SUBGENUS *VETRIX*

Dum. 1862, Bull. Soc. Bot. Belg. **1**: 141.

T y p u s: *Salix caprea* L.

Shrubs or moderate-sized trees. *Caprea*-type of bud gradation in majority of species. Petioles eglandular. Catkins mostly precocious, bracts black. One nectary typical for all groups of species within this country. Stamens two, their filaments either connate or distinct. A very large and diverse group embracing more than $^{2}/_{3}$ of the species in the genus.

Sect. 12. *Hastatae*

Kerner, 1860, N.-Öst. Weid.: 241.

T y p u s: *Salix hastata* L.

Low or moderate-sized shrubs, occasionally small trees. Floriferous buds significantly different from vegetative ones; *caprea*-type (type 3) of bud size gradation. Stipules distinct, equilateral or subequilateral. Leaves broad, denticulate at margins, their reticulation fine, not pronounced. Catkins precocious to serotinous. Nectary solitary, small, short-rectangular. Capsules glabrous, acute, gradually attenuating into a distinct style; stigmas two-lobed, not large (0.3–0.6 mm).

This is a boreal and arctic-alpine holarctic group consisting of 12–15 species, mostly American. The section is very natural, distinctly delimited from other sections, at least as far as the Old World flora is concerned. The most obvious links are those with *Lanatae*, *Nigricantes*, and *Glabrella*; more distant ones with *Myrtosalix*.

Key to Species

1. Buds lanceolate, acute, mostly attenuating into beaks. Stipules broad, round or reniform, not acuminate. Petioles 5–20 mm long, slender. Ovaries much reflexed (positioned at right or even obtuse angle to rachises). Stipes 1–2 mm long, two-four times longer than nectaries . . . . . 47. **S. pyrolifolia**
— Buds ovoid, obtuse, not attenuating into beaks. Stipules ovate or lanceolate, acuminate, midribs pronounced, pointing to apices. Petioles up to 10 mm long. Ovaries less reflexed. Stipes 0.2–1.0 mm (occasionally to 1.5 mm), either shorter than nectaries or not more than twice as long 2
2. Leaves nearly concolorous, yellowish-green, rather lustrous, with stomata on their upper side . . . . . 46. **S. fedtschenkoi**
— Due to waxy bloom, leaves whitish or glaucous beneath (occasionally excluding inferior ones); upper leaf surface light green, dull, without stomata 3
3. Catkins precocious or subprecocious, stalks short, stout (in female ones 2–12 mm long and not less than 1 mm thick), mostly with 1–3 leaflets. Leaflets abortive, densely

glandular at margins. Bracts entirely black, 1.5–3.5 mm long, covered with dense, long trichomes. Stipes 0.2–0.5 mm, not exceeding nectaries 4

— Catkins serotinous or subserotinous, stalks in female ones 7–25 mm long and not more than 1 mm thick, with 2–4 leaflets. Usually, at least one or two leaflets are comparable
148 with leaves of vegetative shoots in their size; lowermost leaflets abortive, entire or sparsely denticulate. Bracts 1–2 mm long, rufescent or brownish, occasionally blackish-purple at apices. Stipes 0.6–1.5 mm long, mostly exceeding nectaries . . . . . 43. **S. hastata**

4. Stipules broadly (oblique-)ovate, mostly obtuse. Cataphylls glabrous beneath. Styles comparatively long (0.8–1.8 mm) . . . . . 45. **S. apoda**

— Stipules (oblique-)ovate or lanceolate, acuminate. Cataphylls beneath clothed with long trichomes, at least on their central part. Styles comparatively short (0.5–1.5 mm) . . . . . 44. **S. karelinii**

43. **S. hastata** L. 1753, Sp. pl.: 1017; Ledeb. 1850, Fl. Ross. **3**, 2: 612; Wimmer, 1866, Salic. Eur.: 83; Anderss. 1867, Monogr. Salic.: 170 (p.p.: excl. var. *himalayensis* et *viridula*); Krylov, 1930, Fl. Zap. Sib. **4**: 756; Floderus, 1931, Salic. Fennosc.: 211; Perfilyev, 1936, Fl. Sev. kr. **2–3**: 33; Nazarov, 1936, Fl. SSSR **5**: 116 (p.p. excl. pl. Caucasi et Asiae Med.); Buser, 1940, Ber. Schweiz. bot. Ges. **50**: 685; Shlyakov, 1956, Fl. Murm. **3**: 106; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 111; id. 1964, Fl. Eur. **1**: 52; Popov, 1959, Fl. Sredn. Sib. **2**: 802; Polyakov, 1960, Fl. Kazakhst. **3**: 28 (p.p.: quoad pl. altaicas tantum!). —*S. psiloides* Kom. 1929, Fl. Kamch. **2**: 18; Nazarov, 1936, op. cit. **5**: 117. —*S. hastata* ssp. *psiloides* Flod. 1926, Ark. bot. **20A**, 6: 54. —? *S. barclayi* (non Anderss.) Hultén, 1928, Fl. Kamtch. **2**: 8; Nazarov, 1936, op. cit. **5**: 121.

T y p u s: "In Lapponia, Helvetia. Fl. Lapp. N 354 et tab. 8 fig. G; Fl. Suec. N 797; Haller Helv. N 151".

HABIT: A shrub 0.2–1.5 m tall (very seldom, a tree to 3 m tall).

HABITATS: Open birch, spruce, and larch stands (in the understory); *yernik*'s; banks of streams, drainage spring fens, and meadows; depressions and small mountain valleys; moraines, rocks, taluses; sometimes, exposed sandy territories. Being generally indifferent to the quality of the bedrock, it appears to be associated with limestone at southern limits of its distributional area. The species cannot tolerate water stagnation. Its area includes the northern part of the forest belt, the forest-tundra, and southern tundra regions; the subalpine and partially alpine zones of mountains. It is also encountered in the forest zone (on rocks and in cold depressions).

DISTRIBUTION: The Pyrenees, Alps, French Massif Central, Apennines (reliable data only from Mount Rondinayo in Tuscany, Italy), the Vosges, Harz, Sudetes, Tatras, Eastern and Southern Carpathians (also some doubtful indications in the Ukrainian Carpathians), and Bosnia. Nearly all of Scandinavia (including northern Denmark), northern Finland, the Kola Peninsula, tundras and forest-tundras of northern European Russia (missing from the Yugorskiy Peninsula and all of the islands except Kolguyev). The northern forest belt (only solitary locations; one of special interest in the Svir Basin near St. Petersburg); the Polar, Prepolar, and partially Central Urals; forest-tundras and southern tundras of West Siberia. East of the Yenisei, on major territory of East Siberia including the Stanovoy Range, coast of the Sea of Okhotsk, and Lower Anadyr, it occurs only sparsely, in the areas of pronounced mountainous landscape (avoiding the warmest lowlands). It is scattered across

the Kamchatka Peninsula. It is a common species in the mountains of South Siberia, however, missing from the Khangai, Sokhondo, and Kentei.

In the Alps, it ascends to 2,500 m; its vertical range in the Tatras is from 1,200 to 2,100 m; in the Khibins, it goes up to 500–600 m; in the Sayans, to 2,100 m. (Fig. 34.)

The literature data on this species concerning the Caucasus and Middle Asia are to be attributed to the following two species.

44. **S. karelinii** Turcz. ex Stschegl. 1854, Bull. Soc. Natur. Moscou **27**: 196; Turcz. *149* ibid.: 393; Skvortsov, 1962, Bot. mat. Gerb. in-ta bot. AN UzbSSR **17**: 63. —*S. prunifolia* Kar. et Kir. 1842, Bull. Soc. Natur. Moscou **15**: 183; non Sm. 1804, Fl. Brit. **3**: 1054. —*S. hastata* auct. florae Asiae Mediae necnon Himalayae, non L.: Anderss. 1851, K. sv. vet. handl. **1850**: 479; id. 1860, J. Linn. Soc. **4**: 51; Hook. f. 1890, Fl. Brit. Ind. **5**: 630; Parker, 1924, Forest fl. Punjab.: 56; Hao, 1936, Syn. Chin. *Salix*: 83; Polyakov, 1960, Fl. Kazakhst. **3**: 28 (p. max. p., sed excl. pl. altaic. et syn. *S. fedtschenkoi*). —*S. hastata* var. *himalayensis* Anderss. 1867, Monogr. Salic.: 173; Schneider, 1916, in Sarg. Pl. Wilson. **3**, 1: 134. —*S. himalayensis* Flod. 1935, Geogr. ann. **17**: 306. —*S. adenophylloides* Flod. 1935, op. cit. **17**: 310. —*S. fedtschenkoi* (non Goerz) Protopopov, 1953, Fl. Kirgiz. **4**: 20.

T y p u s: "Alatau a. 1842 Karelin" (MW! LE! et alibi).

HABIT: A low, sparsely branched shrub (0.3–1.5 m).

HABITATS: Taluses, rocks, and moist slopes in the alpine and partially subalpine zones. Occasionally, it is found along streams.

DISTRIBUTION: The Tarbagatay, Dzungarskiy Alatau, Chinese Tien Shan, all of the Eastern and Central Tien Shan ranges within this country including the Ferganskiy Range. So far, it is not found in the Kirgizskiy Range, yet occurs in the western Talasskiy Alatau. The Pamir-Alay including the Petra Pervogo Range (Range of Peter I) in the west. Missing from the dry areas of the Pamirs, the species is again encountered in Nuristan, on Mount Chitral, and across the Himalayas from the Karakorum Range to central Nepal.

It is found at 2,800 m in the Talasskiy Alatau; in the Terskey, it ascends to 3,300 m; to 3,500 m in the Zaalayskiy Range; to 4,300–4,500 m, occasionally, to 4,900 m in the Karakorum and Nepal. (Fig. 34.)

45. **S. apoda** Trautv. 1866, Index Sem. Horti Petropol. a. 1865: 37; Medvedev, 1919, Der. i kustarn. Kavk.: 296; Nazarov, 1936, Fl. SSSR **5**: 117; Skvortsov, 1966, Trudy Bot. in-ta AN ArmSSR **15**: 121. —*S. hastata* var. *apoda* Laksch. ex Goerz, 1930, in Grossheim, Fl. Kavk. **2**: 6; Grossheim, 1945, Fl. Kavk. 2d ed. **3**: 22; Sosnovskiy, 1947, Fl. Gruz. **3**: 19. —*S. hastata* auct. fl. Caucas. non L.

T y p u s: "Caucasus, prope Pari, leg. Radde" (LE!).

HABIT: A low shrub. *150*

HABITATS: Subalpine birch stands, *Rhododendron* shrublands, rocks, taluses, alpine meadows, and wetlands at 1,800–2,000 m in the alpine and subalpine zones.

DISTRIBUTION: The western part of the Greater Caucasus from the Fisht-Oshten Massif to Daryal Gorge (common). East of that region, it is encountered only at two locations in Dagestan. In the Lesser Caucasus, it is found only near Bakuriani; in Turkey, only in Gü mü shane Province. (Fig. 34.)

46. **S. fedtschenkoi** Goerz, 1931, Salic. As. **1**: 21, 25; id. 1933, Feddes Repert. **32**: 121; Nazarov, 1936, Fl. SSSR **5**: 118; Skvortsov, 1962, Bot. mat. Gerb. In-ta bot. AN UzbSSR **17**: 64; Ikonnikov, 1963, Opred. rast. Pamira: 30.

T y p u s: "Schugnan. ad trajectum Schtam.—a. 1904 B. Fedtschenko" [Goerz, Sal. Asiat. (exs.) N 25] (LE!, TAK! et alibi).

HABITATS: Hollows, banks of streams, areas of alpine cryophilic vegetation at 3,000–3,900 m.

DISTRIBUTION: The Western Pamirs, Darvaz, the Range of Peter I, and Gilgit in northeastern Pakistan. Rare: so far, only about 25 samples are known in total. (Fig. 33.)

47. **S. pyrolifolia** Ledeb. 1833, Fl. Alt. **4**: 270; id. 1834, Icones **5**: 25 et tab. 476; id. 1850, Fl. Ross. **3**, 2: 613; Anderss. 1867, Monogr. Salic.: 169; Wolf, 1900, Izv. Lesn. in-ta **5**: 106; Krylov, 1930, Fl. Zap. Sib. **4**: 757; Perfilyev, 1936, Fl. Sev. kr. **2–3**: 31; Nazarov, 1936, Fl. SSSR **5**: 115; id. 1937, Fl. Zabayk. **3**: 202; Popov, 1959, Fl. Sredn. Sib. **2**: 801; Polyakov, 1960, Fl. Kazakhst. **3**: 28; Rech. f. 1964, Fl. Eur. **1**: 52. — *S. subpyroliformis* Chang et Skvortz. 1955, in Liou Tchen ngo, Ill. Fl. Tr. Shr. Northeast China: 554 et tab. 42.

T y p u s: "Altai: Bystrucha; Koksa; Buchtorma inter pagos Sennoj et Maloj Narymsk. —Ledebour" (LE! omnes).

HABIT: A tall shrub or, more often, small tree, typically, with a few stems, their branches interlacing. I have found specimens to 25 cm in stem diameter in the Northern Urals.

HABITATS: Damp woods, eutrophic drainage fens, banks of streams, and shrublands on moist slopes in the forest belt. The species avoids acidic substrates and stagnant water and is associated with limestone, particularly, at limits of its distributional area. It does not ascend high up in the mountains never approaching the timberline. It is known to grow at 1,300–1,400 m in Tuva (Koropachinskiy, Skvortsova 1966: 79).

DISTRIBUTION: Northern Finland (some solitary findings); the northeastern Kola Peninsula (encountered, but no evidence in herbaria); the northern forest belt of European Russia (starting from Trans-Onega Region and the Northern Dvina Basin); nearly all of the Urals (reaching 65–66° in the north and the forest-steppe zone in the south); the West Siberian Plain (only in the southern forest belt); the ranges Dzungarskiy and Tarbagatay; the Altai and all of East Siberia. The northern area border in East Siberia runs via Dudinka, the Upper Vilyuy and Molodo rivers, Verkhoyansk, Druzhina on the Indigirka, and Srednekolymsk. Easternmost limits comprise the middle reaches of the Kolyma, the Maya (tributary of the Aldan), and Zeya. The species is also found in the northwestern part of Northeast China and northernmost Mongolia. (Fig. 33.)

Sect. 13. *Glabrella*

A. Skv. sect. nova. Novosti sist. vyssh. rast. 1968 describetur.

T y p u s: *Salix glabra* Scop.

Shrubs with stout short branches. Floriferous buds look similar to vegetative ones (type 2 of bud size gradation). Cataphylls (and occasionally also inferior leaves) beneath clothed with long sericeous trichomes. Stipules none or small, inequilateral. Leaves elliptic or
151 obovate, flat, bright green, rather lustrous above, dull or glaucescent beneath, veins on lower surface of mature leaves somewhat prominent. Catkins large, stalked; stalks stout, not infrequently leafy. Bracts thin, scarious, pale or brownish. Nectary solitary. Capsules stipitate, acute, gradually attenuating into rather long styles.

Key to Species

1. Bracts large (2.5–3.5 mm long, 1.5–2.0 mm broad), densely pubescent, their apices broad, rounded, or truncate, or irregularly dentate. Anthers 0.9–1.2 mm long. Styles more or less cleft (often down to their middle or even more). Stigmas 0.6–1.0 mm long, cleft into slender, linear, twisted parts. Mature capsules ovoid, 5–6 mm long . . . . . 48. **S. crataegifolia**
— Bracts not as above (either small, or glabrate, or their apices different). Anthers 0.8–0.9 mm long. Stigmas 0.4–0.6 mm long, their parts not twisted. Mature capsules lanceolate, (6–)7–8 mm long 2
2. Tall shrub. Buds flat on adaxial side, their carinas distinct, beaks flat. Leaves on vigorous shoots usually stipulate; stipules 3–5 mm long. Leaves 50–100 mm long. Bracts mostly acutish. Anthers 0.7–0.9 mm long . . . . . 51. **S. jenisseensis**
— Low shrubs. Buds without distinct carinas and flat beaks. Stipules none or inconspicuous. Leaves 20–60 mm long. Bracts obtuse, truncate, or more or less emarginate. Anthers 0.5–0.7(–0.8) mm long 3
3. All leaves rather regularly denticulate at margin. Bracts mostly pale (at least during flowering period), not less than 1 mm broad. Capsules glabrous. Style length + stigma length less than 1.2 mm . . . . . 49. **S. glabra**
— Leaves mostly entire, or partially entire, or obscurely and irregularly dentate; if dentation pronounced, then leaves spiny-toothed, their denticles pointing toward apex. Bracts not more than 1 mm broad, mostly dark brown or blackish at apices. Capsules often rather pubescent. Style length + stigma length not less than 1.1–1.2 mm . . . . . 50. **S. reinii**

48. **S. crataegifolia** Bertoloni, 1814, Desv. J. Bot. **2**: 76; id. 1854, Fl. Ital. **10**: 312; Caruel, 1860, Prodr. Tosc.: 581; Parlatore, 1867, Fl. Ital. **4**: 244; Camus, 1905, Saul. Eur. **2**: 74; Negri, 1906, Sched. ad Fl. Ital. exs.: N 426; Pellegrini, 1942, Fl. Apuan.: 267; Floderus, 1944, Sv. bot. tidskr. **38**: 64; Rech. f. 1964, Fl. Eur. **1**: 49. —*S. glabra* var. *crataegifolia* Anderss. 1867, Monogr. Salic.: 175 (p. p.). —*S. phylicifolia* var. *crataegifolia* Fiori, 1923, Nuova fl. anal. Ital. **1**, 3: 344.

