblong-ovate, with short papilliform hairs on outer side and ring of longer hairs at base. Pappus persistent, double, consisting of fewer elastic, somewhat stiff, bristles, longer in outer row and very short in inner one; achenes with toothed margin and numerous parallel raised ribs, with oblique hilum.

A monotypic genus.

1. *C. benedictus* L. Sp. pl. (1753) 826; DC. Prodr. VI, 606; Ldb. Fl. Ross. II, 713; Schmalh. Fl. II, 130; O. and B. Fedtsch. Perech. Rast. Turk. IV, 278.—*Centaurea benedicta* L. Sp. pl. ed. 2 (1763) 1296.—*Carbenia benedicta* Benth. in Benth. and Hook. f. Gen. pl. II (1873) 482.—*C. cnicus* Winkl. in herb.

Annual. Plant 5–50 cm high, branched from base, often lacking main stem, but with equally long, prostrate or ascending branches, bearing solitary terminal capitulum sometimes at ground level. Stem and branches densely hairy with long deciduous, beaded hairs; sticking together, mostly horizontally spreading, later less dense. Leaves green on both sides, with similar hairs, sometimes later becoming glabrous and with scattered sessile glands, pinnately parted into triangular or mostly oblong-triangular, acuminate lobes, lobes with spines along margin and notches separating them, somewhat stiff, fragile, with conspicuous but thin veins; leaves sessile and decurrent on stem, lower ones strongly narrowed toward base into winged decurrent petiole; basal leaves petiolate, uppermost leaves forming leafy involucre around capitula and enveloping them. Outer involucral bracts oblong-ovate or oblong, with more or less thin spine at apex surrounded by long, flexuous, thin hairs, usually originating from beaded stalk; middle bracts longest, oblong or lanceolate, with relatively hard, long, pectinate, ochreous or brownish spine at apex, with similar hairs and often additionally with scarcely visible spinules; inner bracts slightly shorter, lanceolately linear, with scarious border, with scarcely developed pectinate appendage at apex. Corolla of peripheral sterile florets filiform,

¹Treatment by M.M. Iljin.

²A Dioscoridean name of the plants, derived from the Greek word *knixein*—to scratch, injure; so named for its prickly habit.

pale; central florets bisexual, weakly yellowish, 13–17 mm long, with corolla tube 8–11 mm long and longer lobe (3.0–3.5 mm), shorter lobes 1.5–2.0 mm long. Pappus consisting of 9–12 hard, elastic, scarcely toothed, ochreous bristles 4–11 mm long; outer row bristles much shorter, covered with cobwebby hairs; achenes oblong-cylindrical, 7.0–8.5 mm long, somewhat thick, hollow, lustrous, ochreous, or even dark-brown, with regular parallel ribs, and toothed edge above. Flowering May; fruiting June.

Clayey deserts, on gravelly loams, loessic and clayey hills, wastelands, old fields, garbage dumps, and crop fields.—*European Part*: Black Sea Region (also cultivated throughout south of Ukraine); *Caucasus*: Eastern, Western, and Southern Transcaucasia; *Soviet Central Asia*: Lake Balkhash Region, Dzhungaria-Tarbagatai, Tien shan, Syr-Darya, Amu-Darya, mountainous Turkmenia, Kyzyl-Kum(?), Karakum(?), Pamiro-Alai. *General distribution*: Mediterranean, Balkans-Asia Minor, Armenia and Kurdistan, Iran-Afghanistan, Indo-Himalayas(?), Dzhungaria-Kashgaria. Described from western Europe. Type in London.

Economic Importance. A medicinal plant, entered into the pharmacopaea; its active principle is a bitter substance—carbenedictin and cnicin (= Centrauran), used as an appetizer. Moreover, it contains tannins, some quantity of resin, gums, sterols, and glucosides. Its seeds contain 24–29% oil with specific gravity of 15/15—0.9262; the refractive index is 1.4653 at 25°C; the saponification number is 191 and the iodine number is 141 (S.L. Ivanov). At the Ulyanovsk experimental field 26 centners of seeds were obtained from one hectare.

Tribe 13. Mutisieae Cass. in Dict. Sc. nat. VIII (1817) 395, XX (1821) 379, XXXIII (1824) 462, LX (1830) 584; Opusc. phyt. I (1826) 327; Less. in Linnaea, V (1830) 131 and 237 p. p. excl. subtrib. *Facelideae* Less.: O. Hoffm. in Pflanzenfam. IV, 5 (1893) 333.—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.—Ordo *Perdicieae* Link, Handb. I (1829) 728.—Trib. *Mutisiaceae* Les. Synops. 589 Comp. (1832) 92 p. p. excl. subtrib. *Facelideae* Less.: Benth. in Benth. and Hook. f. Gen. pl. II (1873) 214.—Trib. *Mutisiees* Baill. Hist. des. Plantes, VIII (1882) 69.—Fam. *Mutisiaceae* Bessey in Ann. Miss. Gard. II, 2 (1915) 164.—Capitula heterogamous or homogamous. Involucral 2-many rowed, involucral bracts obtuse, subobtuse, or acuminate. All florets bilabiate, bisexual, or peripheral ones pistillate, longer. Receptacle flat or slightly convex, locular or alveolate, mostly glabrous. Anther with short basal appendage. Style without tuft (collar) of pollen collecting hairs, bilobate.

Herbs (in USSR), shrubs, rarely trees, distributed mainly in America, particularly in South America; some genera are found in Africa and Asia.

Subtribe 1. Mutisinae O. Hoffm. in *Pflanzenfam.* IV, 5 (1893) 340.—Subtrib. *Mutisieae* Less. in *Linnaea*, V (1830) 241 p. p., VI (1831) 98 and *Synops. Comp.* (1832) 93 p. p.—Subtrib. *Lerieae* Less. in *Linnaea*, V (1830) 350 and *Synops. Comp.* (1832) 120.—Subtrib. *Barnadesiae* Benth. in *Benth. and Hook. f. Gen. pl.* II (1873) 215.—Subtrib. *Onoserideae* Benth. op. cit. 215 p. min. p.—Subtrib. *Gerbereae* Benth. op. cit. 217 p. p.—Subtrib. *Nasauvieae* Bebh. op. cit. 218 p. min. p.—cf. description of the tribe.

KEY TO GENERA OF SUBTRIBE MUTISINAE*

1. Capitula all alike 2.
- + Capitula variable; in spring, heterogamous, in autumn, homogamous, with cleistogamous florets **Leibnitzia** Cass.
2. Peripheral florets with long limbs, surpassing 2–3-rowed involucre **Gerbera** Cass.
- + Peripheral florets with short limbs, shorter than many-rowed involucre of imbricate bracts **Uechtrizia** Freyn.

GENUS 1628. **Gerbera** Cass.^{1,2}

Cass. in *Bull. Soc. Philom. Paris* (1817) 34.—**Arinica** L. *Sp. pl.* (1753) 885 p. p.

Capitula heterogamous. Involucre 1-, 2-, less often 3-rowed. Florets with bilabiate, corolla; peripheral florets one-rowed, pistillate, with long limb surpassing involucre and usually brightly colored, and 2 short lobules of upper lobe rolled into ring; disk florets bisexual, very small, with corolla covered by pappus, its lobes almost equal in length, upper lobe with 2 lobules, lower one with 3 teeth, all coiled in ring; 590 pollen tube very long exerted from corolla; anthers with filiform basal appendage, 1/3 as long as anther; style with flat, broadly elliptical lobes. Perennial herbs, with simple stems, each bearing single capitulum and only having basal leaves.

*Constructed by E.G. Pobedimova.

¹Treatment by E.G. Pobedimova.

²Named in honor of the 18th-century German naturalist, T. Gerber, who worked in Russia.

Type of genus: *G. linnaei* Cass.

A genus with South African species for the most part. The number of species and their distribution in Asia is difficult to ascertain, since, after Cassini's paper cited above, botanists included in the genus species that clearly do not belong to it (for example, *G. schimperi* Sch. Bip., in which the achenes have a long beak.). In its present circumscription, the genus *Gerbera* is an aggregate genus needing monographic treatment. Only one cultivated species is known in the USSR.

G. jamesonii Bolus in Gard. Chron. I (1889) 772, fig. 122; Hook. f. in Bot. Mag. (1889) tab. 7087.—Ic.: Bolus, loc. cit.; Hook. f. loc. cit.

Perennial. Rhizome short, with numerous roots. Leaves only basal, oblong, obtusely or acutely lobed with undulate lobes, unequal teeth, 13–25 cm long and 5–8 cm wide, petiolate; petioles 15–20 cm long. Floriferous shoots to 20 from each rhizome, 25–60 cm high, hard, glabrous. Capitula solitary, 7–15 cm in dia. Involucre campanulate, 7–10 cm in dia, narrowed toward base; bracteal leaves lanceolate, appressed. Peripheral florets one-whorled, about 30, with narrow, long limbs, with 3 teeth, yellowish in lower part, orange or flame-red above, with very short tube, upper lip [lobe] of corolla very short, bilobate, coiled into ring; disk florets small, with short, roundish ring of both corolla lobes. Achenes of peripheral florets and disk florets identical, terate, pubescent; pappus white, with scarcely toothed bristles. Flowering 2nd half of October to December.

Caucasus: Eastern, Western and Southern Transcaucasia (in USSR known only in cultivation). Described from cultivated plants from Kew; seeds collected from South Africa (Transvaal). Type in Kew.

Note. This species was introduced into cultivation long ago in gardens all over the world. In open ground, it can be cultivated only in the subtropics, and northwards—in green houses. It is one of the most beautiful ornamental plants, with the ray florets having very long, brightly and extremely diversely colored limbs. Often hybrids of this species are cultivated because they are more resistant (Chochua in *Tr. Sukhum. Bot. Sada*, VI [1951] 169).

Cass. in Bull. Soc. Philom. Paris (1817) 34; in Dict. Sc. nat. XXV (1822) 421.—*Anandria* Less. in Linnaea, V (1830) 346; DC. Prodr. VII (1838) 40; Ldb. Fl. Ross. II (1846) 768; Turcz. in Bull. Soc. Nat. Mosc. XXI, 3 (1848) 87 (Fl. baic.-dahur.).—*Gerbera* auct. non Cass.: Sch. Bip. in Flora, XXVII (1844) 782 p. p. quoad sect. *Anandria* Walp. Repert. VI (1846–1847) 316; Maxim. in Bull. Soc. Nat. Mosc. LIV, 1 (1879) 29.

Capitula variable: in spring-heterogamous; in autumn—homogamous with cleistogamous florets. In spring capitula peripheral pistillate florets, ligulate; disk florets smaller, bisexual with almost equal short lobes and projecting staminal tubes; style scarcely exerted from tube. In fall capitula all florets bisexual, small with short, almost equal lobes, lower lobe broad with 3 teeth, and upper ones cut almost to base into linear lobes; staminal tube scarcely visible at throat of florets; style included in staminal tube, less often capitula consisting of florets with shortened lobes. Perennial herbs with rosettes of basal leaves, small during spring flowering and large during autumn flowering time.

Type of genus: *L. anandria* (L.) Turcz.

Besides the two species reported here for the flora of the USSR, this genus includes the Himalayan species, *L. kuntzeana* (A. Br. and Aschers.) Pobed. comb. nova (= *Gerbera kuntzeana* A. Br. and Aschers. in *Cat. sem. hort. Berol.* [1871] App. 3), and the southern Chinese *L. ruficoma* (Franch.) Pobed. comb. nova (= *Gerbera ruficoma* Franch. in *Morot. Journ. Bot.* II [1 March 1888] 68).

1. Plant 15–30 cm high; leaves large, lyrate, (6)9–10(13) cm long, (2.0)2.5–3.0(4.0) cm wide, with roundish, sometimes broadened terminal lobe and 3–4 pairs of lateral lobes somewhat smaller than terminal lobe, glabrous or weakly arachnoid-hairy beneath, less often floccose. Disk florets with staminal tube included in corolla
..... 2. *L. knorringiana* (B. Fedtsch.) Pobed.
- + Plant 5–18 cm high; leaves small, weakly lyrate, (1.5)2.0–5.0(7.0) cm long, (0.7)1.5–2.5(2.8) cm wide, with ovate or oblong terminal lobe, and 2–3 pairs of small lateral lobes several times smaller than terminal lobe, white-tomentose beneath. Disk florets with staminal tube greatly-exserted from corolla³..... 1. *L. anandrii* (L.) Turcz.

¹Treatment by E.G. Pobedimova.

²Named in honor of Leibnitz, an eminent 17th-century scientist and philosopher.

³These species have been compared only in an early stage of development, because there are no complete specimens in the herbarium.