T y p u s: "In suprema Tambura Alpium Apuanarum" (FI, vidi specim. a ipso Bertolonio lectum—an holotypus?).

HABIT: A low (to 1 m) shrub with stout, ascending branches.

HABITATS AND DISTRIBUTION: Calcareous rocks of the Apuan Alps (Apennines System, Tuscany Province) at 300–1,600 m. (Fig. 35.)

NOTE. This is a local endemic species remarkable for its restricted distribution. Still more striking is its extremely close affinity to *S. ernestii* Schneid., a species distributed in Southwest China. Treating *S. crataegifolia* as a variety of *S. glabra* or any other European species is by all means very inappropriate. On the contrary, it might make sense to withdraw *S. crataegifolia* from the section *Glabrella* and unite it with *S. ernestii*, *S. sikkimensis* Anderss., and probably with *S. daltoniana* Anderss. The only reason for me to refrain from doing it here is that sections of Chinese-Himalayan willow species have not yet been clearly delimited.

49. **S. glabra** Scop. 1772, Fl. Carn. **2**: 255; Wimmer, 1866, Salic. Eur.: 81; Anderss. 1861, Monogr. Salic.: 173; Parlatore, 1867, Fl. Ital. **4**: 253; Camus, 1905, Saul. Eur. **2**: 71; Beck, 1906, Fl. Bosn. Herc. **2**, 1: 98; Seemen, 1909, in Aschers. et Graebn. Synopsis **4**: 158; Toepffer, 1914, in Vollman, Fl. Bayern: 192; Thommen et Rechinger, 1948, Ber. Schweiz. bot. Ges. **58**: 69; Janchen, 1956, Catal. fl. Austr. **1**: 103; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 112; id. 1964, Fl. Eur. **1**: 49.

T y p u s: "In montanis elatioribus Carnioliae" (n. v.).

HABIT: A medium-sized (to 1.5–2.0 m) shrub.

HABITATS: Rocks, taluses, banks of streams, and moist meadows on slopes, mostly in the subalpine and upper forest zones (1,400–1,800 m). However, it may also descend to 500 m, as well as ascend up to 2,200 m.

DISTRIBUTION: Limestones and dolomites of the Eastern Alps (including southern Bavaria, Tirol, and Canton Ticino); the mountains of the territory of former Yugoslavia including Herzegovina (scattered). The species was also listed for the flora of the High Tatras (Dostá l 1950: 895), which appears to be a mistake, as it is not mentioned in Pawłowski's "Flora of the Tatras". Data on occurrence in the western Alps are as well rather doubtful. There is a sample labeled "In Monte Cenisio lecta ded. Hooker", LE, however, most likely, the label was mishandled. (Fig. 35.)

50. **S. reinii** Fr. et Sav. ex Seemen, 1903, Salic. Jap.: 41; Fr. et Sav. 1875, Enum. pl. Jap. **1**: 459 (nom. nud.); Koidzumi, 1913, Bot. Mag. Tokyo **17**: 91; Schneider, 1916, in Sarg. Pl. Wilson. **3**, 1: 127; Kimura, 1931, Sci. Rep. Tohoku Univ. 4 ser. **6**, 2: 189; id. 1934, in Miyabe, Kudo, Fl. Hokkaido **4**: 402; id. 1940, Symb. Iteol. **8**: 412; Ohwi, 1965, Fl. Jap.: 366. —*S. kakista* Schneid. in Sarg. Pl. Wilson. **3**, 1: 128. —*S. tontomussirensis* Koidz. 1916, Bot. Mag. Tokyo **30**: 81; Tatewaki, Kimoto, 1933, Acta Phytotax. Geobot. *153* **2**: 227, 228; Kimura, 1934, op. cit. **4**: 449; Tolmachev, 1956, Der. i kustarn. Sakhal.: 70. —*S. hidewoi* Koidz. 1919, Bot. Mag. Tokyo **33**: 220; Kimura, 1934, op. cit. **4**: 403; Ohwi, 1965, op. cit.: 366. —*S. shikotanica* Kimura 1934, op. cit. **4**: 447.

T y p u s: "Insula Nippon media, in Monte Haksan —leg. Rein (Hb. Savatier N 2923, 2924)" (P; fragmenta LE!).

HABIT: A low (25–150 cm), occasionally prostrate shrub.

HABITATS: Rocks, taluses, scarps; moist slopes (amidst shrub alder, tall herbs, or bamboo thickets); secondary coppices and meadows at forest clearings; sometimes, maritime sand (together with *Rosa rugosa*).

DISTRIBUTION: The Kuril Islands (Shikotan, Kunashir, Iturup, Urup, and Shimushir, from the sea level to subalpine zone, common); Moneron, Hokkaido, and the alpine zone of Hondo. On the continent, it is known to occur in three localities: the southern Sikhote-Alin (Mount Sestra), the barren heights of the Tachin-Tchan Range (1,600–1,700 m), and Zarechye, a settlement in Khasanskiy District, where it descends nearly to the sea level. (Fig. 35.)

51. **S. jenisseensis** (Fr. Schmidt) Flod. 1936, Sv. bot. tidskr. **30**: 390 et fig. 3; Popov, 1957, Spisok rast. Gerb. Fl. SSSR **81**: N 4012; id. 1959, Fl. Sredn. Sib. **2**: 804; Skvortsov, 1959, Bot. mat. Gerb. Bot. in-ta AN SSSR **19**: 83. —*S. nigricans* var. *jenisseensis* Fr. Schmidt, 1872, Fl. Jeniss.: 117; Lundström, 1888, K. sv. vet. handl. **22**, 10: 201; Nazarov, 1936, Fl. SSSR **5**: 86. —*S. hastata* var. *viridula* Anderss. 1867, Monogr. Salic.: 173; id. 1868, in DC. Prodr. **16**, 2: 258. —*S. viridula* (Anderss.) Nasarov, 1936, op. cit. **5**: 119; id. 1937, Fl. Zabayk. **3**: 204. —Non *S. viridula* Anderss. 1858, Mem. Amer. Acad. **6**:

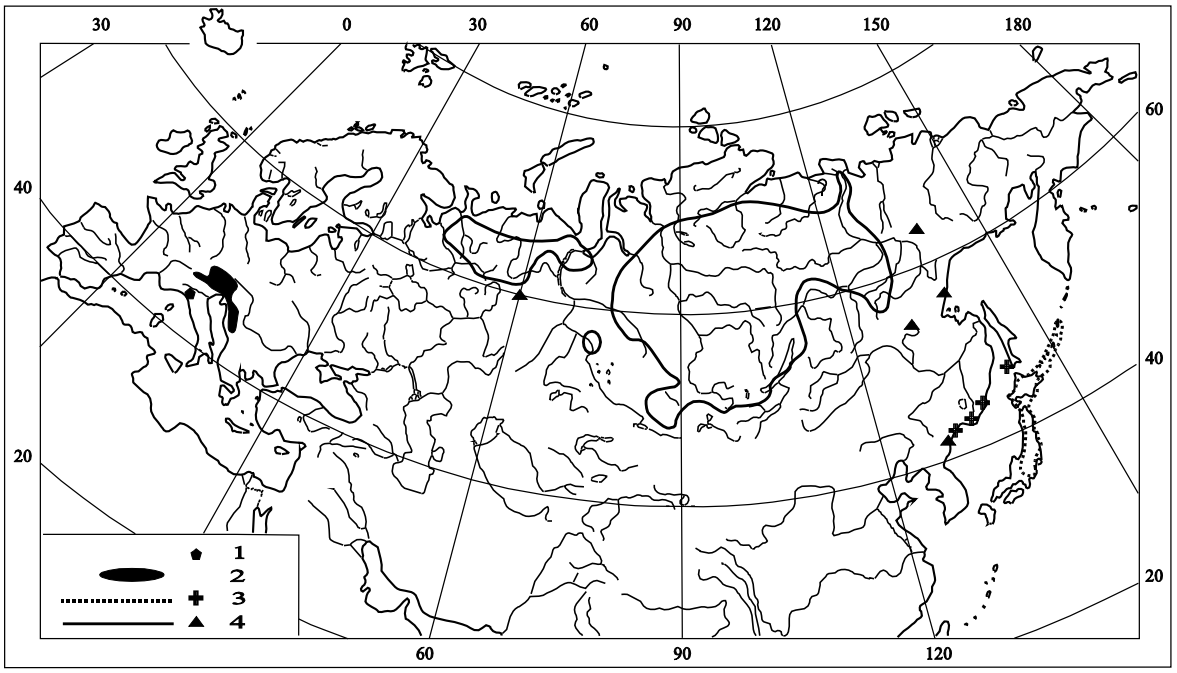

Fig. 35. Distributional areas of *Salix crataegifolia* Bertoloni (*1*), *S. glabra* Scop. (*2*), *S. reinii* Fr. et Sav. ex Seemen (*3*), and *S. jenisseensis* (Fr. Schmidt) Flod. (*4*)

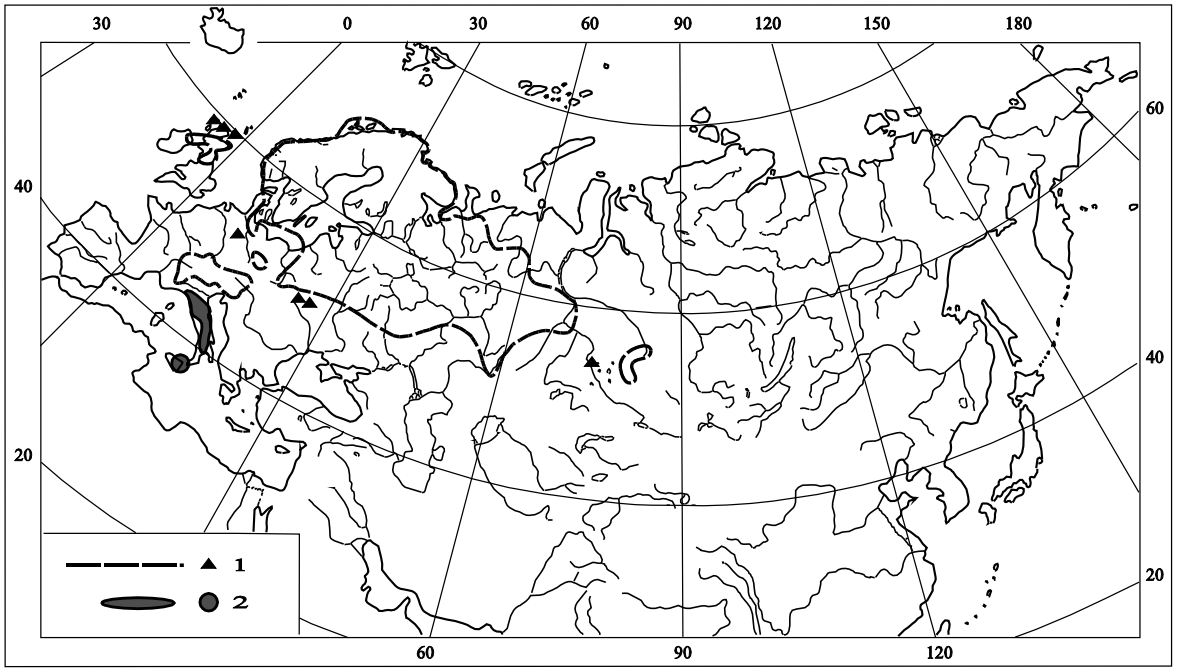

Fig. 36. Distributional areas of *Salix myrsinifolia* Salisb. (*1*) and *S. apennina* A. Skv. (*2*)

451. —*S. borealis* Nasarov, 1936, op. cit. **5**: 87 (p. max. p.). —*S. rectispica* Nakai ex Flod. 1939, Ark. bot. **29A**, 18: 26 et tab. 2.

T y p u s: "An Abhängen bei Dudino und Norilgebirge. —Fr. Schmidt" (LE!).

HABIT: A tall shrub or small tree (to 4–5 m tall).

HABITATS: Open woods, stony slopes and stone-fields, depressions, banks of streams (often together with *Alnus fruticosa*). Within its distributional area, it occurs extremely inconsistently being rather common in many parts and, at the same time, completely absent from large territories. That may be attributed to availability of appropriate substrates (the species is calciphilic).

DISTRIBUTION: The northeast of European Russia from the Northern Dvina and Vychegda rivers to the forest-tundra belt; the Urals (from 60° N at Mount Kumba to the Shchuchya Basin); the lower reaches of the Ob. East of a rather large gap, the species again occurs across the forest belt of Siberia starting from the Taz and Tara basins and the Altai, reaching the Lower Lena, Verkhoyanskiy Range, and Upper Aldan. There are solitary findings around Ayan, at the Upper Zeya, and in the mountains of the northern Korea Peninsula. The species is missing from most of Transbaykalia as well as Mongolia (except some few locations in its northern part).

In the Altai and Sayan Mountains, it occurs mostly in the subalpine zone, at 1,600–2,000 m (to 2,200 m in Tuva); on the Aldan High Plateau, it reaches 1,000 m. (Fig. 35.)

Sect. 14. *Nigricantes*

Kerner, 1860, N.-Öst. Weid.: 235.

T y p u s: *Salix myrsinifolia* Salisb.

Small or medium-sized shrubs. Floriferous buds greatly different from vegetative ones, ovoid, obtuse; *caprea*-type of bud size gradation. Stipules mostly fully developed, distinctly inequilateral. Leaves firm, bright green above, lustrous when alive, easily blackening when dried, their veins conspicuously prominent beneath. Nectary solitary, short, rectangular or square. Capsules stipitate, acute, attenuating into a pronounced style.
154 Capsule stipes not elongating after flowering. Stigmas two-lobed or two-parted, comparatively small (0.2–0.6 mm), considerably shorter than styles.

This is a small-sized group of some three or four species. Along with those mentioned below, one more might belong here. That is an Iranian willow *S. zygostemon* Boiss., a mysterious species which is still totally obscure.

As to its morphology, the section *Nigricantes* occupies an intermediate position between *Glabrella*, *Hastatae*, *Vetrix*, and *Arbuscella*.

Key to Species

1. All leaves of same color beneath: either dull, whitish or green, lustrous 2
— Inferior leaves green, superior ones glaucous beneath . . . . . 52. **S. myrsinifolia**
2. Leaves green beneath . . . . . 54. **S. mielichhoferii**
— Leaves glaucous beneath . . . . . 53. **S. apennina**

52. **S. myrsinifolia** Salisb. 1796, Prodr. stirp. Allert.: 394 (nom. nov. pro *S. myrsinites* Hoffm. non L.); Schneider, 1916, Öst. bot. Z. **66**: 115; Grappengiesser, 1955, Bot. not. **108**: 327; Korchagin, 1957, Fl. Leningr. obl. **2**: 16; Rasinš, 1959, Ivy Latv.: 101; Skvortsov, 1966, Spisok rast. Gerb. fl. SSSR **91**: N 4530; Krall, Viljasoo, 1965, Eestis kasv. pajud: 48. —*S. myrsinites* Hoffm. 1787, Hist. Salic. **1**, 4: 71 et tab. 17–19; Wulfen, 1788, in Jacquin, Collect. bot. **2**: 136. —Non *S. myrsinites* L. 1753. —*S. nigricans* Sm. 1802, Trans. Linn. Soc. **6**: 120; Koch, 1820, Flora **3**: 283; Ledeb. 1850, Fl. Ross. **3**, 2: 608 (excl. pl. Sibir. orient.); Wimmer, 1866, Salic. Eur.: 70; Anderss. 1867, Monogr. Salic.: 125; Seemen, 1909, in Aschers. et Graebn. Synopsis **4**: 131; Enander, 1910, Salic. Scand. Exs. **3**: N 101–104; Krylov, 1930, Fl. Zap. Sib. **4**: 348 (excl. pl. altaic.!); Wolf, 1930, Fl. Yu.-V. **4**: 47; Floderus, 1931, Salic. Fennosc.: 48; Nazarov, 1936, Fl. SSSR **5**: 85 (excl. var. *jenisseensis*); Buser, 1940, Ber. Schweiz. bot. Ges. **50**: 693; Nazarov et al. 1952, Fl. URSR **4**: 35; Shlyakov, 1956, Fl. Murm. **3**: 84; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 87; id. 1964, Fl. Eur. **1**: 49. —*S. borealis* (Fries) Nasarov, 1936, op. cit. **5**: 87 (p. p. minore!); Floderus, 1936, Sv. bot. tidskr. **30**: 393; Shlyakov, 1956, op. cit. **3**: 86; Rech. f. 1964, op. cit. **3**: 48. —*S. kolaë nsis* Schljakov, 1956, op. cit. **3**: 90, 364. —*S. phylicifolia* L. 1753, Sp. pl.: 1016 (p. p. quoad var. ß).