- 593 1. **L. anandria** (L.) Turcz. in Scheglov¹, Ukaz. Otkryt. VIII, I, 3 (1831) 404; Bess. in Flora, XVII, 1, 17; Nakai in Journ. Jap. Bot. XIII, 852; Kitagawa, Lineam. Fl. Mansh. 456; Kryl. Fl. Zap. Sib. XI, 2964.—*Tussilago anandria* L. Sp. pl. (1753) 865.—*T. lyrata* Willd. Sp. pl. III, 3 (1803) 1936.—*Perdicium anandraia* R. Br. in Ait. Hort. Kew. ed. 2, V (1813) 84.—*P. tomentosum* Thunb. Fl. Jap. (1784) 920 (sec. Less.).—*Leibnitzia cryptogama* Cass. in Dict. Sc. nat. XXV (1822) 422.—*L. phaenogama* Cass. ibid.—*Chaptalia anandria* Spreng. Syst. veg. 3 (1826) 504; Ldb. Fl. alt. IV, 89.—*C. lyrata* Spreng. ibid.—*Anandria radiata* Less. in Linnaea, V (1830) 241 and 346.—*A. discoidea* Less. ibid. 347.—*A. bellidiastrum* DC. Prodr. VII (1838) 40; Maxim. Prim. Fl. Amur. 176; Turcz. in Bull. Soc. Nat. Mosc. XXI, 3, 87(Fl. baic.-dahur.).—*A. bellidiastrum* α . *vernale* Turcz. in DC. loc. cit.—*A. bellidiastrum* β . *autumnale* Turcz. in DC. loc. cit.—*A. dimorpha* Turcz. in Bull. Soc. Nat. Mosc. XI (1838) 95 (Cat. pl. baic.-dahur. No. 695); Ldb. Fl. Ross. II, 768.—*Gerbera anandria* Sch. Bip. in Flora, XXVII (1844) 782; Walp. Repert. VI, 316; Kom Fl. Manchzh. III, 762; Kom. and Alis. Opred. Rast. Dalnevost. Kr. II, 1086.—**lc.**: Pobedimova in Bot. Zhurn. SSSR, XXX, 5 (1945) 220, 221, and 223.—**Exs.**: GRF Nos. 1931, 1932, and 3499.

Perennial. Rhizome very short, thick, brown, with large fascicle of string-like, fleshy, light brown roots. Plants with two growth stages—spring and autumn. Leaves in the spring stage ovate or oblong-ovate, less often weakly lyrate, cordate, (1.5)–2.0–4.0(5.0) cm long and (0.7)1.5–2.5(2.8) cm wide, green and weakly arachnoid hairy above, white-tomentose beneath, almost entire, with short, thick, inconspicuous cusp or irregularly toothed, with more frequent and larger cusp; petioles (1.0)1.5–3.0(3.5) cm long, white-tomentose. Scapes 1, less often 2, (5.0)5.5–15.0(18.0) cm long, simple, erect, each bearing single capitulum, tomentose, developing simultaneously with bracts 3–5 mm long and 0.25–0.5 mm wide, less often distant. Capitula (0.6) 1.0–1.5(2.8) cm wide. Involucre 2-rowed; outer bracts short, narrow, linear; inner ones somewhat broader; all bracts obtuse, reddish-violet along margin, more or less floccose, peripheral florets pistillate, bilabiate, with short, initially white, later pinkish ligules at end of flowering time, with 1–2–3 unequal teeth at apex, upper lip in form of 2 short teeth; staminal tube included in corolla; anthers with smaller quantity of pollen, with 2 acute, short, basal appendages; style exerted from staminal tube, bifid, its lobes papillose; disk florets with both lips coiled in ring; staminal tube long, exerted from corolla;

¹The almost non-existent volumes of this publication are preserved only in the Public Library, Leningrad.

594 anthers also almost lacking pollen; ovary covered with short, upward-spreading, appressed hairs. Mature achenes undeveloped in spring form. Flowering second half of April to June.

Leaves in the fall stage lyrate, (5)9–15(18) cm long and (3.0)3.5–5.5(6.5) cm wide, terminal lobe broad, ovate, acute, scarcely cordate and with 3–4 pairs of smaller lobes, pale green beneath, glabrous or weakly arachnoid-hairy, less often whitish-pubescent; petiole weakly winged, arachnoid-hairy, (1.0)3.5–7.5(10.5) cm long. Scapes one or many, 25–60 cm high, with single capitulum, floccose-tomentose, with numerous, linear bracts (9)13–30(40) mm long, 0.5–1.0 mm wide. Capitula 2.5–4.0 cm in dia, opening only at fruiting. Involucral bracts narrower than in spring capitula. All florets bisexual with small corolla shorter than pappus bristles; its lower lobe short, with 3 obtuse teeth, upper lobe bifid; staminal tube inserted in corolla; anthers with abundant pollen, basal appendages of anthers short. Achenes on short stalk, oblong, 5–6 mm long, 0.75–1.0 mm wide, with short beak and prominent ribs, pubescent, especially in upper part; pappus longer than achene, with numerous toothed bristles connate at base in ring. Flowering July to September.

Dry open mountain slopes, grassy patches, in mixed and oak forests.—*Eastern Siberia*: Angara-Sayans, Dauria; *Far East*: Zeya-Bureya, Ussuri, Sakhalin. *General distribution*: Mongolia, China, Japan, Korean Peninsula. Described from Siberia. Type in London.

2. **L. knorringiana** (B. Fedtsch.) Pobed. comb. nova.—*Gerbera knorringiana* B. Fedtsch. in *Izv. Bot. Sada*, XV, 1 (1915) 3; O. and B. Fedtsch. *Perech. Rast. Turk.* VI, 346.

Perennial. Rhizome short, woody, brown, with light brown fleshy, more or less slender roots, in upper part covered with remnants of previous years' petioles of leaves. Leaves only basal, lyrate, large (6)9–10(13) cm long, (2.0)2.5–3.0(4.0) cm wide, terminal lobe almost round or scarcely broadened, slightly longer than 3–4 pairs of lower lobes, gradually decreasing toward leaf base, dark green and glabrous above, pale, glabrous or finely arachnoid-hairy beneath, less often floccose, with large, irregular teeth and short obtuse cusp; petiole 3–7 cm long, often winged in upper part; scapes 1 or 3, 15–30 cm high, floccose, especially densely below capitula; bract leaves small, scattered. Capitula one on each scape, narrow, (7)10–12(15) cm in dia, involucre 2–3-rowed; involucral bracts: outer short, lanceolate, obtuse, inner almost twice as long as outer; all glabrous, sometimes violet along margin and at apex; receptacle locular, scarcely convex; peripheral pistillate florets with 3 toothed lower tip (ligule), with upper tip biparted into narrowly linear short lobes; style bilabiate, ciliate,

595 exerted from corolla; disk florets with almost equal lobes, lower lobe broader with 3 large teeth, upper one not divided up to base, with weakly coiled labellae; staminal tube included in floret; style not exerted or with small linear, appressed basal appendages, stamen filament shorter than anthers, attached in upper third of tube; ovary with short appressed erect hairs; mature achenes unknown. Flowering May to June. (Plate XXVIII, Fig. 2).

High-mountain spruce forests (under canopy of spruce).—Soviet Central Asia: Tien Shan. Endemic. Described from western Tien Shan (Lake Sary-Chilek). Type in Leningrad.

Note. This species is known only in the flowering stage. It was collected in August 1945 in the fall stage by V. Vipper in Arkit, Karagatun-Sai in a spruce-alder forest under a canopy of spruce, at 1,700 m, unfortunately, only in the vegetative state with longer leaves than in the spring form (cf. Plate XXVII, Fig. 2). The absence of capitula on these plants does not permit us to resolve definitively whether this species belongs to the genus *Leibnitzia*; however, the great similarity in the structure of the capitula with *L. anandria* forces us to include it in this genus.

GENUS 1630. *Uechtrizia* Freyn^{1,2}

Freyn in Oest. Bot. Zeitschr. XLII (1892) 240.—*Gerbera* §3. *Uechtrizia* Beauverd in Bull. Soc. Bot. Geneva, ser. 2, II (1910) 43.

Capitula homogamous. Involucre subglobose; involucre bracts many-rowed, imbricate, usually white-tomentose. All florets bisexual; peripheral florets one-rowed, with slightly longer, 3-toothed, lower and narrow, bifid rounded ring of upper lobe of corolla; anthers with short appendages at base and with very little pollen; style bifid, with flat elliptical lobes; disk florets slightly smaller, all corolla lobes coiled in ring; staminal tube exerted from corolla, style scarcely visible. Achenes lacking beak, oblong, more or less pubescent. Perennial herbs, with simple stems bearing single capitulum and only basal leaves.

Type of genus: *U. armena* Freyn.

Freyn described this genus as monotypic. However, after studying the Mediterranean species "*Gerbera kokanica*," we were convinced that it also belongs to the genus *Uechtrizia* on the basis of the structure of the capitulum and the bisexual florets, and the subglobose involucre with imbricate involucre bracts, which is not characteristic

¹Treatment by E.G. Pobedimova.

²Named in honor of the Polish botanist Rudolph Uechtriz.

of the genus *Gerbera*. Moreover, apparently, even the ranges of these
 596 genera are well separated: *Gerbera* is tropical whereas *Uechtritizia* is more northern. However, until the species composition of the genus *Gerbera* is established, it also is not possible to define more precisely its overall range.

1. Leaves ovate, linear-ovate, or broadly ovate, obtuse, cordate, almost entire or very rarely with remote, scarcely visible, obtuse teeth 1. **U. armena** Freyn
- + Leaves lyrate, linear-obovate; terminal lobe large, ovate, obtuse, lateral lobes 3–4 pairs, smaller, almost round or weakly elongated 2. **U. kokanica** (Rgl. and Schmah.) Pobed.

1. **U. armena** Freyn in Oest. bot. Zeitschr. XLII (1892) 240–242.—*Gerbera armena* Beauverd in Bull. Soc. Bot. Geneve, ser. 2, II (1910) 43.—Exs.: Herb. Fl. cauc. No. 50.

Perennial. Rhizome thick, woody, brown, covered with brown scaly leaves, at apex with remnants of petioles of previous year's leaves, with thick string-like light brown roots. All leaves in basal rosette ovate, linearly or broadly ovate, (7.5)10.0–11.0(12.5) cm long, (6.0)6.5–8.0(8.5) cm wide, obtuse, cordate, almost entire or with occasional, irregularly spaced, inconspicuous, obtuse teeth, green above, glabrous, lustrous, with very distinct veins or irregularly weakly floccose-tomentose, densely tomentose beneath, long-petiolate; petiole 8–11 cm long, more often weakly winged, floccose-white-tomentose. Scapes usually 1, less often 2, 55–70 cm high, one-headed, straight, simple, floccose-tomentose, densely pubescent below capitulum, leafless, occasionally in upper half with remote, very small, 4–6 mm long, 0.5 mm wide, linear bracteal leaves, green above, white-tomentose beneath. Capitula (4.0)4.5–5.0(5.5) cm in dia. Involucre many-rowed, imbricate; outer involucre bracts lanceolate, acuminate, white-tomentose on outer side, fluff, readily detaching and exposed upper part reddish, inner bracts oblong, obtuse, abruptly acuminate; all spinescent, with thick reddish glands on more especially in upper half. Receptacle flat, alveolate, with filiform lacerate scales on edges of alveoli. Peripheral florets bilabiate, with erect, broad lower lobe (ligule) with 3 apical teeth and
 597 upper lobes bifid in thin lobules linear, coiled in ring, and clavate; staminal tube short with style strongly exerted, bifid, papillate; in disk florets corolla lobes variable, all lobes coiled in ring; staminal tube very long, strongly exerted from corolla, stamen filaments attached in middle of corolla tube, shorter than anthers; basal appendage of anthers linear, longer, toothed; style bifid, slightly exerted from staminal tube. Achenes 7 mm long, 2 mm wide, oblong, terete, brown,

densely covered with short appressed hairs; pappus very long, 12 mm long, with numerous scarcely toothed bristles connate at base in ring. Flowering July to August.

Pine forests on mountain slopes. So far not found in USSR.—*General distribution*: Armenia and Kurdistan (former Kars Region). Described from Eastern Anatolia (Sapikor-Dag Mountain). Type in Brno; isotype in Leningrad.

2. *U. kokanica* (Rgl. and Schmalh.) Pobed. comb. nova.—*Gerbera Kokanica* Rgl. and Schmalh. in *Izv. Obshch. Lyubit. Estestv. Antrop. i Etsn.* 34, 2 (1882) 53; O. and B. Fedtsch. *Perech. Rast. Turk*, IV, 304.

Perennial. Rhizome thick, woody, dark brown, covered at apex with brown remnants of petioles of previous year's leaves, with thick, string-like, light brown roots. All leaves in basal rosette, oblong-obovate, (7)12–15(20) cm long, (3)5.0–7.5(8.5) cm wide, lyrate, lustrous and glabrous above, densely white-tomentose beneath, irregularly toothed with distant prickles and very short spines; terminal lobe ovate, obtuse, large; lateral lobes 3–4 pairs, almost round or weakly attenuate; petiole short, 2–7 cm long, more or less winged; scape one, less often 2, (20)25–50(65) cm high, terminating in single capitulum, straight, simple, floccose-tomentose, densely white-tomentose below capitulum; bracteal leaves uniformly distributed on scape, remote, erect, very small, (3)5(7) mm long, 0.25–0.5 mm wide, lanceolate-linear, acute, reddish-green above, white-tomentose beneath. Capitula (2.8)4.0–5.0(6.0) cm in dia. Involucre many-rowed, imbricate; involucre bracts lanceolate, gradually acuminate, white-tomentose on outer side, glabrous inside, green, with reddish-lilac margin, and occasional thick, short glands. Receptacle flat, scarcely convex, locular. All florets bilabiate, bisexual; in peripheral florets lower lobe short, erect, with 3 teeth, not longer than involucre; upper one bifid with narrowly linear lobules coiled in ring, clavately thickened; staminal tube short, usually with little pollen; appendages at base of anthers short; style long, strongly exerted from corolla, bifid, with short, flat, oval lobes papillate; in disk florets both lobes coiled in ring; staminal tube very long, exerted from corolla, pinkish-lilac, with normally developed pollen; appendage at base of anthers very long, sometimes longer than anthers, linear, weakly toothed; stamen filaments, not longer than staminal tube, inserted in lower third of corolla; style scarcely exerted from staminal tube. Achenes 4.5 mm long, 1.5–2.0 mm wide, oblong, cylindrical, weakly compressed laterally, densely white-pubescent with long silkish, erect hairs, lacking beak; pappus much longer than achene,

with tiny and short-toothed appressed bristles, connate at base in ring. Flowering July to September (Plate XXVIII, Fig. 1).