T y p u s: "Carinthia, Klagenfurth, am Fuß e des Schmalzbergels —F. X. Wulfen" (B?, n. v.).

G. Hoffmann described the plants he had received from F. Wulfen. The original plants are lost now, none of them found in Hoffmann's Herbarium in Moscow. However, there are many duplicates of F. Wulfen's collections in Willdenow's Herbarium in Berlin-Dahlem.

Ssp. **borealis** (Flod.) A. Skv. comb. nova. —*S. nigricans* ssp. *borealis* Flod. 1931, Salic. Fennosc.: 49; Hylander, 1945, Uppsala Univ. Arsskr. **1**, 7: 121. —*S. nigricans* var. *borealis* Fr. 1840, Bot. not.: 193. —*S. kolaë nsis* Schljakov, 1956, Fl. Murm. **3**: 90, 364.

T y p u s: "In regionibus subsylvaticis et subalpinis Scandinaviae" (Fries Herb. Norm. fasc. 7, N 63, S, LE! et alibi).

The subspecies *borealis* is characterized on the average by larger leaves, their lower surface mostly green, pubescence more pronounced and often considerably sericeous.

HABITATS: Lighted, not too dry forests, edges of eutrophic and mesotrophic wetlands, as well as a whole range of secondary postforest habitats, such as clearings, coppices, openings, and forest edges. The species is quite common on residential lots and at roadsides. Being able to cope with almost any substrate acidity, it avoids only the most *155* acidic and poorest grounds. Well-moisturized, but not overwatered soils are those preferred by this willow.

DISTRIBUTION: The northern British Isles and all of Scandinavia; Denmark and northwestern Germany (scattered); the Alps, Sudetes, and eastern Poland. The southern boundary goes along the border between Ukraine and Belarus (there are some solitary locations in northwestern Ukraine), then along the line connecting the cities Chernigov, Kursk, Tambov, and Ulyanovsk. Detouring the Bugulma Upland, the area boundary then descends along the Urals to Orsk; east of the Urals, it again steeply ascends northward, reaching Tobolsk and Khanty-Mansiysk; east of that area, there are some solitary findings, but not farther than the Ob. The northern boundary runs from Khanty-Mansiysk to the Konda River Basin, then via the northern meander of the Pechora and the southern Kanin Peninsula. On the Kola Peninsula, the species is encountered nearly everywhere. All data concerning the Altai, East Siberia, etc. are erroneous.

In the Alps, the willow ascends as high as 2,400 m; in Scotland, to 750 m; in northern Norway (around Tromsö), to 900 m; in the Khibins, to 400 m; in the Prepolar Urals, to 500–600 m; in the Southern Urals, to 800 m.

The ssp. *borealis* is distributed only in Fennoscandia; within the Russian territory, it occurs on the Kola Peninsula. (Fig. 36.)

NOTE. *S. myrsinifolia* is probably the most variable, manifold species of all the European willows. One can count scores of its synonyms, which were used by J. Smith, C. Willdenow, J. Forbes, and others for numerous repeated descriptions of this willow (not even to mention a hundred names by J. Schleicher and half a hundred by M. Gandoger). Not infrequently, *S. myrsinifolia* hybridizes with other willows, however, the majority of plants that have been treated as hybrids in the literature and herbaria, are by no means hybrids. Instead, they are normal variants within the species variability range. This is particularly true for those with pronounced pubescence. Even the most dense pubescence of the shoots, leaves, and capsules cannot be considered as a characteristic foreign to the species (see chapter 3, section 5).

Ssp. *borealis* is not very well delimited morphologically or geographically, and therefore it makes absolutely no sense to assign a species rank to this taxon.

Ssp. *alpicola* Buser ex Jaccard, 1895, Catal. valais.: 328 appears to be just an ecological form of the alpine zone and hardly deserves a special taxonomical treatment (cf. Handel-Mazzetti 1957).

53. **S. apennina** A. Skv. 1965, Novosti sist. vyssh. rast. **1965**: 90. —? *S. nigricans* var. *apennina* Borzi, 1885, Compend. fl. forest. ital.: 142. —*S. nigricans* (non Smith) auct. fl. ital. p. p. (quoad pl. apennin.); Bertoloni, 1854, Fl. Ital. **10**: 312; Parlatore, 1867, Fl. Ital. **4**: 250; Fiori, 1923, Nuova fl. analit. Ital. **1**, 3: 344 (pro var.) et al.

T y p u s: "Prov. Toscania, Apenninus Pistoriensis, ad. lacum Greppo, 9.VII 1888 leg. E. Levier" (FI).

HABIT: A low or medium-sized shrub.

HABITATS AND DISTRIBUTION: Damp and paludal places; on siliceous as well as calcareous substrates from 300 m to alpine elevations across the Apennines and on northeastern Sicily (the Etna Massif). (Fig. 36.)

54. **S. mielichhoferii** Sauter, 1849, Flora **32**: 662; Kerner, 1867, Öst. bot. Z. **17**: 85; Rech. f. 1947, Sitzungber. Österr. Akad. Math.-naturwiss. Kl. Abt. 1, **156**: 502; id. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 88; id. 1964, Fl. Eur. **1**: 49; Janchen, 1956, Catal. fl. Austr. **1**: 104. —*S. glabra* var. *mielichhoferii* Anderss. 1867, Monogr. Salic.: 175. —*S. nigricans* × *hastata* Seemen, 1909, in Aschers. et Graebn. Synopsis **4**: 235.

T y p u s: "Reitalpgraben auf dem Dungmahd der Schattbachalpe in der Tofern des Grossarltales, 5000' —Mielichhofer" (Wien Univ. Hb. Kerner, n. v.).

157 HABIT: A medium-sized (to 3 m) shrub.

HABITATS: Damp peaty meadows and banks of streams at 1,500–2,200 m mostly on acidic and siliceous substrates, but occasionally also on limestone, dolomite, slate, etc.

DISTRIBUTION: The Austrian Alps (Styria, Carinthia, Salzburg, Tirol); Italian Alps (Southern Tirol). (Fig. 37.)

NOTE. It may cause a problem to discriminate between this species, *S. myrsinifolia*, and *S. glabra*, if samples are incomplete or poorly dried. Since *S. mielichhoferii* occurs rather sparsely, it appears to be inadequately studied, as far as its morphological and geographical range is concerned. See also the note to *S. phylicifolia*.

Sect. 15. *Vetrix*

Dum. 1825, Bijdr. Natuurk. Wetensch. **1**, 1: 55 (p. p.).
T y p u s: *Salix caprea* L.

Small or medium-sized trees or rather large shrubs. Wood under shoot bark often with longitudinal striae (excrescences). Floriferous and vegetative buds usually extremely different; *caprea*-type of bud size gradation; bud apices mostly abaxially recurved. Stipules mostly distinctly inequilateral. Petioles convex above. Leaves broad, entire, or coarsely and irregularly dentate, their veins usually conspicuously prominent beneath. Catkins precocious or subprecocious. Nectary solitary, short. Ovaries stipitate; stipes may elongate when capsules ripen. Styles mostly short (seldom more than 0.5–0.6 mm long); stigmas nearly as long as styles.

This is a large section (at least 30 species) which is widely distributed across forested areas of the temperate climate belt both in the Old and New World and missing from the arid and subtropical belts. It consists of six subsections, four of which are represented in this country (two more are Chinese-Japanese). The relation with the sections *Nigricantes* and *Hastatae* via the subsection *Vulpinae* is quite obvious.

Key to Species

1. Floriferous buds large (7–12 mm long), strongly flattened, their broad, flat apices markedly recurved off shoots. Stipules abortive, even on vigorous shoots, lanceolate, deformed, much shorter than petioles. Catkin stalks often foliated; leaves fully developed. Bracts pale or rufescent-brown, but not black, 1.5–3 mm long. Ovaries clothed with dense white pubescence 2
— Buds mostly different in shape from above. Stipules on vigorous shoots well developed, broad, distinctly inequilateral, semicordate. Bracts black, at least at apices; if pale, then 0.8–1.5 mm long 3
2. Bracts pale or rufescent. Anthers 0.7–0.8 mm long. Styles not shorter than stigmas . . . . . 55. **S. kuznetzowii**
— Bracts brownish. Anthers 0.8–1.0 mm long. Styles usually significantly shorter than stigmas . . . . . 56. **S. laggerii**
3. Catkins typically subprecocious, rather loosely flowered, their rachises exposed when ripen, at least in female ones. Bracts brownish or black at apices, 1–2 (seldom to 2.5) mm long. Capsule stipes mostly considerably elongating when ripening. Anthers 0.4–0.8 mm long. Stigmas 0.2–0.4 mm long 4 *158*
— Catkins precocious, densely flowered (rachises never exposed). Bracts black, densely pubescent, 2–3 mm long. Capsule stipes elongating inconspicuously when ripening. Ovaries always pubescent. Anthers 0.7–1.1 mm long. Stigmas 0.5–0.8 mm long 18
4. Leaves narrowly oblanceolate, all uniformly covered beneath with dense white tomentum consisting of extremely thin, tangled trichomes . . . . . 68. **S. salvifolia**
— Pubescence on mature leaves looking different or leaves glabrous beneath, either partially or entirely 5
5. Cataphylls more or less dentate at margins. Bracts usually more pubescent on their inside than outside. Ovaries lanceolate, acute (gradually attenuating into styles), usually glabrous, seldom covered with tangled, crispy, white trichomes 6

— Cataphylls mostly entire at margins. Bracts equally pubescent on their inside and outside surfaces. Ovaries covered with grayish, sericeous, not tangled trichomes . 9

6. Stipules obtuse at apices. Bracts less than 1 mm long, densely covered with short, straight, often reddening trichomes that stick out above bract margins as far as 0.3–0.8 mm. Stamen filaments to 3 mm long, anthers 0.4–0.5 mm long. Capsule stipes mostly up to 1 mm long . . . . . 61. **S. vulpina**

— Stipules acute at apices. Bracts sparsely covered with long, soft, white trichomes. Stamen filaments 4–6 mm long, anthers 0.5–0.7 mm long. Capsule stipes mostly longer than 1 mm 7

7. Leaf shape insignificantly changing along shoots. Young leaves in spring mostly of bright reddish color, not blackening on drying. Catkin rachises puberulous or glabrate. Anthers bright rust-colored before dehiscence, dark when dried . . . 57. **S. silesiaca**

— Leaf shape changing significantly along shoots: from obovate in inferior leaves to narrowly lanceolate in superior ones. Young leaves green in spring, easily blackening on drying. Rachises in female catkins densely pubescent. Before dehiscence, anthers yellow or partially purple, but not red 8

8. Low shrub. Leaves thin, glabrous beneath or pubescent along midrib. Capsule stipes 0.7–1.4 mm long . . . . . 58. **S. caucasica**

— Tall shrub or tree. Leaves firm, at least some densely pubescent beneath, particularly in central part of leaf blade. Capsule stipes 2–5 mm long . . . . . 60. **S. pedicellata**

9(5). Floriferous buds ovoid, without beaks. Leaf blades mostly broadest above their middle; leaf shape usually changing significantly along shoots. Mature leaves mostly
159 with prominent reticulation beneath. Pubescence beneath more pronounced in central part of leaf blade, consisting mostly of highly flexuous, randomly oriented trichomes 10

— Floriferous buds lanceolate or oblong-lanceolate, their beaks either acute or obtusish, flattened. Leaves mostly broadly elliptic or elliptic, broadest about their middle, 1–2.5 times as long as broad; much more seldom, leaves obovate. Leaf shape constant along shoots. Leaf blades flat above, with inconspicuous reticulation beneath, either glabrous or uniformly covered with non-crispy, almost straight or slightly flexuous trichomes 13

10. Wood under bark without striae or with sparse, inconspicuous striation. Difference between floriferous and vegetative buds not obvious. Cataphylls and inferior leaves beneath covered with appressed, thin, sericeous trichomes. Capsule pubescence short, dense, tightly appressed, so that capsules look completely silvery . . . . . 59. **S. appendiculata**

— Wood under bark with pronounced striation. Floriferous buds look strikingly different from vegetative ones. Pubescence on inferior leaves and capsules generally not sericeous or silvery 11

11. Low or medium-sized shrub. Shoots slender (1–1.5 mm), frequently reddish. Petioles slender, short, mostly not longer than stipules. Leaves obovate or (occasionally) oblanceolate, always broadest much above middle of blades, mostly coarsely wavy-dentate at margins, their upper surface distinctly reticulate-rugose . . . 67. **S. aurita**

— Tall shrubs or trees. Shoots 1.5–2.3 mm thick. Petioles stoutish (about 1 mm), typically much longer than stipules. Leaves oblanceolate or more or less elliptic, their upper surface usually flat, not rugose 12

12. Leaves mostly oblanceolate. Young leaves often with rufescent pubescence. Bracts comparatively large, mostly black at apices. Capsules more or less lageniform: their

bases widened and upper parts narrowly oblong. Stigmas 0.3–0.5 mm long, usually longer than styles, pigmented . . . . . 65. **S. atrocinerea**

— Leaves mostly elliptic (except inferior ones). Young leaves with white pubescence. Bracts comparatively small, mostly reddish-brown, not black at apices. Capsules lanceolate, gradually attenuating into styles. Stigmas 0.15–0.3 mm long, mostly shorter than styles, usually pale . . . . . 60. **S. pedicellata**

13. Leaves small (7–30 mm long), broadly elliptic or round, often cordate at base . . . . . 69. **S. tarraconensis**

— Leaves larger and more elongated 14

14. Bracts pale or diffusely reddish-brown, mostly not more than 0.5–0.6 mm broad 15

— Bracts black or at least conspicuously blackish at apices, mostly not less than 0.6 mm broad 17 *160*

15. Catkins extremely loose by the time capsules ripen; capsule stipes 2.5–5 mm long; capsules extremely narrow, nearly aciculiform 16

— Catkins only moderately loose by the time fruits ripen. Capsule stipes 1.5–2.5 mm long, capsules narrowly lanceolate . . . . . 75. **S. pseudodepressa**

16. Mature shoots and leaves glabrous. Shoots mostly brightly colored. At start of flowering young catkins and cataphylls highly sericeous . . . . . 70. **S. starkeana**

— Mature shoots and leaves more or less pubescent. Shoots mostly dull. Cataphylls and young catkins slightly sericeous . . . . . 71. **S. bebbiana**

17(14). Mature shoots and leaves glabrous. Shoots, buds, and upper sides of leaves smooth, lustrous. Shoots and petioles mostly reddish or reddish-brown . . . . . 72. **S. taraikensis**

— Shoots and leaves typically at least partially pubescent. Shoots, buds, and leaves dull, without red tones in coloration . . . . . 74. **S. iliensis**

18(3). Floriferous buds lanceolate or oblong-lanceolate, their beaks conspicuous, either acute or obtusish, compressed; adaxial surfaces flattened (lateral carina in close proximity to adaxial surface at side view). Leaves mostly broadly elliptic or elliptic, with obscure reticulation beneath, either glabrous or clothed with thin, appressed, slightly flexuous trichomes (except midrib where pubescence frequently different). Wood striae sparse, scattered. 19

— Floriferous buds more or less ovoid, stout, neither attenuating into beaks nor compressed (lateral carina approximating to median of bud corpus at side view). Leaf veins conspicuously prominent beneath. Leaves pubescent not only on midribs but all over their surfaces, at least young ones; trichomes distorted, deviating off the surface 21

19. Young shoots glabrous or glabrate. Mature shoots, buds, and leaves glabrous, smooth. Bracts blackish-brown, either entirely or only at apices . . . . . 72. **S. taraikensis**

— Young shoots densely pubescent; mature shoots, buds, and leaves retaining at least some pubescence. Bracts completely black, at least at time of flowering 20