Rocks, on mountain slopes in woody-shrubby communities.—*Soviet Central Asia*: Tien Shan, Pamiro-Alai. Endemic. Described from Shakhimardan. Type in Leningrad.

ADDENDA XXVII

DIAGNOSES PLANTARUM NOVARUM IN TOMO XXVIII
FLORAE URSS COMMEMORATARUMDiagnosis of New Species Mentioned in
Twenty-eighth Volume

June 1963

CARDUUS L.

1. *C. hajastanicus* Tamamsch. sp. nova (sect. *Carduus*).

Planta 50–100 cm alt., glaucescenti-viridis; caulis a basi divaricato-ramosus, interrupte alatus, alis spinosis, parce araneoso-tomentosus; folia anguste oblanceolata, sessilia, non profunde et inaequaliter pinnatilobata; lobi triangulares, in spinam flavam longam 8–9 mm lg. attenuat. Pedunculi monocephali; calathidia solitaria, 3–3.5 cm lg., 2.5–3 cm lt.; involucrium subglobosum, basi impressum; involucri phylla inaequilonga, basi dilatata et appressa, subglabra, externa et media in acumen robustum spinosum attenuata, externa reflexa, interna anguste lanceolata, purpurea; flores atro-purpurei vel rubescentes, involucri phyllis longiores; corolla 19–19.3 cm lg.

Habitat in declivibus lapidosis et herbidis.

Typus. Armenia, ad lac. Sevan, prope p. Tzamakabert, 19 VIII 1953, S. Tamamschjan. In Herb. Inst. Bot. Acad. Sc. URSS (Leningrad) conservatur.

Affinitas. *C. onopordioidi* affinis, sed caule divaricato-ramosissimo, pedunculo vix nutante, calathidiis plus minusve elongatis (non globosis), floribus atro-purpureis (non roseis) valde differt.

2. *C. furiosus* Tamamsch. sp. nova (sect. *Carduus*).

Planta valde spinosa, 30–35 cm alt., lucide viridis; caulis solitarius, simplex, dense foliosus; folia vix coriacea, spinosissima, pinnatilobata; lobi dentati, spinosi, spina flava robusta valde pungente terminati; folia caulina supra lucida, subtus atro-virentia, vix et partim perplexe araneoso-tomentosa. Calathidia subglobosa, 3–3.5 cm lg., 3–4 cm lt.; involucrium globosum, subglabrum vel vix araneosum; involucri phylla pappo et corolla longiora, exteriora mediaque robusta, basi plus minusve lata, in acumen spinosissimum subito attenuata, reflexa; corolla rosea, 22–23 mm lg.

Habitat in lapidosis siccis.

Typus. Irania, Badalan. In Herb. Inst. Bot. Acad. Sc. URSS (Leningrad) conservatur.

600 *Affinitas*. *C. onopordioidi* affinis est, sed calathidiis subglobosis, involucri phyllorum forma sat bene differt.

3. Sect. **Carduastrum** Tamamsch. sect. nova.

Calathidia magna vel mediocria, subglobosa. Involucri phylla semper angusta, conspicue vel inconspicue appresse imbricata, plus minusve herbacea vel lignosa, rigida, apice valde pungentia. Pedunculi longissimi, usque ad apicem alati, alis spinosis, vel exalati, non spinosi, griseo-lanati.

Typus sectionis: *C. crispus* L.

4. **C. nikitinii** Tamamsch. sp. nova (sect. *Stenocephalus* Rouy).

Planta 5–15(18) cm alt.; caulis vix costatus, usque ad calathidia spinulosus et dense foliatus, simplex vel rarissime in parte superiore parce ramosus. Pedunculi albo-lanati; calathidia cylindrica, parva, pauciflora (flores in numero 8–9); involucri phylla subglabra, virescentia, exteriora late ovata, apice membranaceo-marginata, acuminata, in aculeolum rectum transeuntia, media anguste ovata, intima lineari-lanceolata, membranacea, semper apice fusco-violacea; pappus sordide albus, corolla et achenio longior.

Habitat in declivibus siccis et schistosis in Turcomania.

Typus. Turcomania, montes Kopetdagh orientalis, Kaachka, 27 IV 1957. leg. V. Nikitin et Isczenko. In Herb. Inst. Bot. Acad. SC. URSS (Leningrad) conservatur.

Affinitas. A *C. pycnocephalo*, qui in Europa meridionali habitat, involucri phyllorum forma, pubescentia et aculeolo non reflexo differt; a *C. arabico*, *C. beckeriano* et *C. cinereo* involucri phyllis habituque valde distinguitur.

CIRSIUM Mill.

5. Sect. **Caucasigena** Charadze sect. nova.—Calathidia nutantia. Involucrum plus minusve arachnoideo-pubescentia; involucri phylla integra vel aculeolato-ciliata, apice in aculeum elongatum attenuata; involucri phyllorum exteriorum aculei reflexi vel patentes. Flores rubri, rarius albi; corollae tubus angustus parti dilatatae subaequilongus vel eam superans. Folia supra aculeolato-arachnoidea.

Typus sectionis: *C. caucasicum* (Adams) Petrak.

6. **C. gagnidzei** Charadze sp. nova (sect. *Caucasigena* Charadze).

Perennis; caules ascendentes, ad 1 m alt., subcostati sulcatique, purpurei, superne breviter ramosi, ad apicem foliosi; folia oblonga, supra viridia, dense minute setosa, subtus glaucescentia, plus minusve arachnoideo-pilosa, nervis prominentibus subglabris; folia inferiora in petiolum inciso-alatum margine aculeatum angustata, ad nervum medium inciso-pinnatipartita, segmentis ovato-triangularibus bipartitis margine aculeolatis, lobis dentibusque in aculeum luteolum 5–7 mm lg. acutatis; folia caulina sessilia, basi auriculato-dilatata, semiamplexicaulia, 15 cm lg., 7 cm lt., ad medium inciso-pinnatipartita, segmentis ovato-triangularibus bipartitis, lobis in aculeum firmum acutatis; folia superiora diminuta, inciso-pinnatipartita, suprema sub calathidiis solitaria, ea paulum superantia. Calathidia subsessilia, in numero 2–3 ad apices ramorum congesta vel solitaria, oblonga, denique ovato-globosa, inflorescentiam corymbosam formantia; involucrium 10–12 mm in diam., inferne leviter superne dense arachnoideo-pilosum; involucri phylla virescentia, lanceolata, carinata, a medio in aculeum tenuem luteolum erectum vel patentem attenuata, externa parva, glabra, media elongata, arachnoideo-pilosa, interna lineari-lanceolata, aculeo elongato filiformi falcato; flores purpurei; corolla 20 mm lg., parte dilatata fere ad medium dissecta; tubus angustus partem dilatatam subaequans; pappus sordide albus, pilis internis apice scabris elongatis.

Habitat in regione subalpina, in pratis altiherbosis Caucasi occidentalis.

Typus. Transcaucasia occidentalis, systema fluminis Mzymta ad fontes fl. Laura, 17 VII 1962, R. Gagnidze. In Herb. Inst. Bot. Acad. Sc. RSS Georgicae (Tbilissi) conservatur.

Affinitas. A speciebus proximis calathidiis parvis et lobis foliorum inferiorum latis differt.

7. **C. longiflorum** Charadze sp. nova (sect. *Caucasigena* Charadze).

Perennis; caules erecti, ad 150 cm alt., a medio plus minusve ramosi, ad apicem foliosi, subsulcati, purpureo-colorati, subglaucescentes, superne sparse araneoso-pilosi; folia ambitu elliptica vel oblongo-elliptica, a caulinis inferioribus apicem versus sensim diminuta, 4–17 cm lg., 7–1.5 cm lt., ultra medium profunde late inciso-pinnatipartita, segmentis elongatis lanceolatis vel triangulari-lanceolatis 2–3(5)-partitis, laciniis apice in spinam firmam 5–10 mm lg. luteoloalbidam acutatis; folia supra viridia, setis aculeatis luteolo-albidis et pilis minutissimis sparsis obsita, subtus dense griseo-tomentosa, nervis prominentibus tenuiter pubescentibus; folia suprema sub calathidiis 2–3, parva, lanceolata, involucri breviora vel ei aequilonga. Calathidia numerosa, plus minusve nutantia, breviter pedunculata,

oblonga, plerumque 1.5–2 cm lg., cum floribus 3–3.5 cm lg., in numero 2–3 congesta vel solitaria, inflorescentiam laxam corymboso-paniculatam formantia; involucrium subglabrum, sparse araneosum, plerumque atro-purpureum; involucri phylla lanceolata, navicularia, dense imbricata, dorso carinata, apice in aculeum robustum luteolum patentem attenuata, margine minutissime ciliata, scabra, interna lineari-lanceolata, membranacea, in acumen tenue elongatum fusco-coloratum falcatum attenuata, margine scabra, minutissime acute serrata; flores purpurei; corolla 20–22 mm lg., parte dilatata ad medium quinquepartita; tubus angustus, partem dilatatam subaequans; pappus 16 mm lg., sordide albus, pilis internis apice leviter clavato-dilatatis serrulatis; achenium 4.5 mm lg., 2.3 mm lt.

Habitat in regione montana media, in declivibus australibus Caucasi Magni.

Typus. Transcaucasia occidentalis, systema fluminis Mzymta, in viciniis <<Krasnaja Poljana>>, in pratis, 29 VIII 1962, A. Charadze. In Herb. Inst. Bot. Acad. Sc. RSS Georgicae (Tbilissi) conservatur.

Affinitas. A *C. gagnidzei* foliis profunde pinnatis, segmentis angustis et eclethidiis elongatis numerosis differt.

602 8. *C. czerkessicum* Charadze sp. nova (sect. *Caucasigena* Charadze).

Perennis; caules elati, ad 2 m alt., ascendentes, a medio ramosi, superne atro-purpurei, subsulcati, ad apicem foliosi, subglabri, pilis sparsis flexuosis adpressis; ramuli erecti, subpatentes; folia supra plus minusve dense adpresse aculeolato-setosa, ad nervum crispato-pilosa, subtus pallide viridia, sparse arachnoideo-pilosa vel tenuiter griseo-tomentosa, caulina sessilia, utrinque attenuata, inferiora auriculato-dilatata, semiamplexicaulia, oblongo-elliptica, 25 cm lg., 10 cm lt., ultra medium inciso-pinnatilobata, segmentis remotis triangulari-ovatis 2–3(5)-lobatis margine aculeolato-ciliatis, lobis in aculeum tenuem 4–8 cm lg., acutatis; folia cetera inferioribus similia, apicem versus sensim diminuta, media circa 17 cm lg., 8 cm lt., inferiora oblongo-lanceolata, suprema sub calathidiis 4–5 cm lg., ea vix superantia. Calathidia haud numerosa, ovato-oblonga, 15–22 mm lg., cum floribus ad 3 cm lg., nutantia, terminalia solitaria vel bina, breviter pedunculata, axillaria valde diminuta, inflorescentiam breviter corymboso-paniculatam formantia; involucrium inferne glabrum, superne subarachnoideum; involucri phylla externa oblonga, concava, dorso subcarinata, luteolo-viridia, rarius purpurea, in apicem breviter aculeatum subfalcatum reflexum acutata, margine plus minusve dense aculeolato-ciliata, aculeolis erectis luteolis, interna membranacea, lineari-lanceolata, in mucronem tenuem fere filiformem reflexum

acutata, margine minute arguteque serrata, scabra, superne sub-arachnoidea vel glabra; flores lilacino-rubri; corolla ad 22 mm lg., tubo angusto ad 10 mm lg., parte dilatata ad 1/3 dissecta; pappus sordide albus, pilis internis fere ad apicem pinnatis, apice subdilatatis scabris.

Habitat in regione subalpina, in partibus althiherbosis.

Typus. Caucasus occidentalis, Guzeripl, tractus <<Aspidnyi>>, in declivitate m. Abago, 2000 m s. m., 12 VIII 1962, R. Gagnidze. In Herb. Inst. Bot. Acad. Sc. RSS Georgicae (Tbilissi) conservatur.

Affinitas. A *C. gagnidzei* Charadze et *C. longifloro* Charadze involucri phyllis externis margine aculeolato-ciliatis, apice in aculeum brevius acutatis differt.

9. *C. Buschianum* Charadze sp. nova (sect. *Caucasigena* Charadze).

Perennis; caules ad 1 m alt., subsulcati, araneoso-pubescentes, ascendentes, superne ramosi; folia inferiora mediaque magna, ad 30 cm lg., 13–15(16) cm lt., late elliptica, basi angustata, caulina basi auriculato-dilatata, semiamplexicaulia, apicem versus angustata, acutata, ad medium pinnatipartita, segmentis ovatis rarius bipartitis vix sursum directis, dentibus apice aculeatis, aculeis 2–4 mm lg.; folia supra setis adpressis dense obsita, subtus plus minusve dense albo-tomentoso-pilosa, caulina superiora abbreviata, 4.5–9.5 cm lg., 2–5 cm lt., suprema sub calathidiis linearia. Calathidia terminalia nutantia, ad apicem ramorum elongatorum in numero 2–3, inflorescentiam laxam corymbosam formantia; involucri inferne adpresso arachnoideo-pilosum, superne laxe araneosum, ad 4.5 cm lt.; involucri phylla externa valde abbreviata, media lanceolata, falcata, reflexa, plus minusve dense aculeato-ciliata, in aculeum brevius longum firmum lutescentem reflexum angustata, interna lineari-lanceolata, membranacea, in acumen elongatum aculeatum reflexum angustata; flores lilacino-rubri; corolla (23)25–27 mm lg., parte dilatata ad 17 mm lg.; pappus sordide albus, pilis internis apice subdilatatis scabris; achenia ad 5 mm lg.

Habitat in regione subalpina Caucasi orientalis.

Typus. Ossetia meridionalis, prope p. Ermani, Delwars, 2000 m s. m., 10 IX 1935, E. et N. Busch. In Herb. Inst. Bot. Acad. Sc. URSS (Leningrad) conservatur.

Affinitas. A speciebus proximis ex affinitate *C. ossetici* (Adams) Petrak, foliis majoribus et latioribus et involucri phyllis externis valde abbreviatis falcatis fere tomentoso-pilosis differt.

10. Subsect. *Armata* Charadze. subsect. nova (sect. *Epitrachys* DC.).—Calathidia plerumque magna, rarius mediocria, erecta, foliis

supremis plus minusve elongatis obvallata, solitaria, in numero 2–3 congesta vel inflorescentiam racemosam formantia. Involucrum plerumque dense araneoso-pilosum vel tenuiter araneosum; involucri phylla integra, levia vel scabra, rarius margine sparse aculeolata, plerumque a medio in aculeum elongatum erectum vel patentem attenuata.

Typus subsectionis: *C. lappaceum* (MB.) MB.

11. ***C. megricum*** Charadze sp. nova (sect. *Epitrachys* DC.).

Perennis; caules 30–200 cm alt.; simplices, ascendentes, albo-tomentoso-pilosi, ad apicem foliosi; folia elongato-oblonga, supra aculeolis minutis plus minusve dense obsita et tenuiter arachnoidea, subtus albo-tomentoso-pilosa; folia caulina inferiora profunde pinnatisecta, segmentis elongato-lanceolatis acuminatis, basi in petiolum alatum dentatum plus minusve longum attenuatis, inaequaliter bipartitis, lobis dentibusque in aculeum firmum 10–15 mm lg. acutatis, caulina superiora sesilia, semiamplexicaulia, profunde pinnatipartita. Calathidia terminalia axillariaque subsessilia, inflorescentiam brevem racemosam formantia; involucrum subglabrum vel araneoso-pilosum, 1.2–2 cm lt.; involucri phylla externa linearia, virescentia, cetera membranacea, ab ovatis ad lanceolata, in acumen subfalcatum reflexum in aculeum gracilem attenuatum abrupte acutata, inferne glabra, superne araneoso-pilosa, margine subscabra; flores rosei; pappus luteolo-albidus; achenia fusco-colorata, matura ignota.

Habitat in regione subalpina Transcaucasiae australis, in pratis.

Typus. Armenia, distr. Megri, supra pag. Gjalur, in pascuis, 2300–2400 m s. m., 8 VIII 1932, I. Karjagin (sub. *C. isophyllo* (Petrak) Grossh. × × *C. schelkownikowii* Petrak). In Herb. Inst. Bot. Acad. Sc. RSS Azerbaidzhaniae (Baku) conservatur.

Affinitas. A *C. anatolico* (Petrak) Grossh. calathidiis confertis et segmentis foliorum latioribus differt; a *C. schelkownikowii* Petrak calathidiis parvis, indumento adpresso, segmentis foliorum acuminatis differt.

604 12. Sect. ***Lamyropsis*** Charadze sect. nova.—Calathidia breviter pedunculata. Involucri phylla externa apice triangulari-lanceolata, membranacea, attenuata, in apicem sensim angustata, apice partem dilatam plerumque 2–3 plosuperante, interna externa aequantia vel eis breviora. Pappus e pilis internis gracilibus fragilibus fere ad apicem pinnatis in acumen filiforme attenuatis constans. Planta perennis, foliis plus minusve coriaceis, supra levibus, subglabris, subtus albo-tomentosis, segmentis lateralibus reductis, in aculeum firmum acutatis.

Typus sectionis: *C. sinuatum* (Trautv.) Boiss.

13. *C. badakhschanicum* Charadze sp. nova (sect. *Echenais* (Cass.) Petrak).

Perennis; caules ad 1 m alt., ascendentes, sulcati, inferne sparse crispatopilosi, superne lanuginosi, ramosi, ramis axillaribus plus minusve elongatis; folia caulina glaucescentia, supra sparse pilosa, subtus secundum nervos primarios lanato-pilosa, media ad 10 cm lg., 3 cm lt., superiora valde diminuta, ovata, lanceolata vel oblongo-lanceolata, omnia ad medium inciso-pinnatilobata, lobis 3-5-partitis, basi auriculato-dilatata, semiamplexicaulia, margine inaequaliter crenato-dentata, aculeis numerosis luteolis inaequilongis; lobi foliorum in aculeum longum 12-15 mm lg. acutati; folia suprema sub calathidiis parva, lanceolata, pinnatidentata, aculeis luteolis firmis longis 8-10 mm lg., involucri aequilonga vel id vix superantia. Calathidia ad apices caulis et ramorum 2-5 approximata, subsessilia involucri glabrum, rotundato ovatum, 2-3.5 cm in diam., demum late apertum, phyllis subhorizontaliter reflexis; phylla externa mediaque ovato-lanceolata, vel lanceolata, internis subbreviora, a medio in acumen membranaceum attenuata, in aculeum longum tenuem acutata, margine aculeata, aculeis divaricatis luteolis, interna lineari-lanceolata, apicem versus in acumen subdilatatum margine undulatum acuminatum subreflexum attenuata; flores rosei, 17 mm lg., tubo angusto 7.5 mm lg., parte dilatata fere ad medium dissecta; pappus luteolo-albidus, ad 13 mm lg., pilis tenuissimis, internis apice scabris elongatis.

Habitat in regione montana superiore.

Typus. Tadzikhstania, Pamiro-Alaj, Schugnan, in valle Gunt, Ryvak, 29 VII 1901, O. et B. Fedtschenko. In Herb. Inst. Bot. Acad. Sc. URSS (Leningrad) conservatur.

Affinitas. Ab omnibus speciebus sectionis *Echenaidis* (Cass.) Petrak ex Asia Media involucri phyllis externis margine longe aculeatis, involucri phyllis internis apicem versus in acumen membranaceum angustum acuminatum attenuatis, foliis margine aculeis longioribus tenuioribus armatis differt.

14. Subsect. **Montana** Charadze subsect. nova (sect. *Cirsium*).

Calathidia haud numerosa, ad apices caulis et ramorum lateralium congesta. Folia magna, lata, integra vel late pinnatilobata, glabra vel subtus arachnoideo-vel fere tomentosopilosa.

Typus subsectionis: *C. pseudopersonata* Boiss. et Bal.

Area geographica subsectionis: Europa austro-orientalis, Caucasus occidentalis, Asia Minor (Anatolia borealis).

15. Subsect. **Aciculata** Charadze subsect. nova (sect. *Cirsium*).

Calathidia mediocria, foliis supremis margine longe aciculatis eis

brevioribus vel longioribus obvallata. Involucri phylla ab ovatis ad lineari-lanceolata in aculeum brevem vel mucronem acutata.

Typus subsectionis: *C. obvallatum* (MB.) MB.

Area geographica subsectionis: Caucasus, Asia occidentalis.

ONOPORDUM L.

16. *O. prjachinii* Tamamsch. sp. nova (sect. *Onopordum*).

Planta 60–100 cm alt., lucide virenti-grisea; caulis superne ramosus, usque ad apicem alatus; alae sursum gradatim angustatae, margine sinuato-spinulosae; floia caulina media 13–25 cm lg., 2.5–4 cm lt., decurrentia, apice acuminata, spinula terminata, margine inaequaliter pinnati-sinuata; lamina foliorum utrinque griseo-arachnoidea. Calathidia complanate globosa, 5 cm in diam., ad apices ramorum divaricatorum solitaria; involucrum subglobosum; involucri phylla basi albidotomentosa, superne glabra, virescentia, fructificatione reflexa, spinulosa, omnia aequilonga; corolla pallide rosea vel albida; pappus pallide aureus, setis inaequilongis basi scabrido-setulosis apice glabris.

Habitat in fruticetis montium Asiae Mediae.

Typus. Asia Media, in valle fl. Vachs, prope Cziljak in fruticetis, 26 V 1939, M. Prjachin. In Herb. Inst. Bot. Acad. Sc. URSS (Leningrad) conservatur.

Affinitas. Habitu *O. acanthio* L. similis est, sed involucri phyllis, calathidiis solitariis et eorum magnitudine differt. Ut videtur species hybrida.

17. *O. frickii* Tamamsch. sp. nova (sect. *Erecta* Rouy).

Planta non vel vix armata; caulis 90–100 cm alt., costatus, in parte superiore vel ad medium longe multiramatus, ramis vix divaricatis, ut caulis spinosoalatis; ala griseo-arachnoidea, 0.5–0.8(10) mm lt., spinis brevibus luteis praedita; folia caulina sessilia, late lanceolata, 12 cm lg., 2 cm lt., decurrentia. Calathidia solitaria, plus minusve parva, 3 cm lg., 1 cm lt., oblongo-cylindracea; involucri phylla omnia imbricata, adpressa, inaequilonga, exteriora 0.6–1.2 cm lg., ovato-lanceolata et lanceolata, media lineari-lanceolata, intima e basi oblongata in aculeum fusco-violaceum transeuntia; achenia 5–6 mm lg., 2–3 mm lt., complanate ovata; pappi setae scabrido-ciliatae, achenio duplo breviores.

Habitat in Armenia.

Typus. Armenia, Laar prope Erivan, in agris, n° 693, Frick. In Herb. Inst. Bot. Acad. Sc. URSS (Leningrad) conservatur.

Affinitas. Nostra species nova nulla specie caucasica generis *Onopordi* similis est; calathidiis parvifloris elongatis (non globosis), habitu et caule gracili parce vel non aculeato valde differt.

18. *O. seravschanicum* Tamamsch. sp. nova (sect. *Erecta* Rouy).

606 Planta robusta, sed non elata, albido-cinerea; caulis 1 cm in diam., sulcato-striatus, albo-tomentosus, divaricato-ramosus; folia basalia breviter petiolata, petiolis alatis crenulato-dentatis, caulina media superioraque sessilia, 12–12.5 cm lg., 2–2.5 cm lt., pinnatilobata, lobis triangulatis, spina tenui flava terminata; foliorum omnium lamina supra valde tomentosa, subtus tomentosissima et rugulosa vel crispata; folia ramulorum gradatim diminuta, sub calathidiis 2 cm lg., 0.5 cm lt., lanceolata, integerrima vel denticulata, spinulosa. Calathidia oblongo-globosa, in inflorescentiam racemosam aggregata; involucrium subglobosum; involucri phylla extrema parva, 0.5–0.6 cm lg., ovato-lanceolata, media lineari-lanceolata, vix reflexa, 2–2.5 cm lg., in spinam transeuntia, basi glabriuscula, superne vix araneoso-pubescentia, glandulosa, margine ciliato-glandulosa, intima basi anguste linearia, apice subulata, violacea, margine ciliata; corolla albida, minute glandulosa; pappi setae barbellatae.

Habitat in montibus altis Asiae Mediae.

Typus. Seravschan, Rars (Maida-Kischtage pass.), alt. 9–10 000 pd., 16 VII 1893, V. Komarov. In Herb. Inst. Bot. Acad. Sc. URSS (Leningrad) conservatur.

Affinitas. Habitu *O. polycephalo* Boiss., quod in Tauro Cilicico habitata, simile, *O. leptolepidi* appropinquat, sed involucri phyllorum et calathidiorum forma valde differt.

SERRATULA L.

19. Sect. *Iljinia* Boriss. sect. nova.—Plantae humiles, acaules vel caulibus 2–20 cm alt., sed tum foliis integris; folia rosulata, radicalia et caulina lyrata, petiolis plus minusve longis, utrinque 2–5-lobata. Calathidia 1.5–3.5 cm in diam., sessilia vel pedunculata, pedunculis plus minusve elongatis; involucri phylla 7–9-seriata.

Typus sectionis: S. lyratifolia Schrenk.

20. *S. modesti* Boriss. sp. nova (sect. *Iljinia* Boriss.).

Planta perennis; radices funaliformes, fuscae; rhizoma robustum, longum; caules 10–20 cm alt., simplices, basi reliquiis foliorum vetustorum obtecti; folia radicalia glabra, 8–15 cm lg. et 2.5–4 cm lt., petiolis (1)5–10 cm lg., margine acute serrata, interdum basi utrinque

uni-bilobata, solida et coriacea, apice acutiuscula, acumine brevi molli tenuique. Calathidia 2.5–3.5 cm in diam., pedunculis foliis fere aequilongis; involucrium 2–3 cm in diam., basi planiusculum, non angustatum, parti superiori aequilatum; involucri phylla 7–9-seriata, exteriora et media ovata, gradatim prolongata, anguste nigro-marginata, viridia, apice acumine caduco, interna lanceolata, appendice membranacea; receptaculum dense setosum, setis levibus 5 mm lg.; corolla purpurea, 25 mm lg., parte inferiore filiformi-tubulosa ca. 13 mm lg., parte superiore anguste campanulata 13 mm lg., lobis linearibus 7 mm lg.; tubus antherarum corolla subbrevior, superne lobatus, lobis liberis obtusis, basi appendicibus linearibus brevissimii praeditus; filamenta libera, parce papillari-pubescentia; stylus corolla paulo longior, breviter bilobatus; achenia ovata, 5 mm lg. et 3 mm lt., sublevia, tenuis sime sulcata; pappus ca. 16 mm lg., densus, flavidus; pappi setae appress brevissime plumosae.