20. Three- and four-year-old shoots olivaceous-tawny or blackish. Bud beaks mostly acute. Style length + stigma length = 1.2–1.7 mm; style length nearly = stigma length . . . . . 73. **S. abscondita**

— Three- and four-year-old shoots light gray or yellowish. Bud beaks mostly obtuse, compressed. Style length + stigma length = 0.7–1.1 mm; stigmas typically longer than styles . . . . . 74. **S. iliensis**

21(18). Trees 22 *161*

— Tall shrubs 24
22. Wood smooth or with short, sparse striae. Inferior (and often all) leaves elliptic, equally acuminate at both ends. Mature leaves uniformly pubescent all over their surface; trichomes bent at apices, but not rumpled, deviating off leaf blades. Anthers 0.9–1.2 mm long . . . . . 62. **S. caprea**
— Wood with multiple striae. Inferior (and occasionally all) leaves obovate or oblanceolate, their broadest parts definitely above middle of leaf blades. Anthers 0.6–1.0 mm long 23
23. Leaves broad (20–50 mm; 1.25–3.5 times as long as broad), ordinary and superior ones mostly broadest about middle of blades; all leaves pubescent beneath, at least around midribs (rarely completely glabrous); trichomes white or grayish, deviating off leaf blades (as in *S. caprea*); pubescence on veins of second and third order, if any, not more dense than between veins . . . . . 63. **S. aegyptiaca**
— Leaves narrower (12–30 mm; 2.5–4.5 times as long as broad); pubescence mostly rufescent, consisting of rumpled trichomes, conspicuously more dense on veins than in-between; frequently, leaves absolutely glabrous . . . . . 65. **S. atrocinerea**
24(21). Wood striae mostly rather sparse; no conspicuous furrows on outside of bark. Mature leaves dark green, mostly glabrous above, glaucous beneath. Leaf blades mostly lanceolate or spear-shaped (narrowing more towards base than top), rarely oblanceolate or spatulate. Marginal denticles extending to very leaf blade base. Veins of third order obscure, reticulation not very dense beneath. Young leaves easily blackening on drying . . . . . 66. **S. pseudomedemii**
— Wood striation usually very prominent; longitudinal furrows distinct on bark surface of four- or five-year-old and older branches. Mature leaves dull green, usually puberulent above and mostly ash gray (cinereous) beneath. Leaf blades oblanceolate, abruptly acuminate at apices, gradually attenuating towards bases (occasionally, nearly spatulate); denticles not extending to leaf base. Veins of third order distinct, reticulation dense beneath. Leaves not blackening on drying . . . . . 64. **S. cinerea**

Subsect. *Kuznetzowianae*

A. Skv. subsect. nova. Novosti sist. vyssh. rast. a. 1968 describetur.

T y p u s: *Salix kuznetzowii* Goerz.

Subalpine shrubs with stout short branches. Floriferous buds strongly flattened, with flat, recurved apices. Stipules small. Leaves large, conspicuously changing their shape along vigorous shoots: inferior ones broad and short, superior ones narrow and elongated; beneath covered with dense, crispy pubescence. Catkins densely pubescent, bracts large, rufescent or brownish, but not black. Capsules densely lanate, white with pubescence.

162 This is a rather isolated group consisting of just two species.

55. **S. kuznetzowii** Laksch. ex Goerz, 1930, in Grossheim, Fl. Kavk. **2**: 9; Görz, 1934, Feddes Repert. **36**: 231; Nazarov, 1936, Fl. SSSR **5**: 98; Grossheim, 1945, Fl. Kavk. 2 ed. **3**: 19; Sosnovskiy, 1947, Fl. Gruz. **3**: 15; Karyagin, 1952, Fl. Azerb. **3**: 53; Makhatadze, 1961, Dendrofl. Kavk. **2**: 26; Skvortsov, 1966, Trudy Bot. in-ta AN ArmSSR **15**: 129.

T y p u s: "Daghestan. Kaitago-Tabasaran". No specimen labeled like this was found in the St. Petersburg Herbarium. However, there is a nice sample "Chewsuretia ad lacum Tanes —Hb. Bayern" with an enclosed authentic diagnosis by P. Lakschewitz. That

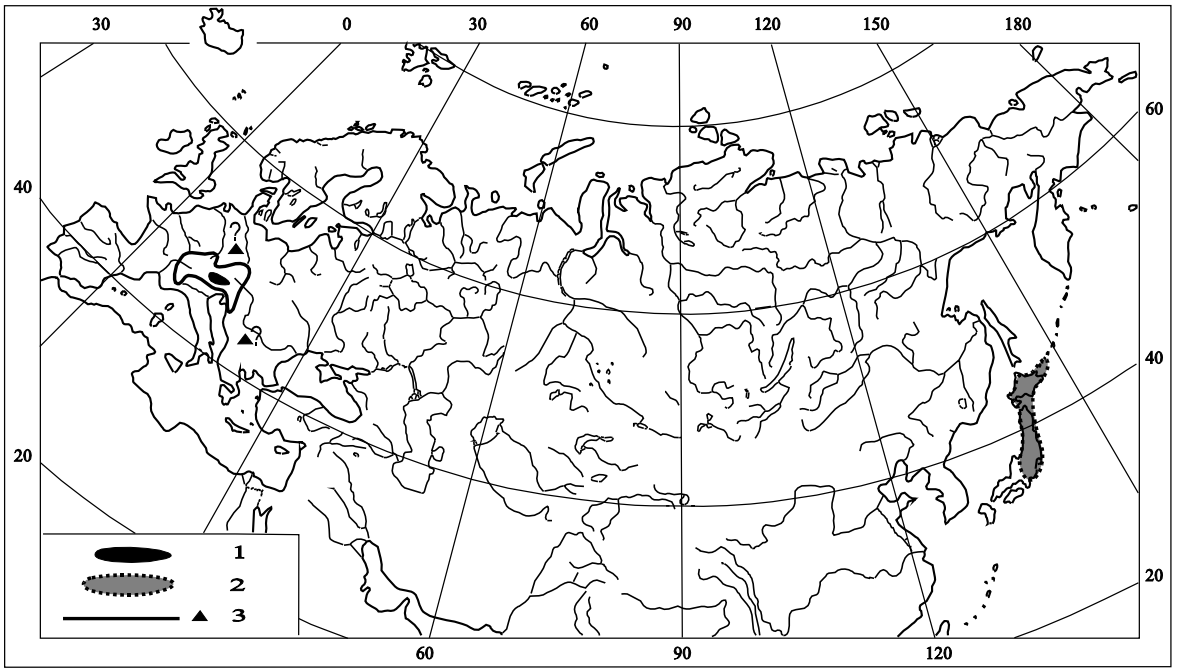

Fig. 37. Distributional areas of *Salix mielichhoferii* Sauter (*1*), *S. vulpina* Anderss. (*2*), and *S. appendiculata* Vill. (*3*)

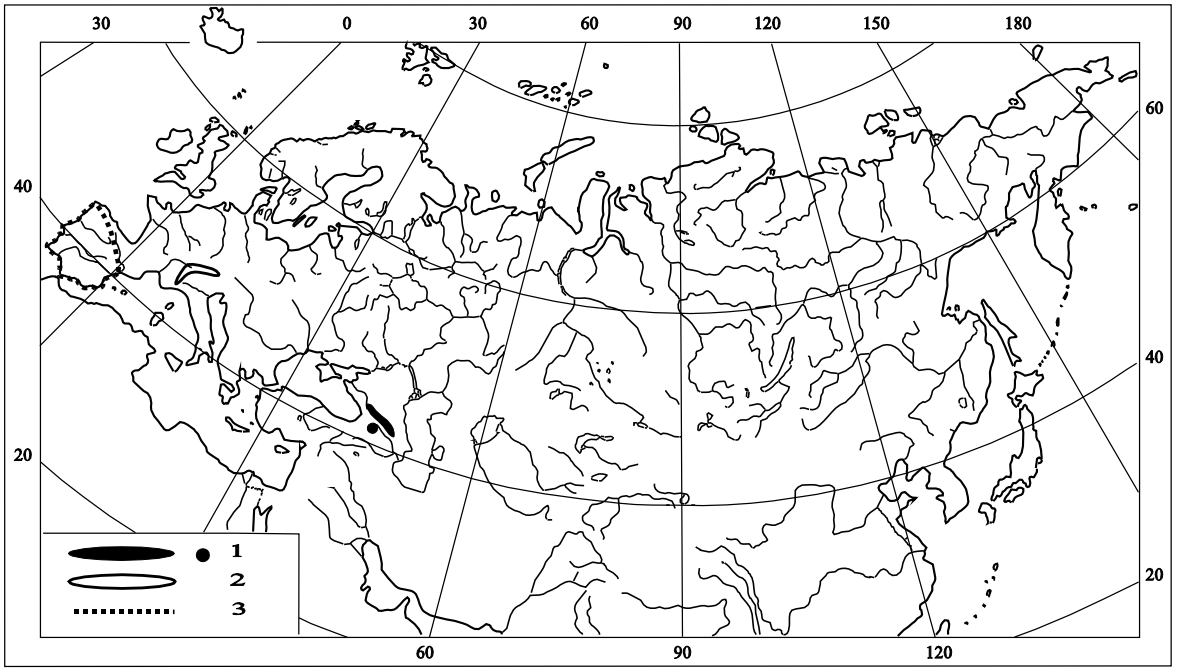

Fig. 38. Distributional areas of *Salix kuznetzowii* Laksch. ex Goerz (*1*), *S. laggerii* Wimm. (*2*),

specimen could be accepted as neotype.

HABIT: A medium-sized or fairly low shrub.

HABITATS: Rocks, shrublands, light birch and pine forests in the upper forest, subalpine, and partially alpine zones (1,600–2,600 m). The species apparently is restricted to limestone.

DISTRIBUTION: The Greater Caucasus from Uch-Kulan Gorge in Karachay to Mount Shakhdag in Azerbaijan (sporadically); the Trialeti Range (near Bakuriani and along the Tana River). There are just a little more than 30 locations known total. (Fig. 38.)

56. **S. laggerii** Wimm. 1854, Flora **37**, 11: 62; Rech. f. 1963, Öst. bot. Z. **110**: 339; id. 1964, Fl. Eur. **1**: 50. —*S. pubescens* Schleich. ex Kern. 1865, Herb. Öst. Weid.: N 30, 31; Buser, 1940, Ber. Schweiz. bot. Ges. **50**: 650; Rech. f. 1947, Sitzungber. Österr. Akad. Math.-naturwiss. Kl. 1, **156**: 499; id. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 102; Janchen, 1956, Catal. fl. Austr. **1**: 104. —*S. devestita* Arvet-Touvet, 1873, Essai pl. Dauphin.: 60. —*S. albicans* Bonjean ex Buser, 1897, in Dörfler, Schedae ad Herb. Norm. **32**: 83 (N 3230); Jaccard, 1895, Catal. valais.: 329; Becherer, 1956, Suppl. Valles.: 136. —*S. glauca* × *grandifolia* Wimm. 1866, Salic. Eur. : 256.

T y p u s: "Ad moles glaciales Rhodani (am Rhonegletscher), 1853, Dr. Lagger" (G, LE!, FI!).

HABIT: A low, distorted shrub.

HABITATS: Rocks, taluses, and banks of streams in the subalpine and alpine zones (1,500–2,100 m).

DISTRIBUTION: A comparatively small number of extremely scattered locations from the Maritime Alps to Austrian Tirol. (Fig. 38.)

163 Subsect. *Vulpinae*

Kimura, 1934, in Miyabe, Kudo, Fl. Hokk. a. Sagh. **4**: 403.

T y p u s: *Salix vulpina* Miq.

Small trees or, more frequently, shrubs. Floriferous buds ovoid, not very distinctly different from vegetative ones. Pubescence on young leaves pronounced, consisting of crispy trichomes, usually fugacious. Female catkins loose, bracts small, obtuse, light brown or blackish only at apices, mostly puberulent. Ovaries glabrous or pubescent, lanceolate, acute. Stigmas very short.

There are five species in the flora of this country. It is not improbable that the similarity between *S. vulpina* and the European species may be purely apparent, so that further studies may result in separating *S. vulpina* from the European species.

57. **S. silesiaca** Willd. 1806, Sp. pl. **4**, 2: 660; Wimmer, 1866, Salic. Eur.: 60; Anderss. 1867, Monogr. Salic.: 65; Wołoszczak, 1899, Öst. bot. Z. **39**: 331; Beck v. Mannagetta, 1906, Glasn. zem. muz. Bosn. Herc. **18**: 73; Seemen, 1909, in Aschers. et Graebner Synopsis **4**: 107; Görz, 1928, Feddes Repert. Beih. **52**: 1 et seq. (p. p.: excl. pl. caucas.); Nazarov et al. 1952, Fl. URSR **4**: 46; Beldie, 1952, Fl. Rom. **1**: 307; Pawłowski, 1956, Fl. Tatr **1**: 190; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 97; id. 1964, Fl. Eur. **1**: 49; Cmelař, 1963, Sb. Vys. šk. zem. Brne **2**: 119.

T y p u s: "In Silesiae montibus. Herb. Willdenow N 18116" (B, n. v.) (cf. Goerz, 1928: 19).

HABIT: A medium-sized or tall (1–4 m) shrub, occasionally almost a small tree.

HABITATS: Lighted woods, forest edges, openings, subalpine shrublands, as well as a whole range of secondary postforest habitats. It grows in the mountains, mostly within the distributional area of the spruce; on the plain, it is very rare.

DISTRIBUTION: The Sudetes, all of the Carpathians (Western, Eastern, and Southern), the mountains of Bosnia, Herzegovina, Crnagora (Montenegro), Albania (?), and western Bulgaria. In the Eastern Carpathians, it is encountered in the middle and upper forest zone, typically ascending to 1,700–1,800 m. There are some solitary locations on the plain in the vicinity of Lvov. In the Tatras, it occasionally ascends to 2,000 m (Chmelař 1963); also to 2,000 m in Montenegro. (Fig. 39.)

58. **S. caucasica** Anderss. 1867, Monogr. Salic.: 68; Nazarov, 1936, Fl. SSSR **5**: 101; Grossheim, 1945, Fl. Kavk. **3**: 21; Skvortsov, 1966, Trudy Bot. in-ta AN ArmSSR **15**: 122. —*S. silesiaca* var. *caucasica* Anderss. 1868, in DC. Prodr. **16**, 2: 219; Görz, 1930, in Grossheim, Fl. Kavk. **2**: 7; id. 1934, Feddes Reppert. **36**: 234. —*S. heterandra* Dode, 1908, Bull. Soc. Bot. Fr. **55**: 654. —*S. paracaucasica* Goerz, 1928, Feddes Repert. Beih. **52**: 28 et tab. 2; id. 1930, op. cit. **2**: 7; Nazarov, 1936, op. cit. **5**: 102. —*S. palibinii* Goerz, 1928, op. cit. **52**: 29 et tab. 3; id. 1930, op. cit. **2**: 7; Nazarov, 1936, op. cit. **5**: 102. —*S. daghestanica* Goerz, 1930, op. cit. **2**: 6; id. 1934, op. cit. **36**: 236.

T y p u s: "Caucasus —Nordmann" (LE!).

HABIT: A low or medium-sized (0.5–1.5, sometimes to 2 m) shrub, usually rather distorted.

HABITATS: Humid parts of the subalpine and upper forest zones (1,500–2,400 m). Occasionally, it may descend to considerably lower elevations, where it grows along streams or on cold spring fens (for instance, in the Bzyb River Gorge in Abkhazia it is encountered as low as 200–300 m).

DISTRIBUTION: The western Greater Caucasus (from the Fisht-Oshten Massif to Svanetia, very common). East of that area it occurs less often, being encountered all across the main range, its southeasternmost location in Ismailli District. Seven findings known from Dagestan and eight from Azerbaijan. It again becomes common in the Adzharo-Imeretinskiy and Adzharo-Shavshetskiy ranges, although it has never been found in other *164* parts of the Lesser Caucasus. Within the territory of Turkey, the only known collections are from Chorukh (Artvin). (Fig. 39.)

59. **S. appendiculata** Vill. 1789, Hist. pl. Dauphin. **3**: 775; Timbal-Lagrave, 1856, Mem. Acad. Toulouse 4, **6**: 147; Schinz et Thellung, 1913, Vierteljahresschr. Naturf. Ges. Zü rich **58**: 49 (cf. Toepffer, 1913, Öst. bot. Z. **63**: 343); Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 99; id. 1964, Fl. Eur. **1**: 50. —*S. grandifolia* Seringe, 1815, Saul. Suisse: 20; Wimmer, 1866, Salic. Eur.: 66; Anderss. 1867, Monogr. Salic.: 60; Camus, 1904, Saul. Eur. **1**: 208; Seemen, 1909, in Aschers. et Graebn. Synopsis **4**: 103; Rouy, 1910, Fl. Fr. **12**: 207; Toepffer, 1914, in Vollman, Fl. Bayern: 198; Rech. f. 1938, Feddes Repert. **45**: 88; Buser, 1940, Ber. Schweiz. bot. Ges. **50**: 647; Rech. f. 1953, Godišn. Biol. Inst. Sarajevu **5**: 335; Chmelař, 1963, Sb. Vys. šk. zem. Brne C, **2**: 119. —Excl. syn. *S. pubescens* Schleich., *S. albicans* Bonjean, *S. laggerii* Wimm.

T y p u s: "Dauphiné, bois de la Grande Chartreuse" (Herb. Chaix, P?, n. v.).

HABIT: A medium-sized or tall shrub or a small tree.

HABITATS: Rocks, taluses, moist slopes, and banks of streams in the montane forest and subalpine zones, mostly on limestone. It has also been encountered on peaty as well as siliceous substrates.

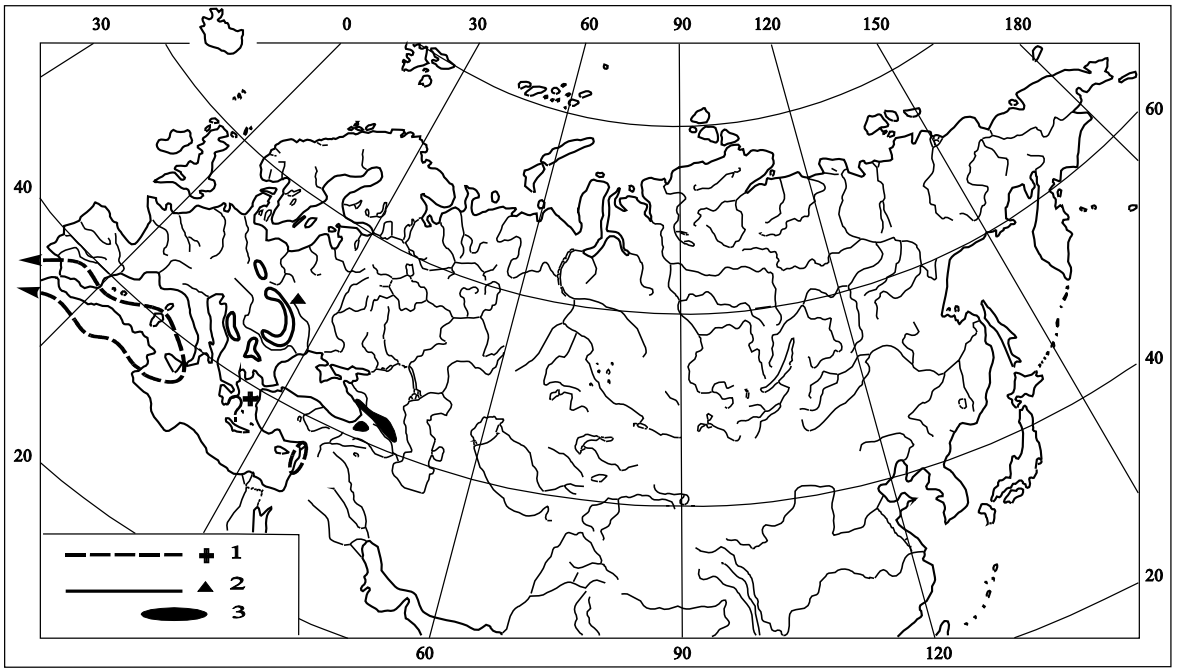

Fig. 39. Distributional areas of *Salix pedicellata* Desf. (*1*), *S. silesiaca* Willd. (*2*), and *S. caucasica* Anderss. (*3*)

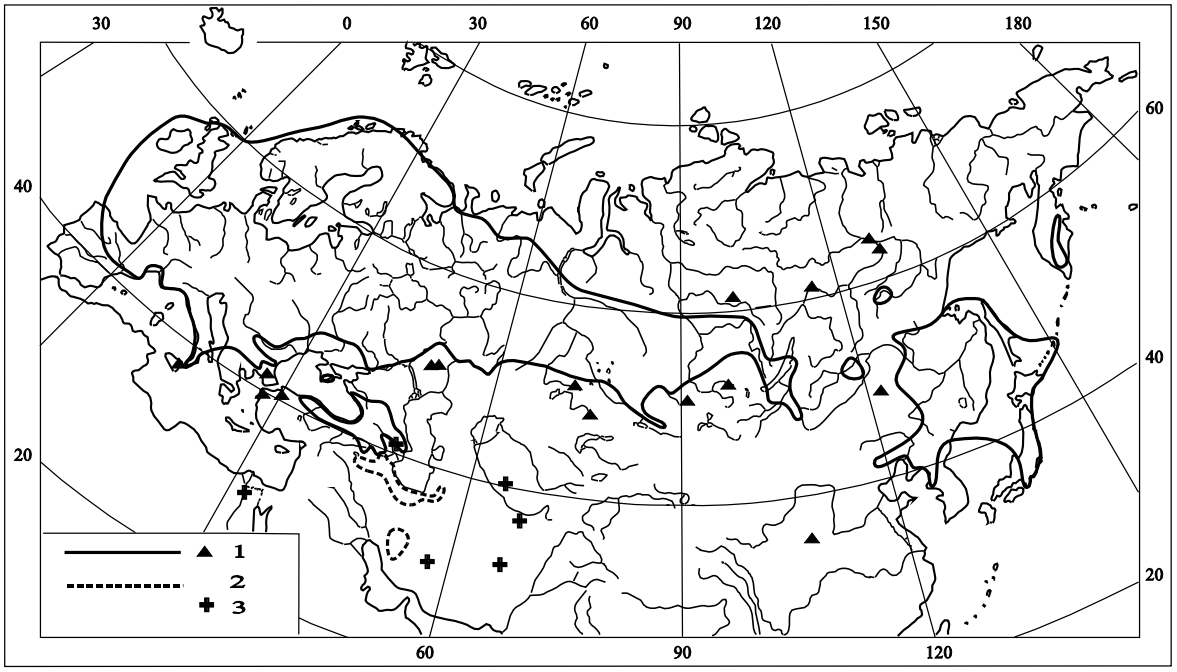

Fig. 40. Distributional areas of *Salix caprea* L. (*1*), *S. aegyptiaca* L. (*2*), and cultivated *S. aegyptiaca* (*3*)

DISTRIBUTION: All of the Alps from the Maritime Alps to Lower Austria and Slovenia; the Jura, Schwarzwald, Shumava, Bohemian-Moravian Highlands, Croatia (the Velebit Range); the Apennines (findings in Tuscany and Emilia, such as those from Boscolongo and Mount Rondinayo, are the only reliable ones; the rest have to be assigned to *S. apennina*). I also found some solitary samples from Thuringia (near Weimar), the Belanskiye Tatras, and southern Serbia (the Suva Planina); however, data from these localities need to be confirmed. (Fig. 37.)

60. **S. pedicellata** Desf. 1800, Fl. Atlant. **2**: 362; Anderss. 1867, Monogr. Salic.: 59; Boiss. 1879, Fl. Or. **4**: 1189; Post, 1933, Fl. Syr. **2**: 532; Vicioso, 1951, Salic. Españ: 104; Maire, 1961, Fl. Afr. Nord **7**: 58; Skvortsov, 1966, Trudy Bot. In-ta AN ArmSSR **15**: 123. —*S. canariensis* Chr. Smith ex Buch, 1825, Physik. Beschr. Canar.: 159; Webb, 1850, Phytogr. Canar. **3**: 270 et tab. 215. —*S. nigricans* Boiss. 1879, op. cit. **4**: 1190, non Sm. —*S. libani* Bornm. 1914, Beih. Bot. Zbl. **31**: 259. *165*

T y p u s: "Ad rivulos Sbibae in regno Tunetano" (n. v.).

Ssp. **canariensis** (Buch) A. Skv. comb. nova. —*S. canariensis* Chr. Smith ex Buch (1825) l. c.

T y p u s: "Insulae Canarienses, Chr. Smith" (n. v.).

HABIT: A tall shrub or small tree (to 8–10 m tall).

HABITATS: River banks and moist places.

DISTRIBUTION: Southern Spain including Huelva, Ciudad Real, and Almeria (so far, not found in Portugal); Sardinia, Sicily, and Malta; the mountainous regions of Tunisia; northern Algeria (including the Saharan Atlas) and Morocco (including the Anti-Atlas). Having an enormous distributional gap, it is found next in Lebanon, the mountains of western Syria, and Turkey (Hatay Province). It might have been found on Ikaria in the Aegean Sea (Rechinger 1943: 96), although these data need confirmation. Evidence from continental Italy as well as Corsica is hardly true (a few samples from Corsica, that I examined, appeared to be *S. atrocinerea*).

The vertical range in Northern Africa is from nearly the sea level to 2,400 m; on Sardinia, 0–700 m; in Lebanon, 300–1,100 m.

The area of ssp. *canariensis* comprises the Madeira and Canary islands (300–800 m). (Fig. 39.)

NOTE. I had an opportunity to examine a rather nice series of *S. canariensis* (11 samples without duplicates). Although the differences from *S. pedicellata* s. str. were quite obvious when considering the whole series, it was still impossible to identify each of the samples confidently. Therefore, *S. canariensis* would be more properly treated in the rank of subspecies. It is characterized by less pronounced pubescence on mature shoots, leaves, and buds; narrower and longer leaves; shorter capsule stipes (1.5–2.5 mm compared to 2–4.5 mm in ssp. *pedicellata*). I don't have enough reasons to distinguish the subspecies segregated by R. Maire (ssp. *antiatlantica*, ssp. *hesperia* Maire, 1961, op. cit. **7**: 60).

S. peloritana Prestrandr ex Tineo, 1847, Plant. rar. Sicil. **2**: 31; Parlatore, 1867, Fl. Ital. **4**: 246; Nicotra, 1904, Nuovo Giorn. bot. Ital. **11**: 47; Lojacono, 1904, Fl. Sic. **2**, 2: 393. Cf. etiam: Camus, 1904, Saul. Eur. **1**: 281; Rouy et Foucaud, 1910, Fl. Fr. **12**: 230; Rouy, 1895, Ill. pl. Eur. rar. **6**: 48.

T y p u s: "Messina all' Ortora —Prestrandr" (n. v.; vidi specimina in loco classico collecta).

This peculiar willow was described in the vicinity of Messina (Sicily), where it occurs on maritime marshes. It must be very rare nowadays, since L. Nicotra (op. cit.) reported

it to become rare due to extensive soil draining as early as 1904. I have examined 10 unicate samples (FI), which appear to be nearly all of collected material on this willow, and came to the same conclusion as A. Camus (Camus, l. c.). *S. peloritana* might be a hybrid of *S. pedicellata* and *S. purpurea*. Hybrids of *S. appendiculata* and *S. purpurea* look very much like *S. peloritana* (e. g., Kerner, Herb. Öst. Weid. N 76).

61. **S. vulpina** Anderss. 1858, Mem. Amer. Acad. **6**, 2: 452; Seemen, 1903, Salic. Jap.: 37; Koidzumi, 1913, Bot. Mag. Tokyo **27**: 89; Schneider, 1916, in Sarg. Pl. Wilson. **3**, 1: 130; Kimura, 1934, in Miyabe, Kudo, Fl. Hokk. a. Saghal. **4**: 404; id. 1957, Symb. Iteol. **14**: 9; Ohwi, 1965, Fl. Jap.: 336. —? *S. miquelii* Anderss. 1867, Monogr. Salic.: 166; id. 1868, in DC. Prodr. **16**, 2: 256.

T y p u s: "Yokohama legg. Williams and Morrow (♂)" (GH, S, n. v.). Icones photogr. typi apud Kimura, 1957 fig. 2 et tab. 3.

HABIT: A medium-sized shrub.

HABITATS: Forest edges, open woodlands, and prostrate pine (*Pinus pumila*) thickets.

DISTRIBUTION: The southern Kuril Islands (there are three different samples from Iturup; A. Kimura (1934) also enlisted it for Shikotan); Japan (Hokkaido and the mountains of Hondo). The species appears to be rather rare everywhere. (Fig. 37.)

166 Subsect. *Laeves*

Camus, 1904, Saul. Eur. **1**: 45

T y p u s: *Salix caprea* L.

Trees or large shrubs. Leaves mostly large, with prominent reticulation beneath, clothed with deviating or rumpled trichomes. Catkins precocious, mostly large, densely pubescent, usually with large black bracts. Capsules rather short-pubescent, their stipes not very much elongating on flowering.

62. **S. caprea** L. 1753, Sp. pl.: 1020; Ledeb. 1850, Fl. Ross. **3**, 2: 609; Wimmer, 1866, Salic. Eur.: 55; Komarov, 1929, Fl. Kamch. **2**: 11; Wolf, 1930, Fl. Yu.-V. **4**: 50; Krylov, 1930, Fl. Zap. Sib. **4**: 746; Floderus, 1931, Salic. Fennosc.: 73; Perfilyev, 1936, Fl. Sev. kr. **2–3**: 38; Nazarov, 1936, Fl. SSSR **5**: 90; Buser, 1940, Ber. Schweiz. bot. Ges. **50**: 646; Vicioso, 1951, Salic. Españ: 106; Nazarov et. al. 1952, Fl. URSR **4**: 37; Skvortsov, 1966, Tr. Bot. in-ta AN ArmSSR **15**: 123; Shlyakov, 1956, Fl. Murm. **3**: 92; Andreyev, 1957, Der. i kustarn. Mold. **1**: 67; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 91; id. 1964, Fl. Eur. **1**: 50; Popov, 1959, Fl. Sredn. Sib. **2**: 795; Polyakov, 1960, Fl. Kazakhst. **3**: 30. —*S. hultenii* Flod. 1926, Ark. bot. **20A**, 6: 51; Nazarov, 1936, op. cit. **5**: 92; Ohwi, 1965, Fl. Jap.: 365. —*S. bakko* Kimura, 1928, Bot. Mag. Tokyo **42**: 568; id. 1934, in Miyabe, Kudo, Fl. Hokk. a. Saghal. **4**: 417; Ohwi, 1965, op. cit.: 365. —*S. coaetanea* Flod. 1930, Bot. not.: 331; id. 1931, op. cit.: 83; Nazarov, 1936, op. cit. **5**: 93; Shlyakov, 1956, op. cit. **3**: 95; Rech. f. 1964, op. cit. **1**: 50. —*S. hallaisanensis* (non Lév. 1912) Nakai, 1930, Fl. sylv. Kor. **18**: 129. —*S. idae* Goerz, 1930, Feddes Repert. **28**: 126.

T y p u s: "In Europae siccis. Fl. Suec. N 811; Fl. Lapp. NN 365, 367 et tab. 8 fig. N, S, U".

HABIT: A tree to 12–15 m tall; occasionally, due to some damaging impact, it may have a shrubby habit.

HABITATS: Woods on well-drained soils as well as a vast variety of secondary postforest habitats, such as clearings, forest edges, residential lots, roadsides; also, mountainous habitats near the timberline. The species avoids wet and, particularly, paludal soils.

DISTRIBUTION: Europe from northern Spain, southern Italy, Albania, and Macedonia to the extreme north of Scandinavia. In Eastern Europe and European Russia, its southern limit fits the line connecting Kishinev, Zaporozhye, Rostov, Volgograd, and Orenburg; in the north, it reaches the southern Kanin Peninsula and northern meander of the Pechora. The area comprises northern Asia Minor, the mountains of the Crimea Peninsula, and nearly all of the Caucasus (except the arid Kura Depression and Talysh). In Asia, the southern boundary goes from Orsk via Bayan-Aul to the foot of the Altai; then, approximating the border with Mongolia, it reaches the forested regions of Manchuria, North Korea and cuts the northern two-thirds of Hondo; in the north, the area includes the southern Kurils, entire Sakhalin, the Shantar Islands, Zeya, and Shilka; then the area boundary runs via Barguzin, the lower reaches of the Angara, and drainage divides between Ob and Taz, Ob and Pur, Ob and Nadym. North of that line, there are isolated fragments of the area at the Upper Aldan, on the Kamchatka Peninsula, as well as some scattered solitary locations along the Lena from Mukhtuya to Sangar. According to available data, in eastern Transbaykalia there is a considerable gap in *S. caprea* distributional area. There are some isolated locations far away southward: north of Beijing (the Weichang Plateau) and in the Qin Lin Range near Sian (Xi'an), Shansi (Shanxi) Province. (Fig. 40.)