607 *Habitat* in declivibus lapidosis siccis et collibus jugi alatau Dshungarici.

Typus. Kasachstania, distr. Dzarkent (nunc Panfilov), flum, Kapkak, in declivibus lapidosis et siccis, 13 VII 1912, V. Saposhnikow et B. Schischkin. In Herb. Inst. Bot. Acad. Sc. URSS (Leningrad) conservatur.

Affinitas. A *S. lyratifolia* Schrenk caule evoluta, foliis integris, calathidiis et floribus majoribus differt.

21. Sect. **Leuzeopsis** Boriss. sect. nova.—Plantae monoeciae; folia coriacea, magna, integra vel praecipue laminarum parte inferiore pinnatilobata, nervis prominentibus, margine obtuse crenato-dentata. Calathidia magna, 3–4 cm lt., subglobosa, floribus hermaphroditis; involucri phylla coriacea, glabra, appendice reflexa aculeata 5–6 mm lg.; achenia ovata, ad basin subito angustata; pappus longus, 11–15 mm lg.; achenia ovata, ad basin subito angustata; pappus longus, 11–15 mm lg., achenio duplo longior.

Typus sectionis: *S. serratuloides* (Fisch. et Mey.) Takht.

22. Sect. **Demetria** Boriss. sect. nova.—Plantae monoeciae; caules late alati; folia magna, decurrentia, margine non profunde sinuato-dentata et aculeata. Calathidia magna, 2.5–3.5 cm in diam., globosa vel ovata; involucri phylla coriacea, subglabra, spinis longis 7–10 mm lg. erectis; corollae pars dilatata parte inferiore angusta 1.5-plo longior.

Typus sectionis: *S. caucasica* Boiss.

RHAPONTICUM Adans.

23. Sect. **Eleutherochaetum** Soskov sect. nova.—Pappus flavescenti-rufescens vel flavescenti-cremeus, setis breviter plumosis rigidis basi in anulum non connatis, setae pilis latitudine eius axis duplo-triplo longioribus. Achenia 8–12 mm lg., 3–4.5 mm lt., flavescenti-helvola vel flavescenti-brunnea. Corolla flava.

Typus sectionis: *R. integrifolium* Winkl.

CENTAUREA L.

24. **C. razdorskyi** Karjag. sp. nova in litt. (subgen. *Centaurea*).

Perennis, pallide virens, saepe glaucescens; caulis basi reliquiis squamatis vel plus minusve fibrosis brunnescentibus vaginarum florum emarcidorum vestitus, glaber, erectus, ramis paucis elongatis, 40–70 cm alt. et altior; folia radicalia caulinaque inferiora petiolata, in axillis et rachidum parte inferiore arachnoideo-lanata, caulina ambitu oblonga vel elongato-oblonga, 8–30 cm lg., 3–13 cm lt., glabra, inferiora secus rachidem laxa et longe albo-lanata, segmentis numerosis lanceolato-linearibus vel lanceolatis 1–7 cm lg. acutis vel acuminatis secus rachidem decurrentibus margine crebre serrulatis, serrulis cartilagineo-mucronatis, vel plus minusve pinnatifida, laciniis triangularibus triangulari-lanceolatis vel lanceolatis; folia superiora sessilia, sensim diminuta, pinnatisecta, laciniis angustis integerrimis, suprema linearia, integerrima, acuminata. Calathidia ovata, 1.5–2.5 cm lt.; involucri glabri phylla adpressa, subcoriacea, lutescentia, lineis 5–9 longitudinalibus subparallelis fuscis ornata, extrema late ovata vel subrotundata, obtusissima, margine tenuiter membranacea, interiora oblonga, appendice ovata tenuiter membranacea lacera non emarcida; flores laete citrici, marginales aucti; achenia 7–8 mm lg., oblonga, subtetragona, levia, ad apicem vix transverse rugulosa, areola obliqua lutea marinata; pappus scabridus, cinnamomeus, achenio aequilongus. Fl. VI–VII, fr. VII–VIII.

Habitat in declivibus lapidosis siccis Caucasi orientalis (Kobystan).

Typus. Azerbaidzhania, Kobystan, mons Agh-burun, 12 VI (fl.) et 14 VII (fr.) 1952, I. Karjagin. In Herb. Inst. Bot. Acad. Sc. RSS Azerbaidzhaniae (Baku) conservatur. Species in memoriam cathedrae botanicae Universitatis primae in Azerbaidzhania a. 1923 fundatoris professoris V. Th. Razdorsky nominatur.

Affinitas. Valde affinis *C. kasakorum* Iljin et *C. talievii* Kleop. e cyclo *C. ruthenicae* Lam., sed a prima forma segmentorum foliorum et

eorum rachide laxe albo-lanato, a secunda caule glabro et foliorum pubescentia differt.

25. Subsect. **Fischerianae** Czer. subsect. nova (subgen. *Cyanus* (Juss.) Hayek sect. *Protocyanus* Dobrocz.).—Appendices involucri phyllorum ea omnino vel partim obtegentes, margine fimbriatae, fimbriis longis argentatis vel albis; corolla florum radii lilacino-rosea, purpurea, pallide flava, raro albida vel alba. Radix obliqua vel subverticalis, comparative longa, superne in rhizoma vulgo ramosum stolonibus et radicibus adventitiis funaliformibus destitutum abiens; rami rhizomatis oblique ascendentes, breves vel plus minusve elongati, sat tenues, folia rosulata et caules floriferos in numero 1–3(5) emittentes; caules humiles vel mediocres, simplices vel in parte superiore parce compressi ramosi, vulgo sat robusti, ascendentes, arcuatim curvati, interdum in parte inferiore fere humifusi, raro erecti, basi vaginis nigro-vel purpureo-brunnies valde dilatatis petiolorum foliorum radicalium normaliter evolutorum ad tempus florendi haud marcescentium omnino tecti; folia oblique sursum directa, rigidiuscula, a lyrato-pinnatisectis ad integerrima; pubescentiae areneosae pili basi valde dilatati (sub lente!). Plantae in regionibus subalpina, alpina, rarius montana media montium Caucasi, Asiae Minoris, Iraniae Borealis (jugum Elburs) et partis meridionalis peninsulae Balcanicae Distributae sunt.

Typus subsectionis: *C. fischeri* Willd.

26. **C. willdenowii** Czer. sp. nova (subgen. *Cyanus* (Juss.) Hayek sect. *Protocyanus* Dobrocz. subsect. *Fischerianae* Czer.).

Planta perennis, tota viridulo-grisea, pubescentia araneosa vel araneosolanata tecta, ob tomentum tenue araneosum rarius grisea vel griseola, pilis basi valde dilatatis (sub lente!); caules non numerosi, (8)15–35 cm alt., plus minusve robusti, interdum comparative graciles, ascendentes, arcuatim curvati, raro suberecti, vulgo simplices; folia lanceolata, oblongo-lanceolata, rarius lineari-lanceolata vel oblongo-oblanceolata, apice a breviter acuminatis ad obtusiuscula, ab integerrimis ad profunde sinuato-pinnatipartita, rosulata, radicalia et caulina inferiora petiolata, cetera sessilia, plus minusve breviter deccurrentia; folia caulina media 4–10(15) cm lg. et 0.4–2.5(3.5) cm lt. Calathidia vulgo solitaria; involucri ovatum vel globoso-ovatum, 18–22(25) mm lg. et 12–15(18) mm lt., praecipue glabrum; appendices involucri phyllorum exteriorum mediorumque semiobcircularia vel triangularia, phylla partim obtegentes, margine longe fimbriatae, fimbriis argentatis 1.5–2.5 mm lg.; appendices phyllorum interiorum superne pallide fuscae vel albido-fuscae, minores, fimbriatae; corolla florum disci violaceo-lilacina, lilacino-rosea, raro alba vel albida, 15–19 mm

lg., radii purpurea, roseolo-purpurea, raro alba, vel albida, 6–8-partita, 28–37(40)mm lg.; tubus corollae florum radii 13–20 mm lg., limbo 14–17(20) mm lg., lobis a lanceolato-linearibus ad lineares vulgo acuminatis; achenia ellipsoidalia, 4.5–5 mm lg. et 2.3–2.5 mm lt.; pappus 2–3 mm lg., internus externo quadruplo brevior. Fl. VI–VIII.

Habitat in pratis subalpinis alpinisque (ad alt. 2700 m s. m.) Ciscaucasiae, Daghestaniae, Transcaucasiae orientalis australisque.

Typus. Caucasus septentrionalis, vallis fluminis Chyzny prope ostium fluminis Tujala, 2000 m s. m., 7 VIII 1931, E. et N. Busch. In Herb. Inst. Bot. Acad. Sc. URSS (Leningrad) conservatur.

Affinitas. A proxima *C. fischeri* Willd. s. str. involucris minoribus ovatis vel globoso-ovatis, floribus minoribus et foliis breviter decurrentibus bene differt.

27. Subsect. **Stricticaules** Czer. subsect. nova (subgen. *Cyanus* (Juss.) Hayek sect. *Protocyanus* Dobrocz.).—Appendices involucri phyllorum ea partim obtegentes, margine fimbriatae, fimbriillis ab albidis ad nigras; corolla florum radii cyanea vel coerulea. Rhizoma verticale, brevissimum, stolonibus destitutum, radicibus adventitiis funaliformibus non numerosis tectum, rosulam foliorum haud emittens; caules vulgo solitarii, mediocres vel alti (ad 80 cm alt.), superne parce compressae ramosae, rarius simplices, subgraciles, erecti, interdum basi vix ascendentes; folia oblique sursum directa, sat rigida, subangusta, integerrima, non raro radicalia et caulina inferiora utrinque uni-tridentata vel lobata; pubescentiae araneosae pili basi valde dilatati, rarius non dilatati (sub lente!). Plantae in planitiibus silvo-stepposis, stepposis et in regionibus praemontana et montana inferiore Europae mediae australisque nec non in regionibus australibus partis europaeae URSS distributae sunt.

Typus subsectionis: *C. stricta* Waldst. et Kit.

28. Subgen. **Czerniakovskya** Czer. subgen. nov.—Calathidia mediocria, multiflora, ad apices caulium et ramorum lateralium solitaria, in inflorescentiam laxam corymbiformem vel subcorymbiformem aggregata; involucria ovata, ovalia vel oblongato-ovalia, 8–15 mm lt., leviter araneosa vel subglabra; phylla coriacea, viridula (in sicco flavescentia), superne plus minusve striata, externa orbiculari-ovata et ovata, interna oblongato-lanceolata et oblongato-linearia; appendices phyllorum externorum mediorumque membranaceae, haud decurrentes vel decurrentes, triangulares vel lanceolato-triangulares, apice seta brevi elastica vel rigidiuscula instructae, margine pectinato-ciliatae; appendices phyllorum internorum membranaceae, fimbriato-ciliatae vel inaequaliter dentatae; flores omnes tubulosi, flavi vel pallide flavo-rosei,

heterogeni, disci hermaphroditi, radii steriles, staminodiis albis in numero 5 in tubo corollae occultatis, non aucti, corolla 5–6(7)-partita; filamenta complanata, papillis tecta; stylus breviter bilobatus; achenia oblongato-ellipsoidalia, 7–8 mm lg., parce pilosa; pappus achenio aequilongus vel duplo longior, rufidulus, non deciduus, duplex, externus e setis sat multiseriatis planis serratis inaequilongis constans, internus externo 1.5–2-plo brevior, uniseriatus, paleaceus, paleis (10)12–15 plus minusve latis oblongatis vel oblongato-lanceolatis serrato-scabridis rigids. Herbae perennes, caulibus parce ramosis vel simplicibus ad apicem foliosis et foliis vulgo integerrimis tomentosissimis vel araneosis subsessilibus.

Typus subgeneris: *C. kopetdaghensis* Iljin.

29. *C. holophylla* Socz. et Lipat. sp. nova (subgen. *Psephellus* (Cass.) Schmalh.).

Planta perennis, caulis erectus, simplex, 30–60 cm alt., foliis radicalibus 1.5-plo longior, subglaber, sub calathidio parce albo-araneosus; folia supra viridia, subtus tenuiter albo-tomentosa, radicalia et caulina integra, margine denticulata, denticulis raris acuminatis, oblongato-ovata, basi cordata, apice acuta; folia radicalia magna, 10–15(20) cm lg. et 4.5 cm lt., longe petiolata, petiolis 10–20(30) cm lg., caulina minora, brevius petiolata; folium apicale basi cuneatum, breviter petiolatum. Calathidia solitaria; involucrium ovatum, 2.5 cm lt.; appendices involucri phyllorum magnae, triangulari-lanceolatae, brunneae, nervo uno pullato, basi subnigrae, margine hyalinae, fimbriis longis, lucide fuscis; flores violacei, marginales non aucti. Fl. VII–IX.

Habitat in pinetis partis occidentalis Caucasi Majoris.

Typus. Caucasus septentrionalis, pars superior systematis fluminis Kjafara affluentiae fluminis Zelenczuk, in pineto Kyzylczuk, ca. 1800 m s. m., 2 IX 1945, V. Soczava et V. Lipatova. In Herb. Inst. Bot. Acad. Sc. URSS (Leningrad) conservatur.

Affinitas. A speciebus omnibus sectionis *Hypoleucarum* (sosn.) Sosn. caule subglabro, foliis integris margine remote denticulatis differt.