In Scotland, it ascends to 750 m; in the Pyrenees, to 1,900 m; in the Alps to 2,100 m; in the Carpathians, to 1,400–1,600 m; in Bulgaria, to 2,500 m (never descending lower than 800 m); in the Caucasus and Asia Minor, its range is from 800 to 2,700 m (in the Karabakh and southern Zangezur mountain ranges, not lower than 1,500 m). In northern Norway, the species ascends to 400 m; in the Kola Peninsula, to 300 m; in the open forests of the Prepolar Urals, it goes up to 500 m; in the Northern Urals, to 800 m; in the Southern Urals, to 1,000 m. In the Altai and Sayans, where it is generally rather rare, it *167* goes as high as 1,000 m up in the mountains; in the southern Sikhote-Alin, to 1,300 m; on southern Sakhalin, to 900 m.

NOTE. Plants from the Far East usually differ in larger, rugose leaves. However, this difference is vague, so that it is impossible to use it for tracing any particular morphological or geographical limits. I have found plants with a typical "Far East" habit growing near Irkutsk; on the other hand, there are samples from Transbaykalia and Maritime Province having a completely "European" habit. Therefore, so far we would better refrain from segregating the Far Eastern plants in a distinct taxon.

S. coaetanea is merely a very indistinct climatic ecotype of *S. caprea* that is characterized by a later time of flowering. No taxonomic rank is appropriate for *S. coaetanea*.

63. **S. aegyptiaca** L. 1755, Cent. pl. **1**: 33; Floderus, 1933, Ark. bot. **25A**, 11: 1 et seq. p. p. (excl. syn. *S. pseudomedemii* et var. *cuneata* et *erosa*); Nazarov, 1936, Fl. SSSR **5**: 94; (p. p.: excl. syn. *S. phlomoides, S. pseudomedemii* et *S. cinerea* var. *cuneata* et *erosa*); Skvortsov, 1960, Bot. mat. Gerb. Bot. in-ta AN SSSR **20**: 82 (p. p.: excl. syn. *S. pseudomedemii*); id. 1962, Bot. mat. Gerb. in-ta bot. AN UzbSSR **17**: 65; id. 1966, Trudy Bot. in-ta AN ArmSSR **15**: 125. —Non *S. aegyptiaca* Rech. f. 1964, Fl. Eur. **1**: 49. —*S. nitida* S. G. Gmelin, 1774, Reise Russ. **3**: 283 et tab. 28. —*S. phlomoides* Marschall a Bieberstein, 1808, Fl. Taur.-Cauc. **2**: 415; id. 1819, ibid. **3**: 728, p. p. (quoad

pl. e Kizliar); Grossheim, 1945, Fl. Kavk. **3**: 19 (p. min. p.); Karyagin, 1952, Fl. Azerb. **3**: 50 (p. p. minore). —*S. medemii* Boiss. 1846, Diagn. **7**: 100. —*S. cinerea* var. *medemii* Boiss. 1879, Fl. Or. **4**: 1189. —*S. caprea* scrutatorum florae iranicae omnium, non L.

T y p u s: "In Aegypto (Febr. 1751) —Fr. Hasselquist" (UPS, n. v.). Icones photogr. typi apud Floderus 1933.

HABIT: A small tree to 8–10 m tall.

HABITATS: Lighted forests on slopes and banks of streams; secondary postforest plant communities at clearings, forest edges, and residential lots.

168 It is favored for cultivation, since it is easily propagated from cuttings, unlike *S. caprea*. Male catkins were commonly used in the East for making a drink.

DISTRIBUTION: The Caucasus (Talysh and Diabarskaya Depression, very ordinary, from the sea level to 1,800 m); the Karabakh and southern Zangezur (occasionally); extreme southeastern Turkey (Hakkâ ri and Bitlis); northern Iran (the Elburz and Kopet-Dag); the Turkmenian Kopet-Dag (gorges at the Upper Sumbar and near Nokhur, occasionally). The Zagros Mountains in southern Iran; Afghanistan and northern Pakistan (scattered, presumably, only as a cultivated species). It reaches 2,300 m in the Elburz.

There is no doubt that the plant from Egypt, after which the species was named, was also a cultivated specimen. The willow is cultivated at some locations in Azerbaijan and Middle Asia. (Fig. 40.)

NOTE. The species is close to *S. caprea*, morphologically as well as ecologically; the geographical areas of the two species are vicarious. They grow close together only in the Karabakh and Zangezur, however, being confined to different elevations: *S. caprea* occurs exclusively high up in the mountains (not lower than 1,500–1,600 m), and *S. aegyptiaca* grows only at lower levels. Erroneous reports of *S. aegyptiaca* from the Lower Volga, Kazakhstan, Crimea, etc., still occasionally appear in the literature (e. g., Rechinger 1964).

Two different species were hiding under the name of *S. phlomoides* M. B.: *S. cinerea* collected around Sarepta (near Volgograd) and cultivated *S. aegyptiaca* from Kizlyar. The samples from Sarepta have survived in the St. Petersburg Herbarium as well as in Moscow (in Trinius' Herbarium). I did not manage to find those from Kizlyar. However, B. Floderus was familiar with them and positively assigned them to *S. aegyptiaca*. According to B. Floderus (1933), the labels positively said that those samples had been collected from cultivated plants.

64. **S. cinerea** L. 1753, Sp. pl.: 1021; Ledeb. 1850, Fl. Ross. **3**, 2: 607; Wimmer, 1866, Salic. Eur.: 47; Boiss. 1879, Fl. Or.: 1189 (p. p.: excl. pl. Caucasi et Asiae Minor.); Wolf, 1930, Fl. Yu.-V. **4**: 54; Krylov, 1930, Fl. Zap. Sib. **4**: 744; Floderus, 1931, Salic. Fennosc.: 50; Perfilyev, 1936, Fl. Sev. kr. **2–3**: 39; Nazarov, 1936, Fl. SSSR **5**: 99 (p. p.: excl. pl. caucas.); Buser, 1940, Ber. Schweiz. bot. Ges. **50**: 644; Nazarov et al. 1952, Fl. URSR **4**: 40; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 94; id. 1964, Fl. Eur. **1**: 50; Polyakov, 1960, Fl. Kazakhst. **3**: 32. —*S. deserticola* Goerz ex Pavlov, 1935, Fl. Ts. Kazakhst. **2**: 26, 31 (nom. invalidum, sine descr. latina).

T y p u s: "In Europae nemoribus paludosis. Fl. Suec. N 805; Fl. Lapp. N 358".

HABIT: A tall (up to 4–5 m) shrub.

HABITATS: Eutrophic wetlands, muddy banks of stagnant or slow water bodies, floating bogs, damp depressions and *zapadina*'s in the steppe belt. In conditions of sufficient humidity, it becomes very common in various secondary habitats, such as ditches, ruts, embankments, forest edges and openings.

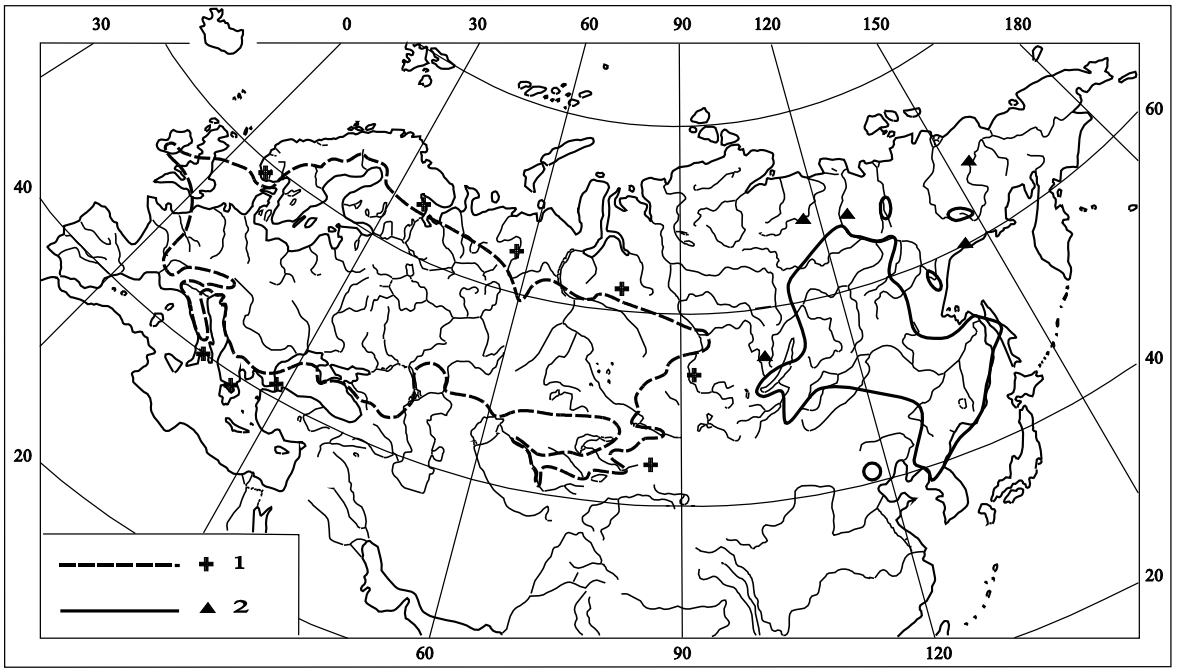

Fig. 41. Distributional areas of *Salix cinerea* L. (*1*) and *S. abscondita* Laksch. (*2*)

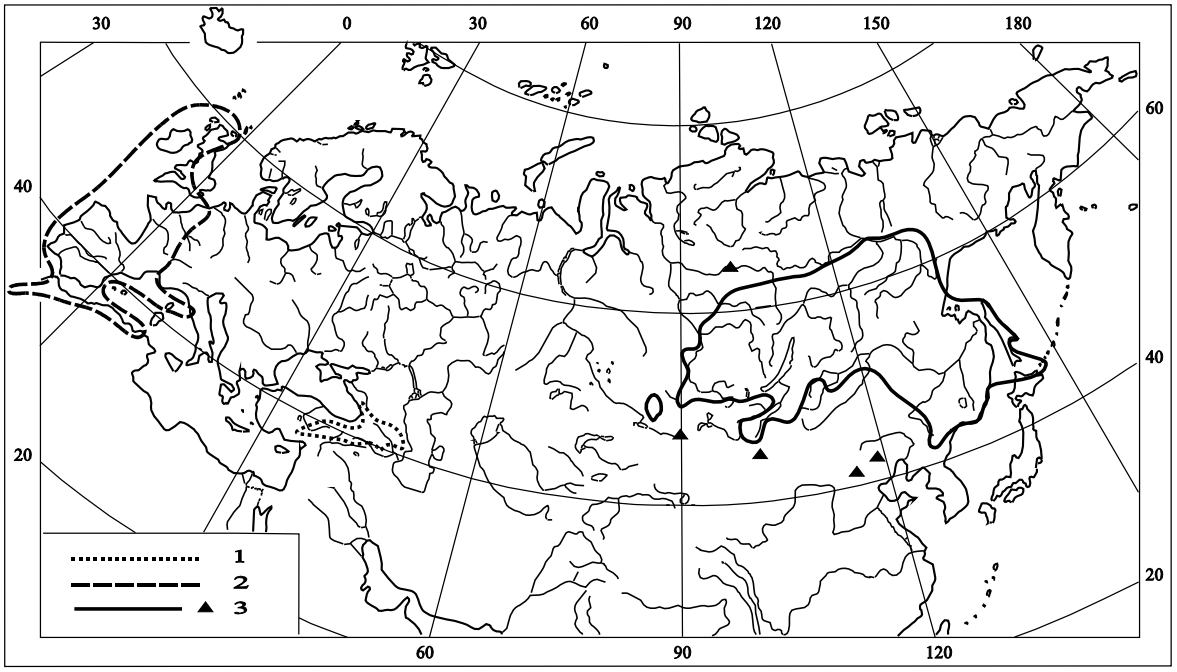

Fig. 42. Distributional areas of *Salix pseudomedemii* E. Wolf (*1*), *S. atrocinerea* Brotero (*2*), and *S. taraikensis* Kimura (*3*)

DISTRIBUTION: Southeastern England, eastern France, nearly all of Italy (except the extreme south and the islands); the Balkan Peninsula (though very rare in Greece and the European part of Turkey); all of Central Europe; and southern Scandinavia. In Eastern Europe, it goes south to the Black Sea Coast, the foot of the Caucasus (the area includes the Lower Kuban River and Tersko-Kumskiye Sands), and the Volga Delta, nearly reaching the mouth of the Ural River. In Asia, the southern limit comprises the coast of the Aral, middle and lower reaches of the Syr Darya (with the southernmost location in the wetlands along the Chirchik River downstream of Tashkent), and the northern foot of the Tien Shan, occasionally penetrating into the mountains along river valleys and gorges. Along the valleys of the Ili and Black Irtysh, the species reaches the Chinese territory. In the east, the species limit is found along the foot of the Altai and Kuznetskiy Alatau and on the eastern bank of the Yenisei around its confluence with Angara. In Minusinskaya Depression, there is an isolated location. The northern limit matches the drainage divides
169 between the Ob and Taz, Ob and Pur, Ob and Nadym, then going via the basins of the Pelym and Malaya Sosva, crossing the Urals south of Konzhakovskiy Kamen, and then proceeding via the Upper Pechora, Middle Mezen, Arkhangelsk, the Onega Peninsula, and central Karelia.

In the Alps, the species ascends as high as 1,000–1,100 m; in the Carpathians, to 1,100 m; in the Southern Urals, to 700 m; in the Zailiyskiy Alatau, to 1,800 m; in the Dzungarskiy Alatau, to 1,600 m. (Fig. 41.)

NOTE. All data on *S. cinerea* findings in the Caucasus and Asia Minor are attributed to *S. pseudomedemii* (Skvortsov 1966a). The northern limit of the species, as it was described by I. Perfilyev (1936), that is, via the Pesha River, the entire Pechora Basin, and western Bolshezemelskaya Tundra, appears to be doubtful, inasmuch as it is not supported by any herbarium material. *S. cinerea* never reaches the forest limit: neither the northern one, nor altitudinal. The western species limit on the territory of France and England is not clarified. There, *S. cinerea* is still confounded with a closely related species, *S. atrocinerea* Brot. As I understand, all references to *S. cinerea* on Corsica, Sardinia, and Sicily have to be attributed either to *S. pedicellata* Desf. or *S. atrocinerea* Brot.

65. **S. atrocinerea** Brotero, 1804, Fl. Lusit. **1**: 31; Buser, 1894, Magnier Scrin. fl. sel. **13**: 327; Rouy, 1910, Fl. Fr. **12**: 203 (pro "race"); Guinier, 1912, Bull. Soc. Bot. Fr. **58**, suppl.: IX et seq.; Görz, 1929, Saul. Catal.: 43; Chassagne et Görz, 1931, Bull. Soc. Dendr. Fr. **80**: 69; Coutinho, 1935, Bol. Soc. Broter. **10**: 75; id. 1939, Fl. Portug. ed. 2: 191; Almeida, 1944, Publ. Serv. Florest. **11**: 125; Chassagne, 1956, Invent. fl. Auvergne **1**: 237; Rechinger, Lawalrée, 1960, Bull. Jard. bot. Bruxelles **30**: 367; Clapham et al. 1952, Fl. Brit.: 762; Rech. f. 1964, Fl. Eur. **1**: 50. —*S. oleifolia* Smith. 1804, Fl. Brit. **3**: 1065 (non Vill. 1789); Linton, 1913, Brit. willows: 57. —*S. rufinervis* DC. 1808, Mém. Soc. Agric. Dép. Seine **10**: 11. —*S. renecia* Dode, 1908, Bull. Soc. Bot. Fr. **55**: 656. —*S. cinerea* auct. non L.: Coutinho, 1899, Bol. Soc. Broter. **16**: 17; Cadevall, Font, 1933, Fl. Catal. **5**: 184; Franco, 1949, An. Inst. Super. Agron. **16**: 133; Maire, 1961, Fl. Afr. Nord **7**: 62; et al. —*S. aurita* auct. fl. hispan. et lusitan. non L. —*S. catalaunica* Sennen, in sched. ad "Pl. D'Espagne": N 4040, 5425 nom. nud. —*S. jahandiezi* Chassagne, 1938, Bull. Soc. Bot. Fr. **85**: 402 nom. nud. (sine descr. latina!).

T y p u s: "Margenes do Mondego. Brotero". (LISU, n. v.).

HABIT: A tree to 10 (occasionally even 15) m tall.

HABITATS: Damp places and wetlands; in regions with high humidity, it is found everywhere in lighted forests and various secondary habitats. It is associated with moderately acidic soils.

DISTRIBUTION: The British Isles (presumably, except southeastern England); Belgium; most of France (except the eastern part); the islands Corsica, Elba, and Sardinia (??); all of the Iberian Peninsula; Algeria and Tunisia (only rarely, in the mountain ranges closest to the sea), Morocco (not infrequently, ascending to the Grand Atlas).

In Atlantic Europe, its vertical range is from the sea level to 600 m in Wales and Scotland, to 1,600 m in the French Massif Central, to 1,600 m on the Iberian Peninsula; in Northern Africa, 800–2,400 m. (Fig. 42.)

NOTE. This species is morphologically very close to *S. cinerea*, so that in the regions where both species occur together (the British Isles, central France) it is often hard to distinguish samples. Only observations of live plants in nature will make it possible to delimit the species in these regions with confidence.

66. **S. pseudomedemii** E. Wolf, 1909, Trudy SPb. bot. sada **28**, 3: 397; Skvortsov, 1966, Trudy Bot. In-ta AN ArmSSR **15**: 126. —*S. eripolia* Hand.-Mazz. 1912, Ann. Naturh. Mus. Wien **26**: 132. —*S. alifera* Goerz, 1930, Feddes Reppert. **28**: 120; Nazarov, 1936, Fl. SSSR **5**: 100; Grossheim, 1945, Fl. Kavk. **3**: 20. —*S. fuscata* Goerz, 1930, op. cit. **28**: 122; Nazarov, 1936, op. cit. **5**: 100; Grossheim, op. cit. **3**: 20. —*S. cataonica* Goerz, 1930, op. cit. **28**: 123. —*S. neofuscata* Kimura, 1940, Symb. Iteol. *171* **8**: 416. —*S. aegyptiaca* scrutatorum florae Caucasi necnon Asiae Minoris (non L.), p. max. p. —*S. cinerea* (non L.) scrutatorum florae Caucasi necnon Asiae Minoris omnium. —*S. phlomoides* auct. fl. caucas. (p. max. p.), non M. B.

T y p u s: "Leningrad, culta. Provenit e Tiflis" (Hb. Academiae Forestalis, Leningrad!).

HABIT: Usually a rather powerful and tall shrub (1.5–5 m).

HABITATS: Damp places; banks of streams in forested regions.

DISTRIBUTION: All across the Greater Caucasus (except the northwestern part behind the line Gagry—Karachay). The elevation ranges are from the maritime lowland in Abkhazia, Dagestan, and Azerbaijan and from the northern piedmont south of the line connecting Yessentuki and Khasavyurt to 1,000–1,100 m around Kislovodsk, 1,400–1,500 m in Dagestan, and to nearly 2,000 m in south Osetia. In the east it appears to be more common than in the west descending down to Shirvanskaya Steppe (near Agdash and at other places). It is not infrequent in the Lesser Caucasus occurring nearly all across the forested regions, except Adzharia, Karabakh, southern Armenia, and (?) Nahichevan (however, found in the mountain ranges south of Lake Sevan).

In Turkey, it is known from Kars, Erzurum, Agri, Gü mü shane, Malatya, Adana, Tunceli, Sivas, and Maras, as well as from the Cilician and Armenian Taurus. (Fig. 42.)

NOTE. As it was already mentioned in the note concerning *S. aegyptiaca*, the description of *S. phlomoides* M. B. had been based on the samples of *S. aegyptiaca* and *S. cinerea*. Therefore, *S. phlomoides* is a surplus name that should be abandoned.

All data on *S. cinerea* from the Caucasus and Asia Minor are to be attributed to *S. pseudomedemii*. As a matter of fact, *S. cinerea* and *S. pseudomedemii* are very different in their ecological ranges. *S. pseudomedemii* avoids muddy and paludal lake shores and banks of streams, whereas *S. cinerea*, on the contrary, is very rare on banks of mountain streams with rapid water flow.

I have studied the types of *S. eripolia*, *S. fuscata*, *S. alifera*, and *S. cataonica*; their identity with *S. pseudomedemii* is beyond question.

67. **S. aurita** L. 1753, Sp. pl.: 1019; Wimmer, 1866, Salic. Eur.: 51; Krylov, 1930, Fl. Zap. Sib. **4**: 755; Floderus, 1931, Salic. Fennosc.: 54; Perfilyev, 1936, Fl. Sev. kr. **2–3**: 39; Nazarov, 1936, Fl. SSSR **5**: 101; Buser, 1940, Ber. Schweiz. bot. Ges. **50**: 645;

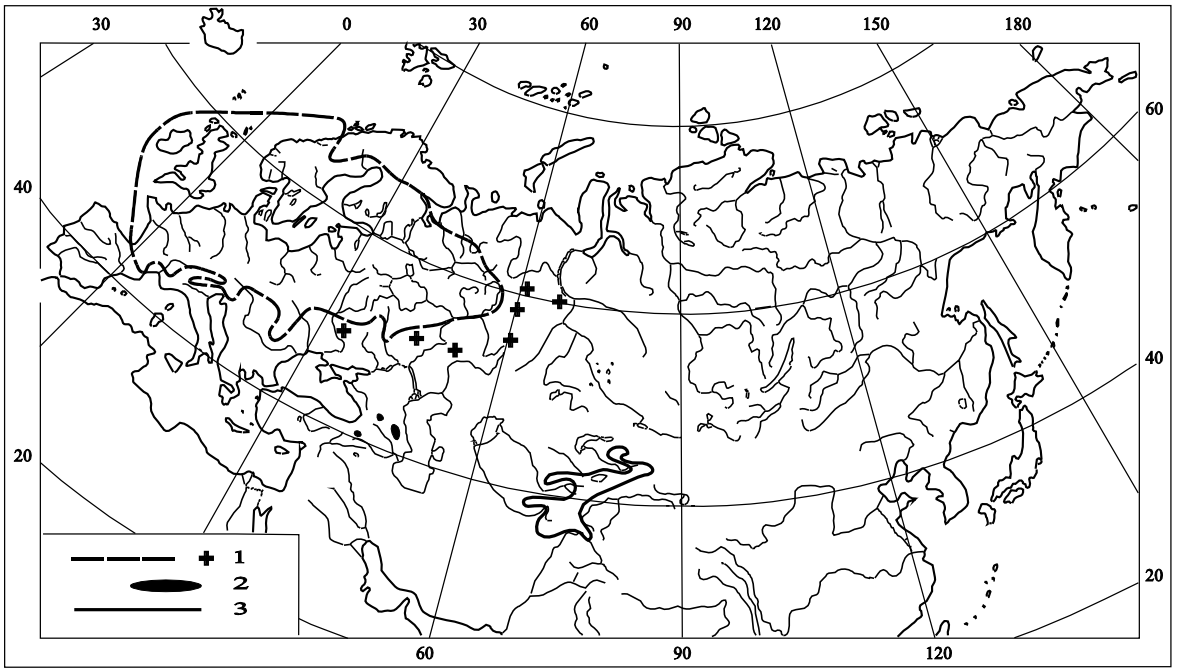

Fig. 43. Distributional areas of *Salix aurita* L. (*1*), *S. pseudodepressa* A. Skv. (*2*), and *S. iliensis* Rgl. (*3*)

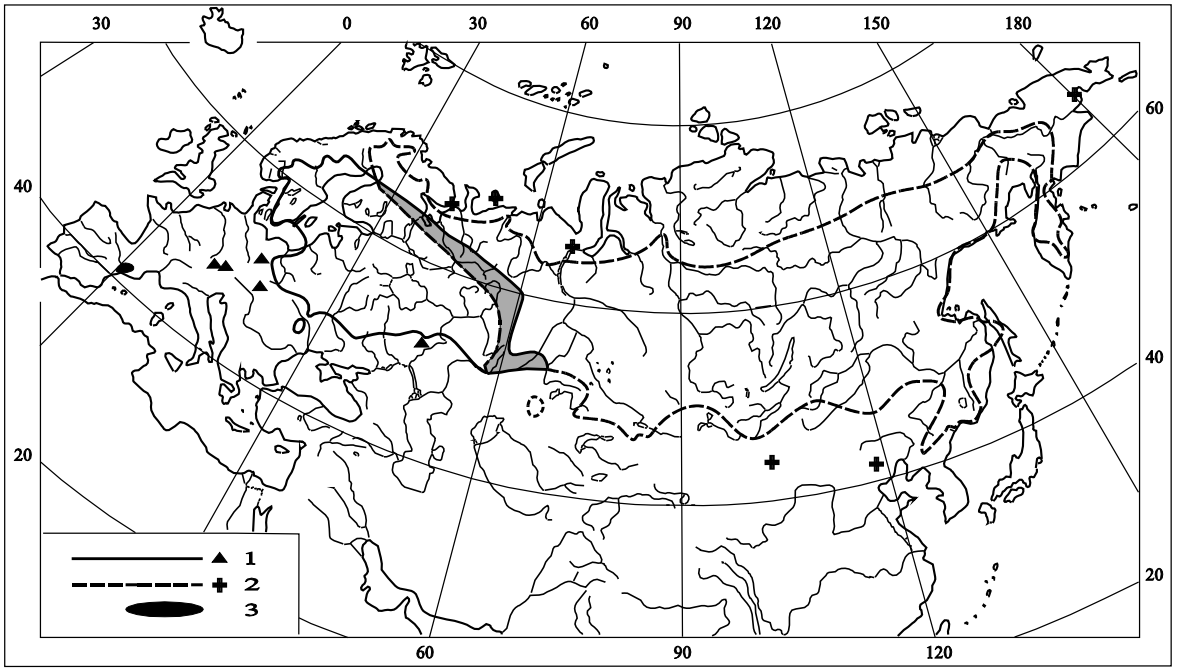

Fig. 44. Distributional areas of *Salix starkeana* Willd. (*1*), *S. bebbiana* Sarg. (*2*), transitional zone where these species hybridize (*3*), and area of *S. tarraconensis* Pau ex Font (*4*)

Nazarov et al. 1952, Fl. URSR **4**: 43; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 96; id. 1964, Fl. Eur. **1**: 50.

T y p u s: "In Europae borealis sylvis. Fl. Lapp. N 369 et tab. 8, fig. V; Fl. Suec. N 810".

HABIT: A shrub of a medium size (1–3 m).

HABITATS: Mesotrophic edges of wetlands, damp lowlands, and light forests. In regions with positive moisture balance, it is also found in a wide variety of secondary habitats, such as roadsides, ruts, embankments, clearings, burns, field boundaries, and abandoned meadows. It is assosiated with acidic and poor soils.

DISTRIBUTION: Major part of Central and Northern Europe including the British Isles, France (except the southeast), Spain (very rare, only in the Pyrenees), Switzerland, Austria, Slovenia, Czechia, Slovakia, Transilvania, Germany, Poland, southern half of Norway, and nearly all of Sweden and Finland. In northern European Russia, it reaches the Kandalaksha Bay, Arkhangelsk, and the Middle Mezen. Eastwards, it goes to Pre-Uralia (the Vychegda and Kama river basins). There are some solitary locations in the Urals from Denezhkin Kamen to Kyshtym; behind the Urals, it is found in the Konda Basin. The southern limit of the species goes along the Lower Kama, then south of Ulyanovsk, Tambov, and Voronezh, via the southern part of Central Russian Upland, Kursk, and Kiev, towards the Carpathians. Some solitary locations are known south of this boundary, in sand dunes. The most remote one is in Buzulukskiy Bor. References to the Altai (Polyakov 1960) are erroneous. (Fig. 43.)

In Scotland, it ascends to 750 m; in the French Massif Central, to 1,750 m; in the *172*
Alps, it is known to reach 1,100 m, in the Tatras and Eastern Carpathians, 1,600 m.

68. **S. salvifolia** Brotero, 1804, Fl. Lusit. **1**: 29; Coutinho, 1899, Bol. Soc. Broter. **16**: 23; Merino, 1906, Fl. Galicia **2**: 619; Coutinho, 1939, Fl. Portugal.: 190; Almeida, 1944, Publ. Serv. Florest. **11**: 133, 141; Vicioso, 1951, Salic. Españ: 101; Rech. f. 1964, Fl. Eur. **1**: 50. —An *S. salviaefolia* Link ex Willd. 1806, Sp. pl. **4**, 2: 688? —*S. oleifolia* Lange, 1870, in Willk. et Lange, Prodr. fl. Hisp. **1**: 229; Laguna, 1883, Fl. forest. Españ **1**: 148. —Non *S. oleifolia* Vill. 1789, nec Smith, 1804.

T y p u s: "Ad Mundae margines, Brotero". (LISU, n. v.).

HABIT: A medium-sized or tall shrub or a small tree.

HABITATS: Banks of streams and damp places.

DISTRIBUTION: All of Portugal and major part of Spain from Galicia to Burgos, Logroño, Castellón de la Plana, and Ciudad Real. (Fig. 38.)

Subsect. *Substriatae*

Görz, 1928, Feddes Repert. Beih. **52**: 140 (p. p.).

T y p u s: *Salix starkeana* Willd.

Shrubs or small trees with short trunks. Wood usually with short, scattered striae. Floriferous buds elongated, lanceolate or oblong-lanceolate, flattened on adaxial side, attenuating into somewhat recurved beaks. Leaves comparatively moderate-sized, elliptic, rarely obovate. Capsules narrowly lanceolate or sublinear, stipitate; stipes considerably elongating on flowering, usually longer than bracts.

69. **S. tarraconensis** Pau ex Font, 1915, Treb. Inst. Catal. Hist. Natur. **1**: 15 et tab. 2; Görz, 1929, Saul. Catal.: 41; Cadevall, Font, 1933, Fl. Catal. **5**: 183; Font, 1950, Fl. Cardó 75; Vicioso, 1951, Salic. Españ: 73; Rech. f. 1964; Fl. Eur. **1**: 53.

173 T y p u s: "Tossa de Caro, penyals calissos a 1,400 m" (BC, n. v.).

HABITATS: Calcareous rocks in the mountains, mostly on northern slopes, at 800–1,400 m.

DISTRIBUTION: Southern Tarragona and northern Castellón de la Plana provinces in northeastern Spain. (Fig. 44.)

NOTE. This is a strict endemic species so far known only from a few localities. Thanks to the courtesy of Prof. O. de Bolós (Barcelona), I got fragments of three samples to examine; that was sufficient to admit *S. tarraconensis* as a distinct species. It appears to be quite obvious that the species is close to *S. starkeana*. Grounds for placing it close to *S. coesia* (Rech. f., l. c.) are provided by purely casual resemblance. Stamen filaments are partially connate in both species; there is no doubt that there also exist plants with distinct stamens.

70. **S. starkeana** Willd. 1806, Sp. pl. **4**, 2: 677; id. 1820, in Guimpel, Willd. Hayne, Abbild. Holz. **2**: 232; Besser, 1822, Enum. Volhyn.: 37; Floderus, 1943, Sv. bot. tidskr. **37**: 81; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 103; id. 1964, Fl. Eur. **1**: 51. — *S. livida* Wahlenb. 1812, Fl. lapp.: 272; Wimmer, 1866, Salic. Eur.: 108; Wolf, 1930, Fl. Yu.-V. **4**: 53; Nazarov, 1936, Fl. SSSR **5**: 105; Nazarov et al. 1952, Fl. URSR **4**: 48. — *S. depressa* auct. (non L. 1755, Fl. Suec. 2 ed.: 332), p. p. (quoad pl. folliis glabris): Fries, 1832, Mantissa **1**: 56; id. 1840, Bot. not.: 197; Ledeb. 1850, Fl. Ross. **3**, 2: 611; Seemen, 1909, in Aschers. et Graebn. Synopsis **4**: 115; Perfilyev, 1936, Fl. Sev. kr. **2–3**: 35; Skvortsov, 1964, in Mayevsk. Fl. sredn. pol. 9 ed.: 191. —*S. vagans* Anderss. 1858, Öfver. K. vet. förhandl. **15**: 121; id. 1858, Bot. not.: 45; id. 1867, Monogr. Salic.: 86, p. p.

T y p u s: "Silesia, prope Gurau, leg. Starke" (B, LE! K, S).

HABIT: A shrub of a medium size (1–3 m), which sometimes may grow as a small tree to 4 m tall.

HABITATS: Light forests (particularly, pine and birch ones), forest edges, clearings, burns; also field boundaries, roadsides, etc. (usually together with *S. aurita* or *S. myrsinifolia*).

DISTRIBUTION: Sweden, southern Finland, southern Karelia; the basins of the Sukhona, Vychegda, Kama, and Belaya. In the south, it reaches northern Saratovskaya Oblast, Voronezh, Kharkov, Kiev, Berdichev, and Lvov. In the Carpathians, it is
174 encountered only in Bukovina; in eastern Poland and the Sudetes, it is distributed sporadically. There are some solitary locations in Slovakia and southern Germany. (Fig. 44.)