30. *C. ciscaucasica* Sosn. sp. nova (subgen. *Psephellus* (Cass.) Schmalh.).

Planta perennis; caules 20–30 cm alt., dense araneoso-tomentosi, vulgo simplices, rarius leviter ramosi; folia supra viridia, sparse araneoso-pubescentia, subtus plus minusve dense albo-tomentosa; folia radicalia breviter petiolata, lyrato-pinnatifida, lobo apicali magno ovato basi plus minusve cuneato vel rotundato apice acuminato margine remote et obscure denticulato, lobis lateralibus utrinque 2–3 minoribus ovatis brevissime petiolulatis; folia caulina non numerosa, vulgo inte-

gra, ovata, inferiora petiolata, superiora sessilia. Calathidia magna; involucrum globosum, 2 cm lt.; involucri phylla plus minusve dense lanato-pubescentia; appendices involucri phyllorum parvae, lanceolatae, nigrescenti-fuscae, fimbriis flaveolis vel albidis, appendicis latitudine longioribus; flores rosei, marginales aucti. Fl. V–VI.

Habitat in declivibus herbaceis montium Ciscaucasiae.

Typus. Ciscaucasia, in vicinitate opp. Kislovodsk, declives ad vallem fluminis podkumok, mons Koltzo, 2 VII 1911, A. Gordjagin. In Herb. Inst. Bot. Acad. Sc. URSS (Leningrad) conservatur.

Affinitas. A *C. abchasica* (Alb.) Sosn. foliorum segmentis lateralibus bi-trijugis ad basin valde angustatis, involucri phyllis plus minusve dense lanato-pubescentibus bene differt.

31. *C. kolakovskyi* Sosn. sp. nova (subgen. *Psephellus* (Cass.) Schmalh.).

Planta perennis; caules 15–35 cm alt., simplices; folia ob pilos appressos araneosos, supra griseola, subtus caerulescenti-griseo-tomentosa; folia radicalia cum petiolo ad 25 cm lg., ambitu oblongato-ovata, pinnatipartita, lobo apicali fere non aucto oblongato-ovato 6–14 cm lg. integro vel basi uni-bifido margine remote denticulato apice acutiusculo basi plus minusve rotundato petiolulato, lobis lateralibus utrinque 3–8 ad basin laminae gradatim decrescentibus ambitu ovatis vel plus minusve ellipticis obtusiusculis basi rotundatis superioribus confluentibus inferioribus petiolulatis; folia caulina diminuta, non numerosa, superiora integra, oblongato-lanceolata. Calathidia mediocria; involucrum 1.5 cm lt.; appendices involucri phyllorum oblongato-lanceolatae, fuscatae, breviter pubescentes, fimbriis albidis; flores rosei, marginales leviter aucti. Fl. VII–VIII.

Habitat in declivibus schistosis calcareis siccis in regione alpine Abchasiae.

Typus. Abchasia, jugum Gagrinsky, mons Chyrka, 27 VIII 1947. A. Kolakovsky et V. Jabrova. In Herb. Inst. Bot. Acad. Sc. URSS (Leningrad) conservatur.

Affinitas. A *C. leucophylla* MB. foliis subtus caesio-tomentosis (non albo-tomentosis), involucri phyllis appendicibus oblongo-lanceolatis fuscatis praeditis differt.

32. *C. schistosa* Sosn. sp. nova (subgen. *Psephellus* (Cass.) Schmalh.).

Planta perennis; caules ascendentes, (7)10–15(30) cm alt., simplices vel parce ramosi, araneoso-lanati, fere ad calathidia foliosi; folia supra leviter araneoso-lanata, subtus albo-tomentosa; folia radicalia pinnatisecta vel lyrato-pinnatisecta, segmento apicali magno elliptico

vel ovato integro vel lobato, segmentis lateralibus minoribus ovatis vel oblongato-ellipticis decurrentibus, interdum partim integra, elliptica; folia caulina paulo diminuta, pinnatisecta, segmentis brevibus oblongatis vel ellipticis integris vel leviter partitis obtusis breviter acuminatis. Calathidia mediocria; involucrium 15–20 mm lt.; appendices involucri phyllorum oblongato-ovatae, albo-scariosae, hyalinae, dorso stria plus minusve lata brunnea ornatae, fimbriis albis, appendicis latitudini aequalibus vel ea vix brevioribus, interdum ex toto albae; appendices
612 phyllorum intimorum triangulares, fimbriatae, macula brunnea notatae, rarius albae; flores purpurei, marginales aucti. Fl. V. Habitat in declivibus schistosis montium Transcaucasiae orientalis.

Typus. Caucasia orientalis, Azerbaidzhania, distr. Divitschi, in faucibus Isti-su inter pag. Arabdagnja (Chaltan-dagnja) et thermas Isti-su, in schistosis, 31 V 1937, I. Karjagin et M. Schevljakov. In Herb. Inst. Bot. Acad. Sc. URSS (Leningrad) conservatur, isotypus in Baju.

Affinitas. A *C. hymenolepide* Trautv. foliis supra griseolis (non viridibus), calathidiis majoribus, involucrio 1.5–2 cm lt. (non 1 cm lt.) differt.

33. *C. meskhetica* Sosn. sp. nova (subgen. *Psephellus* (Cass.) Schmalh.).

Planta perennis; caules numerosi, humiles, 5–15(25) cm alt., ascendentes vel decumbentes, ramosi, basi villosi, dense tomentosi, ad apicem foliosi; folia supra griseolo-viridia, scabra et araneosa, subtus albo-tomentosa; folia radicalia breviter petiolata, ambitu oblongato-ovata, bipinnatipartita, caulibus fere aequilongis, interdum eis longiora, segmentis ovatis vel lanceolatis sessilibus pinnatifidis; folia caulina pinnatipartita, segmentis anguste lanceolatis, suprema pinnata, segmentis linearibus, interdum integra, lanceolata. Calathidia mediocria; involucrium vulgo ovatum, 1–1.5 cm lt.; appendices involucri phyllorum pallidae, lucide stramineae, fimbriis albidis, appendicis latitudini vulgo aequalibus; flores rosei, marginales vix aucti. Fl. VI–VIII.

Habitat in declivibus siccis et collibus argillosis in regione montana media Transcaucasiae orientalis.

Typus. Meskhetia, colles argillosi gypsacei contra opp. Achaltziche, ad ripam sinistram fluminis Poskhov-czai, 4 VII 1947, D. Sosnovsky, Kutateladze et I. Mandenova. In Herb. Inst. Bot. Acad. Sc. RSS Georgiae (Tbilissi) conservatur, isotypus in Leningrad.

Affinitas. A *C. carthalinica* (Sosn.) Sosn. foliis radicalibus cauli subaequilongis, involucri phyllorum appendicibus pallidis lucide stramineis fimbriatis fimbriis albidis appendicis latitudini aequalibus vel ea longioribus differt.

34. *C. substituta* Czer. sp. nova (subgen. *Jacea* (Juss.) Hayek sect. *Jacea*).

Planta perennis, tota vulgo griseolo-viridis vel griseola, pubescentia araneosa plus minusve densa tecta, rhizomate lignoso abbreviato, radices funaliformes emittente; caules solitarii vel non numerosi, ad 80 cm alt., erecti, costatosulcati, sub calathidiis leviter incrassati, a medio vel supra medium sat valde ramosi, ramis elongatis, lilacino-purpurei, praecipue superne ob aculeolos acutos vel pilos rigidos vreves scabri; folia anguste lanceolata, oblongato-oblancoolata, anguste oblongato-lanceolata, interdum caulina superiora sublineari-lanceolata, apice ab acuminatis ad acutiuscula, integerrima, rarius radicalia et caulina media remote denticulata vel haud profunde sinuato-lobata, utrinque pilis densiusculis vel sparsis rigidis curvatis multicellularibus tecta; folia radicalia et caulina inferiora petiolata, sat cito marxescentia, cetera sessilia, ad basin subangustata. Calathidia ad apices caulis et ramorum lateralium solitaria, in inflorescentiam corymbiformem vel racemoso-corymbiformem aggregata; involucrium globoso-ovatum, rarius subglobosum, 16–18 mm lg. et 12–16(18) mm lt., glabrum, basi griseolo-araneosum; appendices involucri phyllorum membranaceae, magnae, phylla omnino obtegentes, albae, in parte media pallide fuscatae vel fuscatae, raro ex toto pallide fuscatae; appendices phyllorum exteriorum mediorumque orbiculares, convexae, laceratae, margine irregulariter dentatae vel fimbriato-dentatae; appendices phyllorum interiorum ab orbicularibus ad ovatas, leviter laceratae, integrae vel apice irregulariter denticulatae; flores lilacino-purpurei; achenia 3 mm lg. et 1–1.3 mm lt.; pappus nullus. Fl. VII–VIII.

Habitat in pratis et fruticetis, ad margines silvarum in regionibus australibus partis europaeae URSS.

Typus. Tauria, Hortus Nikitensis, prope semitam, 28 VII 1922, S. Stankov. In Herb. Inst. Bot. Acad. Sc. URSS (Leningrad) conservatur.

Affinitas. Nostra species nova *C. pannonicae* (Heuff.) Hayek affinis est, sed ab ea differt involucri globoso-ovatis vel subglobosis 12–16(18) mm lt. (non ovatis (8)10–12 mm lt.), caulibus foliisque densius pubescentibus et caulibus magis ramosis.

35. *C. turgaica* Klok. sp. nova (subgen. *Heterolophus* (Cass.) Dobrocz.).

Caules floriferi 1–10 ex axillis foliorum radicalium oriundi, procumbentes vel ascendentes, 5–25 cm lg. vel alti, simplices vel vix ramosi, ramulis 1–2, albido-tomentosi; folia radicalia rosulantia, 3.5–12.5 cm lg., pinnatisecta, segmentis lateralibus 2–7-paribus oblanceolatis vel ellipticis 1.5–20 mm lg. et 1.5–7(11) mm lt. acutatis vel obtusis margine sicut apicale remote denticulatis; segmentum,

apicale usque ad 16 mm lt.; folia caulina apicala integra; folia omnia subtus albo-tomentosa, supra griseola. Calathidia in caule 1–3; involu-
crum subglobosum 15–22 mm lg., 14–22 mm lt.; appendices phyllorum
externorum lanceolatae, fimbriis sub apiculo utrinque 1–2, extremorum
subdenticulatae, reflexae, ca. 2 mm lg.; appendices phyllorum mediorum
phylla omnino obtegentes, atriusculo-fulvae necnon brunneo-aurantiacae
vel cinnamoneae, suborbiculares vel late ovato-triungulares, 5–8 mm
lg. et lt., margine regulariter fimbriatae, fimbriis 1.5–2(3) mm lg.,
apiculum superantibus; phyllorum internorum appendix oblongo-ovata
vel subovalis, 1.5–3.5 mm lg., margine irregulariter denticulata, infra
medium lilacino-cinnamomea; flores purpurei; achenia 5–6 mm lg.,
1.7–3 mm lt., pappo ca. 1.5 mm lg. Fl. V–VII.

Habitat in steppis et declivibus montanis.

Typus. Ditio Turgaica, in viciniis opp. Kustanaj, steppa stiposa,
17 V 1904, S. Fedossejev. In Herb. Inst. Bot. Acad. Sc. URSS
(Leningrad) conservatur.

Affinitas. A proxima *C. sibirica* L. species haec magis xerophila
caulibus subduplo brevioribus debilioribus, foliis duplo minoribus,
segmentis foliorum radicalium oblongioribus, involucri calathidiorum
subgloboso apice haud complanato, appendicibus phyllorum
obscurioribus et brevius fimbriatis necnon habitatione australiore recedit.

614 36. *C. sergii* Klok. sp. nova (subgen. *Heterolophus* (Cass.)
Dobroc.).

Caules floriferi axillares 2–3 (raro plures), procumbentes vel ob-
lique ascendentes, (8)10–20 cm lg. vel lati, simplices vel ramificati, ut
folia arachnoideo-tomentosi; folia radicalia brevipetiolata, 6–15 cm
lg., pinnatisecta, segmentis 7–13; segmenta lateralia oblongo-lanceolata
vel elliptica, 5–32 mm lg., 5–11 mm lt., acutata, apice attenuata cal-
losa glabra; segmentum apicale usque ad 50 mm lg. et 15 mm lt.; folia
caulina inferiora pinnatipartita, segmentis saepissime 5, superiora in-
tegra; folia omnia ab utroque latere ob pubescentiam arachnoideo-
lanulosam albida, margine remote crenulato-denticulata. Calathidia in
caule 1–4; involucrium oblongo-ovoideum, 15–20 mm lg., 7–10 mm
lt., basi arachnoideo-lanulosum; phylla ovata vel oblonga, appendicibus
vix tecta, eis longiora, sub appendicibus pubescentia; appendices
angustae, fulvae, haud attingentes, in phyllis externis brunneolae,
anguste lanceolatae vel lineari-lanceolatae, ca. 3 mm lg. et 1 mm lt.,
integerrimae, plus minusve reflexae, in mediis lanceolatae necnon
oblongo-ovato-lanceolatae, 2.5–5 mm lg., 1–2 mm lt., margine
irregulariter fimbriatae, fimbriis utrinque 2–7 usque ad 1 mm lg.,
acumine fimbriis longiore, rarius subdenticulatae vel integerrimae, in
internis ovals vel oblongo-ovatae, minutissime eroso-denticulatae;

flores roseo-purpurei; achenia 6.5–7 mm lg., ca. 2 mm lt., pappo 2–3 mm lg. fumagineo. Fl. VI–VII.

Habitat in declivibus lapidosis vel arenosis austro-sibiricis.

Typus. Sibiria, in collibus arenosis ad fl. Irtysh, Altai, C.A. Meyer. In Herb. Inst. Bot. Acad. Sc. URSS (Leningrad) conservatur.

Affinitas. A *C. sumensi* Kalen. europaea species haec asiatica involucre magis oblongo, appendicibus phyllorum mediorum longioribus et latoribus fulvis (non atro-cinnamomeis), acheniis longioribus (non 4–4.5 mm lg.), pappo eis subduplo longiore differt.

37. *C. ossethica* Sosn. sp. nova (subgen. *Lopholoma* (Cass.) Dobrocz. sect. *Lopholoma*).

Planta ad 80–100 cm lat., pilis brevibus papillaribus et crispatis intermixtis tecta, tomentello araneoso tenui, leviter scabra, viridis; caules solitarii vel non numerosi, erecti, simplices vel parce ramosi; folia pinnatipartita vel pinnatilobata, inferiora sat longe petiolata, superiora sessilia vel subsessilia, interdum integra; lobi laterales utrinque 2–5, oblongati, integerrimi vel plus minusve dentati; segmentum apicale lateralibus vulgo majus. Involucreum 19–23 mm lt., 14–25 mm lg., glabrum vel subglabrum; appendices involucri phyllorum exteriorum mediorumque tenuiter coriaceae, obtuse triangulares, 2–3.5 mm lg. (sine margine decurrente), nigro-fuscae, margine ciliatae, ciliis albidis 2–3.5 mm lg., apice acumine brevissimo (ad 1–1.5 mm lg.); involucri phylla intima appendicibus suborbicularibus margine profunde fimbriatis; flores rosei, marginales paulum aucti; achenia 5–6 mm lg., breviter sparseque pilosa; pappus 4.5–6 mm lg., pappi interioris setae paleiformes, exterioris setis longissimis 2.5–3-plo breviores. Fl. VII–IX.

Habitat in declivibus lapidosis in regionibus media et superiore montium Caucasi.

615 *Typus.* Ossetia australis, in fauce Ediss, ca. 2050 m s. m., 6 IX 1933, E. et N. Busch. In Herb. Inst. Bot. Acad. Sc. URSS (Leningrad) conservatur.

Affinitas. A proxima *C. scabiosa* L. acheniis et pappo longioribus et area geographica differt.

38. *C. kubanica* Klok. sp. nova (subgen. *Acrolophus* (Cass.) Dobrocz.).—*C. maculosa* auct. fl. cauc. p. p. non Lam.—*C. rhenana* Dumb. in Dokl. Akad. Nauk Arm SSR V, 2 (1946) non Boreau.

Caules solitarii, erecti, 20–110 cm alt., costulato-sulcati, inferne foliiscum subarachnoidei, superne scabridi, ramosi; folia radicalia petiolata, pinnatisecta, segmentis incis, marcescentia; folia caulina brevipetiolata (infima) et sessilia, 1–8 cm lg., pinnatisecta, segmentis

lateralibus 1–11-paribus integris vel in foliis inferioribus incisis, subtus et margine scabrido-setosiuscula; foliorum lobi terminales lineares vel oblongi, 2–27 mm lg., 0.3–5 mm lt., acuminati et subaculeati; folia sessilia, basi auriculata, auriculis integris vel dissectis; folia apicalia integra, lineari-oblonga, incurvata. Inflorescentia communis oblongo-paniculata, ramis 0.5–14 cm lg. parciuscule foliosis, calathidio unico terminatis; involucrium ovoideum vel late ovoideum, 12–15 mm lg., 7–12 mm lt., bicolor; phylla ovata usque ad linearia, 3–11 mm lg., 1.5–3.2 mm lt., 5–7-nervia, virescentia, glandulis sessilibus luteis minutis obsita; appendices late ovatae necnon (in phyllis internis) ellipticae, 1.5–2.5 mm lg., 1–4 mm lt.; appendices phyllorum exteriorum mediorumque parte media integra triangulari vel ovato-triangulari nigra, acumine 0.5–1.5 mm lg. molli margine regulariter fimbriato, fimbriis 5–10-paribus 0.3–2 mm lg. basi nigrescentibus superne rufescentibus apice capilliformibus tortuosis, interiorum ellipticae vel ovato-lanceolatae, denticulatae vel integerrimae; flores purpureo-rosei; corollae florum marginalium 20–21 mm lg., centralium 14–15 mm lg.; achenia oblonga, subobliqua, 2.7–3.2 mm lg., 1.2–1.5 mm lt., pilosiuscula, matura nigrescentia, flavido-striata; pappus 1–2.3 mm lg. Fl. VII–VIII.

Habitat in steppis praemontanis vel montanis caucasicis.

Typus. Kubania, steppae montanae ad ostium fl. Dzemagat, 1907. N. Busch.—Regio Kubanica, steppa montana ad ripam dextram fl. Allu-Kama, in declivibus inferioribus inter ostia, 1907, E. et N. Busch. In Herb. Inst. Bot. Acad. Sc. URSS (Leningrad) conservatur.

Affinitas. Ab occidentali *C. rhenana* Boreau species haec caucasica inflorescentia communi paniculata (haud corymbosa), fimbriis appendicum rufescentibus (non nigrescentibus) differenda est.

39. *C. sophiae* Klok. sp. nova (subgen. *Acrolophus* (Cass.) Dobroc.).

Caules ca. 50–60 cm alt., in costis obtusis leves, densiuscule arachnoidei, ramosissimi; folia caulina inferiora pinnatisecta, segmentis linearibus ca. 1–2 mm lt., margine scabrida; folia apicalia linearia, 4–15 mm lg., 0.5–1 mm lt. Calathidia apice ramorum 2.5–9 mm longorum solitaria; involucrium oblongo-ovoidum, 9–12 mm lg., 5–6 mm lt.; 616 phylla ovata usque ad linearia, 2–8 mm lg., 1.2–2.5 mm lt., 5-nervia, fulvida; appendices albido-fulvidae, in phyllis externis mediisque transversim ovals, 1.5–2 mm lg., 2.5–3.5 mm lt., margine crenulatae et apice tenuiter laceratae; internorum appendices oblongo-ovato-lanceolatae, ca. 1.5–2 mm lg., subintegerrimae; flores rosei; corollae florum marginalium ca. 15 mm lg., centralium ca. 13 mm lg.; achenia oblonga, 3.2–3.6 mm lg., 1.2–1.6 mm lt., matura atro-olivaceo-brunnea, pappo 2–3 mm lg. Fl. VII–VIII.

Habitat in arenosis tanaiticis.

Typus. Ditio Septentrionali-Caucasica, regio Salskiensis, 3–4 km SW versus a st. Tzymljanskaja, terrasa (tanaitica) prima, silva inundata, in pulvino ad Tanaim, 10 VIII 1927, S. Gorschkova. In Herb. Inst. Bot. Acad. Sc. URSS (Leningrad) conservatur.

Affinitas. Species haec a *C. majorovii* Dumb. involucro oblongiore (non ovato-conoideo), caule levissimo (nunquam superne in costis scabro), a *C. arenaria* MB. (incl. *C. wolgensis* DC.) involucro latiore, caulibus crassioribus et densius arachnoideis, ramis floriferis valde brevioribus, foliis margine scabris, nunquam levibus recedit.

40. *C. steveniana* Klok. sp. nova.—(sect. *Acrolophus* (Cass.) Dobroc.).—*C. caprina* auct. fl. taur. non Stev.

Caules usque ad 80 cm alt., basi subteretiusculi levesque, superne in costis scabrido-setosiusculi, foliiscum arachnoidei, subdivaricato-ramosi; folia radicalia necnon caulina inferiora petiolata, bipinnatisecta, subtus setulis aculeoliformibus 0.2–0.3 mm lg. dense obsita, lobulis terminalibus lineari-oblongis oblongo-lanceolatis vel obovatis usque ad 20 mm lg. et 3–4 mm lt.; folia media sessilia, pinnatisecta, segmentis lateralibus 1–3-paribus integris vel incisis. Calathidia apice ramulorum 3–12 cm longorum solitaria; involucrum oblongo-ovoidem, (9)10–12 mm lg., 5–6 lt.; phylla ovata usque ad linearia, appendicibuscum 3–9.5 mm lg. 1–2.5 mm lt., 3–5-nervia; appendices orbiculares neconon ellipticae, 1.2–2.7 mm lt., acumine 0.2–1.2 mm lg. molliusculo; phyllorum externorum mediorumque appendices margine fimbrellis regularibus 2–5-paribus albi dis ca. 0.5–2 mm lg. ornatae, sub eis paleaceo-auriculatae, auriculis latis denticulatis vel laceris; appendicum pars media solida, ovato-lanceolata, cinnamomea vel sordide purpurea; flores roseo-purpurei; corollae florum marginalium ca. 14 mm, centralium 11–12 mm lg.; achenia 2.5–3 mm lg., 1–1.4 mm lt., albida, pappo nullo vel vix evoluto ca. 0.5 mm lg. Fl. VI–VIII.

Habitat in sabulosis vel declivibus glareosis litoralibus ad Pontum Euxinum.

Typus. Ditio Taurica, Eupatoria, in arenis litoralibus ad Pontum Euxinum, 6 VII 1956, M. Kotov. In Herb. Inst. Bot. Acad. Sc. RSS Ucrainiae (Kioviae) conservatur.

Affinitas. *C. caprina* Stev. vera planta hybrida inter nostram et *C. diffusam* Lam. verosimiliter est. A *C. ovina* Pall. et aliis caucasicis proximis species nostra pappo achenii nullo vel subnullo (nunquam 1–1.5 mm lg.) recedit.

617 41. *C. koktebelica* Klok. sp. nova (sect. *Acrolophus* (Cass.) Dobroc.).

Caules nonnulli, erecti, 25–70 cm alt., basi subteretiusculi, supra costatosulcati, in costis scabri, flocculoso-arachnoidei, serius glabrati, a collo divaricato-ramosissimi; folia radicalia necnon caulina inferiora petiolata, pinnatisecta vel pinnatifida, arachnoidea vel arachnoideo-tomentella, subtus et margine setosiusculo-scabra; lobi terminales (segmenta) 2–15 mm lg., 1–4 mm lt., acuminati; folia media pinnatifida, lobis linearibus acutatis vel acuminatis; folia apicalia linearia, acuminata. Calathidia partim sessilia vel subsessilia, congesta, partim apice ramulorum usque ad 4.5 cm longorum solitaria; involucrium oblongo-ovoideum, ca. 9 mm lg., 3.5–4 mm lt.; phylla oblongo-ovata usque ad anguste linearia, 2.5–8.5 mm lg. (cum appendice), 0.8–1.7 mm lt., 1–5-saepeissime trinervia, virescentia, media internaque partim purpurea; appendices orbiculares, 1.5–2.5 mm lg., 1.5–3 mm lt., acumine 0.5–1.3 mm lg., in phyllis mediis margine fimbriis regularibus 4–6-paribus 1–1.5 mm lg. ornatae, basi auriculis paleaceis denticulatis obsoletis auctae; appendicis triangularis pars media integra, flavida, basi saepe macula obscura ornata, cinnamomeopurpurea; flores purpurei; corollae florum marginalium 12–13 mm, centralium 9–10 mm lg.; achenia 3.1–3.2 mm lg., ca. 1.5 mm lt., olivaceo-cinnamomea, pappo subnullo vix 0.1–0.2 mm lg. Fl. VIII–X.

Habitat in steppis tauricis cimmericis.

Typus. Tauria orientalis, regio Sudakiensis, prope pag. Planerskoje, in artemisieto, 6 X 1957, M. Klokov. In Herb. Inst. Bot. Acad. Sc. URSS (Leningrad) conservatur, syntypi — Kioviae.

Affinitas. A proxima *C. steveniana* Klok. calathidiis partim congestis et sessilibus (nunquam omnibus apice ramulorum solitariis), involucro brevior et angustior abhorret; a *C. ovina* Pall. et aliis caucasicis proximis pappo achenii subnullo differt.

42. *C. aemulans* Klok. sp. nova (subgen. *Acrolophus* (Cass.) Dobroc.).

Radix palaris robusta; caules solitarii, erecti, 30–60 cm alt., sulcato-costati, in costis setosiusculi, foliis cum densiuscule arachnoidei, a collo divaricato-ramosissimi; folia radicalia necnon caulina infima petiolata, pinnatisecta, segmentis pinnatifidis vel partim integris; lobi terminales oblongi, oblongo-lanceolati vel obovati, 3–15 mm lg., 1–4 mm lt., apiculati, subtus et margine setulis aculeoliformibus 0.2–0.3 mm lg. dense obsiti; folia media superioraque sessilia, pinnatifida, lobis oblongo-vel lineari-lanceolatis aculeato-acuminatis; folia apicalia in ramulis terminalibus oblongo-linearia vel linearia, 1.5–2 mm lg. et 0.3–0.4 mm lt. Calathidia plus minusve in ramulis secundariis congesta, subsessilia, rarius apice ramulorum usque ad 2 cm longorum solitaria; involucrium subcylindricum, 10–12 mm lg., 3–3.5 mm lt., stramineum,

parum arachnoideum; phylla oblonga usque ad angusto-linearia, 2.5–10 mm lg. (cum appendice), 0.5–1.5 mm lt., nervis obsoletis 1–3; appendices 2–6 mm lg., acumine pungente 0.7–4 mm lg. et fimbriis rigidis 0.3–1.7 mm lg. 3–7-paribus; acumina pungentia, divaricata et in phyllis exterioribus recurvata; flores purpurei, marcescentes pallidi, 618 corollis 10–12 mm lg.; achenia 2.3–2.8 mm lg., 0.9–1.1 mm lt. glabra, epapposa. Fl. VII–X.

Habitat in steppis tauricis cimmericis.

Typus. Tauria orientalis, regio Sudakiensis, prope pag. Planerskoje, in artemisieto, in declivibus, 10 X 1957, M. Klovov. In Herb. Inst. Bot. Acad. Sc. URSS (Leningrad) conservatur, syntypi—Kioviae.

Affinitas. A proxima *C. diffusa* Lam. calathidiis congestioribus saepius sessilibus, involucri longiore (non solum 8–10 mm longo), acuminibus appendicum longioribus robustioribus et magis recurvatis, floribus purpureis (nunquam pallide roseis vel albidis) primo aspectu differt.

43. Sectio **Pseudophalolepis** Klok. sect. nova (subgen. *Phalolepis* (Cass.) Dobrocz.)—Herbae biennes. Appendices involucri phyllorum fere omnino membranaceae vel paleaceae, basi tantum triangulari vel fascia mediana angusta solidiusculae. Pappus achenio subaequilongus, interdum paulum longior vel manifeste brevior. Corollae roseae, pallide purpureae, cremaceae vel interdum flavae.

Typus sectionis: *C. gerberi* Stev. Sectio paleopontica, relicta.

44. **C. vankovii** Klok. sp. nova (subgen. *Phalolepis* (Cass.) Dobrocz. sect. *Phalolepis*).—*C. nikitensis* Illar. in Bot. Mat. Gerb. Bot. Inst. Akad. Nauk SSSR, XVIII (1957) 305 p. p. quoad plantam jailicam.

Caules 2–10, assurgentes, ca. 30–35 cm alt., ramosi, densiuscule arachnoidei, superne in costis scabri; folia radicalia necnon caulina inferiora 4–10 cm lg., petiolata, pinnatisecta, segmentis integris vel partim 2–3-fidis, arachnoidea, subtus setosiuscula, margine scabrido-serrulata; lobi folii laterales saepissime lineari-lanceolati, 9–25 mm lg., 1–2.5 mm lt., acuminati; lobus (vel segmentum) apicalis eis submajor; folia superiora basi trifida, lobulis lateralibus abbreviatis, apicali magno usque ad 3 mm lt.; folia apicalia sub calathidio disposita integra, linearia, 5–15 mm lg., ca. 1 mm lt., supra sublevia, subtus scabra. Calathidia apice ramorum haud longorum solitaria; involucri ovoideum, 14–16 mm lg., 10–14 mm lt.; appendices orbiculares vel late ovatae, parte media solida ovato-triangulari atro-cinnamomea, marginali flavido-paleacea tenuiter denticulata vel subfimbriata; phyllorum mediorum appendices ca. 3–4 mm lg., apice plane

emarginatae, acumine 0.5–0.7 mm lg. molli, externorum longius acuminatae, internorum acumine nullo; flores laete purpurei; achenia oblonga, ca. 4–4.2 mm lg., pilosiuscula, matura nigrescentia, pappo 1.5–1.8 mm lg. Fl. VI–VII.

Habitat in declivibus montanis tauricis.

Typus. Tauria, Jajla (ajpetrica), in locis lapidosis, 17 VI 1907, K. Levandovskij. In Herb. Inst. Bot. Acad. Sc. URSS (Leningrad) conservatur.

Affinitas. A proxima *C. sterili* Stev. (incl. *C. nikitensi* Illar. p. max p.) praemontana species nostra jailicola caulibus humilioribus (nunquam usque ad 100 cm alt.), involucre calathidii late oroideo (non oblongo-ovoideo) et majore (non 10–14 mm lg. et 6–10 mm lt.), acheniis majoribus (non 2.5–3.5 mm lg.) et obscurioribus bene distincta. Praeterea *C. sterilis* Stev. saepissime biennis, nostra vero perennis est.

619 45. *C. novorossica* Klok. sp. nova (subgen. *Phalolepis* (Cass.) Dobrocz. sect. *Phalolepis*).—*C. sterilis* auct. fl. cauc. non Stev.

Herba biennis; caules 1–3, erecti vel ascendentes, 20–70 (et ultra) cm alt., ramosi, costati, foliiscum densiuscule flocculoso-arachnoidei, suprene in costis scabri; folia radicalia necnon caulina inferiora petiolata, bipinnatisecta, lobis terminalibus angustis, sub anthesi saepissime marcescentia; folia media ca. 2–6 cm lg., sessilia, subtus et margine (sicut omnia) scabrido-setosiuscula, supra parum scabrida; lobi eorum laterales anguste lineares vel lineari-lanceolati, 5–25 mm lg., 0.5–1.5 mm lt.; lobus apicalis usque ad 32 mm lg. et 2.5–3 mm lt.; folia superiora pinnatifida, minora, apicalia sub calathidiis integra vel interdum basi subdentata, linearia, 7–12 mm lg., 1.2–1.5 mm lt., acuminata. Calathidia apice ramorum solitaria, in caule (1–3) 7–18, floribuscum 17–20 mm lg.; involucre ovoideum, 12–15 mm lg., 8–12 mm lt., albidum, opacum, vix nitens; appendices in phyllis externis orbiculari-romboideae, acumine usque ad 1.5 mm lg. molli terminatae, margine sicut omnes tenuiter denticulatae, in phyllis mediis orbiculares, ca. 3.5–4 mm lg., ceteris paulum majores, margine lacerae, acumine nullo, basi in parte media macula cinnamomea triangulari notatae, in phyllis internis ovaes; flores laete purpurei; achenia oblongo-cuneata, ca. 4–4.5 mm lg., pilosiuscula, matura nigricantia, pappo 1.5–3.3 mm lg. Fl. VI–VII.

Habitat in declivibus lapidosis praemontanis occidentali-transcausicis.

Typus. Caucasus, prope opp. Novorossijsk, 6 VII 1892, V. Lipsky. In Herb. Inst. Bot. Acad. Sc. URSS (Leningrad) conservatur.

Affinitas. Species haec a *C. sterili* Stev. longiuscule distat, a magis affini *C. sarandinakiae* Illar. Tauriae orientalis incolae lobis foliorum

terminalibus angustioribus, involucri angustiore (non 10–16 mm lt.) albido (nunquam flavido), appendicibus basi maculatis (haud concoloribus) minoribus clare differt.

46. *C. georgica* Klok. sp. nova (subgen. *Phalolepis* (Cass.) Dobrocz. sect. *Phalolepis*).— *C. pseudodeusta* auct. fl. cauc. p. p. non Hayek.

Herba biennis; caules solitarii vel pauci, erecti, 40–70 cm alt., a medio divaricato-ramosi, foliiscum haud dense arachnoidei, inferne leves, superne in costis scabri; folia radicalia necnon caulina inferiora petiolata, bipinnatisecta, lobis terminalibus linearibus vel lineari-lanceolatis angustis, sub anthesi saepissime marcescentia; folia media 1.5–4 cm lg., sessilia, pinnatisecta, segmentis pinnatifidis, subtus et margine aculeolato-scabra, supra scabrida; segmenta vel lobuli terminales lineares usque ad lineari-lanceolatos, ad \pm 10 mm lg., 0.5–1.5 mm lt.; lobus apicalis ad 2–3 mm lt., folia apicalia integra, linearia, acuminata. Calathidia apice ramorum elongatorum primariorum vel breviusculorum secundariorum, in caule (3) 12–30, floribuscum 17–19 mm lg.; involucri ovoideum, ca. 12–13 mm lg. et 8–9 mm lt., flavido-cinnamomeum vel cinnamomescenti-flavum, nitens; appendices parte media solida, flavo-cinnamomea, marginali paleacea, flavida, tenuiter denticulata vel subfimbriata, in phyllis externis ambitu late ovatae, apice in emarginatura acumine ca. 1 mm lg. terminatae, in mediis orbiculares, apice rotundatae, acumine nullo; flores laete purpurei; achenia ca. 3–7 mm lg., brunnescenti-olivacea, pappo ca. 1.5 mm lg. Fl. VI–VII.

Habitat in declivibus lapidosis praemontanis Transcaucasiae occidentalis.

Typus. Transcaucasia, Borshom, 19 VI 1865, G. Radde. In Herb. Inst. Bot. Acad. Sc. URSS (Leningrad) conservatur.

Affinitas. A *C. novorossica* Klok. involucri obscuriore differt.

47. *C. latiloba* Klok. sp. nova (subgen. *Phalolepis* (Cass.) Dobrocz. sect. *Phalolepis*).

Caules solitarii vel pauci, erecti 20–70 cm alt., divaricato-ramosi, foliiscum arachnoidei, superne in costis aculeolato-scabri; folia radicalia necnon caulina inferiora petiolata, usque ad 8–12 cm lg., pinnatisecta, segmentis pinnatifidis ambitu ovatis, subtus setosiuscula; lobuli terminales oblongo-ovati vel obovati, 2–15 mm lg., 1.5–5 mm lt., folia media sessilia, 2–4 cm lg., pinnatisecta, segmentis lateralibus 1–3-paribus oblongis 3–20 mm lg. 1–4 mm lt. apicem versus paulum dilatatis, apicali majore, subtus sicut superiora brevisetosa, margine setosiusculo-serrulata; folia apicalia integra, oblonga, 8–25 mm lg., 2–

6 mm lt., obtusiuscule apiculata. Calathidia apice ramorum solitaria, in caule 7–40, floribuscum 16–21 mm lg.; involucreum late ovoideum vel subglobosum, 11–14 mm lg., 10–15 mm lt., flavidum vel cinnamomescenti-flavidum, nitens; appendices phyllorum parte media solida flava vel laete cinnamomea, marginali paleacea flavida vel flavido-albida subintegerrima, in phyllis externis late ovatae, apice plane emarginatae, acumine subnullo, in mediis orbiculares, ca. 5–6 mm lg., in phyllis internis ellipticae, minutae; flores laete purpurei; achenia ca. 2.5 mm lg., olivaceo-brunnea, pappo ca. 1 mm lg. Fl. VI–VII.

Habitat in declivibus necnon pratis montanis transcaucasicis.

Typus. Transcaucasia orientalis, distr. Kuba, Kusary, 30 VI 1900. S. Grigorjev. In Herb. Inst. Bot. Acad. Sc. URSS (Leningrad) conservatur.

Affinitas. A *C. transcaucasica* Sosn. segmentis lobulisque foliorum valde latioribus, involucreo calathidii haud complanato abhorret.

48. Sect. **Polyodiifoliae** Tzvel. sect. nova (subgen. *Microlophus* (Cass.) Hayek).—Plantae monocarpicae, vulgo biennes, pilis brevissimis papilliformibus et longioribus crispatis tectae; folia radicalia et caulina inferiora pinnatilobata, lobo terminali lobis lateralibus subaequali; folia apicalia vulgo prope basin calathidiorum posita; calathidia plus minusve corymbose congesta.

Typus sectionis: *C. polyodiifolia* Boiss.

49. **C. rhizanthoides** Tzvel. sp. nova (subgen. *Rhizocalathium* (Tzvel.) Tzvel.).

621 Planta acaulis vel subacaulis, viridis, plus minusve crispate pilosa; folia lyrata, longe petiolata, laminae vulgo solum prope basin paucilobatis (lobis 1–3 a quovis latere) saepe partim integerrimis. Calathidia vulgo solitaria, in centro rosularum foliorum posita; involucrea 12–20 mm lt.; appendices involucri phyllorum lanceolatae, retroflexae, marginibus ciliate, vulgo ciliis 1–5 a quovis latere praeditae; flores lucide flavis; achenia 4–5 mm lg., pappo 1–2 mm lg.

Habitat in pratis montanis et declivitatibus lapidosis Georgiae australis et Armeniae occidentalis.

Typus. Armenia, in declivitatibus lapidosis ad vallem lac. Sevan prope pag. Sevan, 13 VII 1957, n° 875, S. Czerepanov et N. Tzvelev. In Herb. Inst. Bot. Acad. Sc. URSS (Leningrad) conservatur.

Affinitas. Species *C. rhizanthae* C.A.M. proxima, sed floribus lucide flavis (non luteis) et foliis solum prope basin paucilobatis vel integerrimis differt.

ADDITAMENTUM

Addition

While the twenty-eighth volume was in press, the next volume of the *Flora URSS* [Flora of the Ukrainian SSR] was published, in which M.V. Klokov described the following new species of the genera *Carduus* L. and *Cirsium* Mill.

1. ***Carduus bicolorifolius*** Klok. in Fl. URSS, XI (1962) 566, 499, Fig. 99 (*C. personata* auct. fl. ucr. non Jacq.).

2. ***Carduus incanus*** Klok. ibid. 566, 502, Fig. 100. The author describes this species from Moldavia and puts it close to *C. crispus* L.

3. ***Carduus fortior*** Klok. ibid., 567, 504, Fig. 101 (*C. acanthoides* auct. fl. ucr. et ross. non L.).

4. ***Carduus tyraicus*** Klok. ibid. 568, 507, Fig. 102 (*C. hamulosus* auct. fl. ucr. non Ehrh.).

5. ***Carduus tauricus*** Klok. ibid. 569, 511, Fig. 103 (*C. hamulosus* auct. fl. taur. non Ehrh.).

6. ***Carduus attenatus*** Klok. ibid. 569, 517. According to the author, this species occupies a systematic position intermediate between *C. nutans* and *C. thoermeri* Weinm.

7. ***Cirsium lipskyi*** Klok. ibid. 570, 533 (*C. arachnoideum* auct. fl. taur.).

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