NOTE. Along the northern and eastern boundary of its distributional area, *S. starkeana* is hybridizing with *S. bebbiana* en masse (see the note to that species).

71. **S. bebbiana** Sarg. 1895, Gard. Forest **8**: 463; id. 1896, Sylva Amer. **9**: 131 et tab. 477 (nom. nov. pro *S. rostrata* Richardson, 1823); Schneider, 1920, J. Arn. Arb. **2**: 66; Floderus, 1933, Ark. bot. **25A**, 10: 7; Nazarov, 1936, Fl. SSSR **5**: 108; Hultén, 1943, Fl. Al. **3**: 544; Raup, 1943, Sargentia **4**: 116; id. 1947, ibid. **6**: 159; id. 1959, Contrib. Gray Herb. **185**: 79. —*S. rostrata* Richardson, 1823, in Franklin, Journey: 753. —Non *S. rostrata* Thuill. 1799, Fl. Paris: 516. —*S. livida cinerascens* Wahlenb. 1812, Fl. lapp.: 273. —*S. depressa* auct. (non L.) p. p. (quoad pl. folliis pubescentibus): Fries, 1832, Mantissa **1**: 56; id. 1840, Bot. not.: 197; Ledeb. 1850, Fl. Ross. **3**, 2: 611; Krylov, 1930, Fl. Zap. Sib. **4**: 753; Perfilyev, 1936, Fl. Sev. kr. **2–3**: 38; Polyakov, 1960, Fl. Kazakhst. **3**: 29 (p. p.: quoad var. *cinerascens*). —*S. macropoda* Stschegl. 1854, Bull. Soc. Natur. Moscou **27**, 1: 197. —*S. vagans* Anderss. 1858, Öfver. K. vet. förhandl. **15**, 3: 121; id.

1867, Monogr. Salic.: 86, p. p. —*S. perrostrata* Rydb. 1901, Bull. N. Y. Bot. Gard. **2**: 163. —*S. cinerascens* Flod. 1926, Ark. bot. **20A**, 6: 48; id. 1926, in Lindman, Sv. Fanerogam-fl.: 209; Komarov, 1929, Fl. Kamch. **2**: 10; Nazarov, 1937, Fl. Zabayk. **3**: 106; Popov, 1959, Fl. Sredn. Sib. **2**: 794. —Non *S. cinerascens* Willd. 1806. —*S. xerophila* Flod. 1930, Bot. not.: 334; id. 1933, op. cit. **25A**, 10: 7; Nazarov, 1936, op. cit. **5**: 107; Schlyakov, 1956, Fl. Murm. **3**: 97; Rech. f. 1964, Fl. Eur. **1**: 51. —*S. floderii* Nakai, 1930, Fl. sylv. Kor. **18**: 123 (p. p.: excl. *S. abscondita* Laksch. et *S. taraikensis* Kimura). —*S. orotchonorum* Kimura, 1934, in Miyabe, Kudo, Fl. Hokk. a. Saghal. **4**: 444; Sugawara, 1939, Ill. Fl. Saghal. **2**: 689; Tolmachev, 1956, Der. i kustarn. Sakhal.: 65. —*S. starkeana* Willd. ssp. *cinerascens* (Wahlenb.) Hultén, 1950, Atlas: N 586; Benum, 1958, Fl. Troms.: 181. —*S. hsinganica* Chang et Skvortz. 1955, in Liou Tchen ngo, Ill. Fl. Tr. Shr. Northeast China: 556.

T y p u s: "Forest regions of Canada W. of Hudson Bay. —1819–1822, Richardson" (NY, K, GH, n. v.).

HABIT: A medium-sized shrub or, frequently, small (up to 5–6 m) tree with a short stem and wide crown.

HABITATS: Lighted forests (particularly, pine and larch stands), stony slopes, various secondary postforest habitats, dry to moderately paludal ones. The species copes with any kind of bedrock and can grow even on very poor soils.

DISTRIBUTION: Swedish and Finnish Lapland, northern Karelia, and the southern Kola Peninsula; the northern forest belt in European Russia (with the southern limit along the line Arkhangelsk—Syktyvkar); the entire Urals. In Asia, the southernmost locations are in the Ulu Tau, Karkaralinskiye Mountains, Tarbagatay, southern Tuva, the Khangai, Kentei, northernmost mountainous regions of Northeast China, and the extreme north of the Korea Peninsula. Isolated fragments of the area are located in the Gobi Altai and mountains of Jehol. In the north, the area includes the Anadyr Basin and Kamchatka, its limit nearly reaching the northern limit of the forest belt. Of all the Far East Pacific islands, it occurs only on Sakhalin. In the tundra and forest-tundra, it is encountered occasionally, presumably, as an anthropogenic plant (Kolguyev Island, the Pechora, Ob, and Kolyma mouths, and the Gulf Kresta). (Fig. 44.)

In the Southern Urals, it ascends to 800 m; in the Northern Urals (Kosvinskiy Kamen), to 600–700 m; in the Altai, Sayans, and Stanovoye High Plateau, to 1,600 m; in Oymyakon District, to 750 m.

NOTE. B. Floderus (1933) was the first to identify the plants from Asia (the Anadyr River Basin) with *S. bebbiana*. However, inconsistently and without any reason, he recognized one more species, *S. xerophila* growing at the same place, the Anadyr River Basin. It is absolutely impossible to treat the Siberian plants as two different species. At the *175* same time, one cannot discriminate between the Siberian and American specimens. Apparently, we have to extend the name *S. bebbiana* to the entire Eurosiberian area. In the Urals and northern Europe, where the areas of *S. starkeana* and *S. bebbiana* come into contact, there is a wide transitional zone, apparently of hybrid nature. That makes it possible to treat *S. bebbiana* as a subspecies of *S. starkeana*. In that case, the valid name should be *S. starkeana* ssp. *cinerascens* Hultén, 1950.

One can occasionally find specimens with conspicuous pubescence on leaves and shoots even deep inside the area of *S. starkeana*. The presence of these plants has given grounds to enlist *S. bebbiana* (*S. xerophila*) for the territory of the European temperate belt, as it was done, for example, in the "Flora" by P. Mayevskiy (ed. 7, 8; 1940, 1954). However,

besides the pubescence, there are some other characters that help to discriminate between the two species, although these characters are rather indistinct: in *S. bebbiana*, shoots are of more dull, brownish color; leaves are more abruptly narrowing towards the base, their veins more pronounced beneath; the glaucous bloom on the leaves is less pronounced; also, the cataphylls are less sericeous. Pubescent specimens from the European temperate belt usually do not exhibit these features, and therefore, from a taxonomical point of view, we would rather treat them merely as specimens of *S. starkeana*. However, it is quite possible that the pubescence is a relict character inherited from *S. bebbiana*, which possibly had occupied the European temperate climate regions before, but then was superseded and taken up by *S. starkeana*. Spruces provide a similar example: within the European temperate belt, one may occasionally come upon spruces with cones approximating the *Picea obovata* type.

72. **S. taraikensis** Kimura, 1934, in Miyabe, Kudo, Fl. Hokk. a. Saghal. **4**: 419; Sugawara, 1939, Ill. Fl. Saghal. **2**: 673; Tolmachev, 1956, Der. i kustarn. Sakhal.: 68; Ohwi, 1965, Fl. Jap.: 366. —*S. livida* var. *sibirica* Lakschewitz, 1914, Spisok rast. Gerb. russk. fl. **50**: N 2472. —*S. livida* auct. non Wahlenb. 1812: Nazarov, 1936, Fl. SSSR **5**: 105 (quoad pl. Sibiriae et Orientis Extrem.); id. 1937, Fl. Zabayk. **3**: 195; Grubov, 1955, Konsp. fl. Mong.: 101; Popov, 1959, Fl. Sredn. Sib. **2**: 794; Cherepnin, 1961, Fl. yuzhn. ch. Krasnoyar. kr. **3**: 16; Sergiyevskaya, 1961, Fl. Zap. Sib. **12**: 3226 (p. p.); Koropachinskiy, Skvortsova, 1966, Der. i kustarn. Tuvy: 76. —*S. floderii* var. *glabra* Nakai, 1930, Fl. sylv. Kor. **18**: 126. —*S. starkeana* (non Willd.) Nazarov, 1936, op. cit. **5**: 106; Liou Tchen ngo, 1955, Ill. Fl. Tr. Shr. Northeast China: 171. —*S. abscondita* (non Lakschewitz) Flod. 1936, Sv. bot. tidskr. **30**: 398.

T y p u s: "Sachalin australis, Shikka, Siska, 7.VI et 21.VIII 1927. A. Kimura N 671 (♀); ibid. 11.VI et 22.VIII 1927. Id. N 700 (♂)" (Herb. Kimura, Sendai, Japonia, n. v.).

HABIT: A tall shrub or, frequently, tree to 10–12 m tall.

HABITATS: Light forests, forest edges, stony slopes, and a vast variety of secondary postforest habitats (much like *S. bebbiana*, however, avoiding very poor and paludal soils).

DISTRIBUTION: The Altai (sparsely in the Katun Basin, so far not known from Chuyskaya Steppe); Pechi on the Bukhtarma (the westernmost location); the Western Sayans, Kuznetskiy Alatau, and Tuva (rather scattered). It becomes fairly common east of the Yenisei. The northern area limit crosses the Angara Mouth, Tura on the Lower Tunguska, Elgyay on the Vilyuy, Sangar on the Lena, the southern Verkhoyanskiy Range (around Tompo), Ayan, and also Bolshoy Shantar, Sakhalin, and Kunashir islands. The southern boundary goes via northern Hokkaido, the very north of the Korea Peninsula, forested parts of Northeast China, the Kentei, and Lake Koso (Hövsögöl, Khöbsögöl) in
176 Mongolia. Some isolated fragments of the area are found in the Chinese Altai, Khangai, Gurban Bogdo, and the mountains north of Beijing. (Fig. 42.)

In the Altai and Sayans, it ascends to 1,600–1,700 m; in the northern Sikhote-Alin and southern Verkhoyanskiy Range, to 600 m; in the southern Sikhote-Alin, to 800 m; in the southern Mongolian Altai (the Baga Bogdo), to 2,000 m.

NOTE. Although *S. taraikensis* is one of the most common willows in East Siberia and the Far East, it has been remaining unclarified and habitually confused with *S. starkeana*. A. Kimura considered *S. taraikensis* to be an endemic of Sakhalin and Hokkaido. However, there is no doubt at present that the plants from Sakhalin and the Kurils are identical to those growing in the Altai or around Irkutsk. That becomes obvious when one examines the bulky material from Sakhalin and Kunashir that is available now. I inspected

15 samples from Kunashir (A. Kimura had not had any material from there) as well as scores of samples from Sakhalin.

73. **S. abscondita** Lakschewitz, 1914, Spisok rast. Gerb. russk. fl. **50**: N 2471; Nazarov, 1936, Fl. SSSR **5**: 77. —*S. floderii* Nakai, 1930, Fl. sylv. Kor. **18**: 123 (p. p.). —*S. tatewakii* Kimura, 1934, in Miyabe, Kudo, Fl. Hokk. a. Saghal. **4**: 422. —*S. sugawarana* Kimura, 1934, op. cit. **4**: 417; Sugawara, 1939, Ill. Fl. Saghal. **2**: 671. —*S. raddeana* Lakschewitz ex Nasarov, 1936, op. cit. **5**: 92, 107. —*S. oleninii* Nasarov, 1936, op. cit. **5**: 93, 108; Karavayev, 1958, Konsp. fl. Yakut.: 83. —*S. enanderii* Flod. 1936, Sv. bot. tidskr. **30**: 396.

T y p u s: "In urbe Czita. 10.V 1910 et 10.VIII 1910 leg. G. Stukov" (Herb. Fl. Ross. N 2471, LE!, MW! et alibi).

HABIT: A tall shrub or, more often, small tree (to 6–8 m) with a short stem and wide crown.

HABITATS: Forest openings, edges, and clearings; coppices on slopes of *sopka*'s and in damp depressions; ditches and roadsides. Quite often, it is found together with *S. taraikensis*, yet restricted to soils that are richer in humus. On the other hand, it may cope with more paludification and less light in comparison with *S. taraikensis*. Therefore, it is often found in river valleys or eutrophic wetlands that cover bottoms of *pad*'s. Presumably, it does not ascend to any considerable heights in the mountains.

DISTRIBUTION. The western border of the species area runs via Irkutsk, the interfluve between the Angara and Upper Lena, the Chona Basin, and Middle Vilyuy. In the north and northeast, the species is distributed, presumably with some gaps, to the Middle Olenek, Srednekolymsk, the Upper Indigirka and Upper Kolyma, Okhotsk, the Maya (a tributary of the Aldan), and the mouth of the Amur (not yet collected near Ayan and in Udskoy District). On Sakhalin, it is found only in the Upper Tym and Upper Poronay basins. The southern limit is in the northernmost Korea, the forested regions of Northeast China, and the Shilka and Argun basins including the Kentei; isolated fragments of the area are in the mountains of Jehol, north of Beijing (Ch'aoyangwantzu [Chevantsze]). (Fig. 41.)

NOTE. While working in the Leningrad Herbarium, P. Lakschewitz put aside a large series of samples to be described under the name of *S. subphylicifolia*. In the publication, however, he changed that name to *S. abscondita*. The change itself did not cause any problems, but the trouble was that P. Lakschewitz mixed two different species under the name of *S. subphylicifolia*. Except the one distributed in exsiccatae under the name *S. abscondita*, P. Lakschewitz placed a considerable number of *S. taraikensis* samples there. The very epithet '*subphylicifolia*' was chosen to emphasize a resemblance to *S. phylicifolia*. Yet it is *S. taraikensis* that resembles *S. phylicifolia* and not *S. abscondita* sensu proprio. Also, in the original diagnosis of *S. abscondita*, one can definitely recognize some characters of *S. taraikensis*. Due to that, *S. abscondita* has been considered an obscure and doubtful species. However, since the type specimens belong to only one of these two species, the name *S. abscondita* Laksch. is valid.

74. **S. iliensis** Rgl. 1880, Acta Horti Petropol. **6**: 464; Nazarov, 1936, Fl. SSSR **5**: 111; Drobov, 1941, Bot. mat. Bot. in-ta, Tashk. **5**: 4; id. 1953, Fl. Uzb. **2**: 35; Skvortsov, 1962, Bot. mat. Gerb. In-ta bot. AN UzbSSR **17**: 65. —*S. pseudolivida* Goerz, 1936, Trudy Tadzh. bazy **2**: 171. —*S. depressa* ssp. *iliensis* Hiitonen, 1950, Mem. Soc. F. Fl. Fenn. **25**: 82. —*S. depressa* var. *iliensis* P. Pol. et var. *macropoda* P. Poljakov, 1960, Fl. Kazakhst. **3**: 29. —*S. caprea*, *S. livida*, *S. depressa* in schedis et in operis impressis scrutatorum fl. Asiae Mediae, non L. nec Wahlenb. nec Fries. *177*

T y p u s: "Sarybulak prope Kuldscha, 4,000'–6,000', 22.IV 1878. Regel" (LE!).

HABIT: A medium-sized or tall shrub or a small (to 7–8 m) tree with a short stem and wide crown.

HABITATS: Forest openings and open woodlands; stony alluvial cones, *sai*, and banks of small streams. Being mostly restricted to forested regions, it may spread to mountainous steppes along *sai* and streams, particularly at high elevations.

DISTRIBUTION: The entire Tien Shan including its Chinese part (except the Karatau northeast of the Syr Darya River); the Pamir-Alay Region including Kashgaria (nearly everywhere, except the westernmost part—the Baysun Mountains and Kashka Darya Basin); the Hindu Kush and Karakorum. (Fig. 43.)

In the Dzungarskiy Alatau and Zailiyskiy Alatau, the species descends to the lower limit of the spruce forests (1,200–1,400 m); in the Pamir-Alay, it presumably does not go any lower than 2,000 m; in the Karakorum and Eastern Pamirs, it is encountered as high as 3,900 m.

75. **S. pseudodepressa** A. Skv. 1966, Trudy Bot. in-ta AN ArmSSR **15**: 127; id. 1966, Spisok rast. Gerb. fl. SSSR **91**: N 4536. —*S. livida* Goerz, 1930, in Grossheim, Fl. Kavk. **2**: 8; id. 1934, Feddes Repert. **36**: 232. —Non *S. livida* Wahlenb. —*S. xerophila* auct non Floderus, 1930: Grossheim, 1945, Fl. Kavk. 2 ed. **3**: 21. —*S. aurita* auct. non L.: Grossheim, 1945, op. cit. **3**: 20.

T y p u s: "Turcia, prov. Kars, prope Sarykamysch, in palude ad rivulum. 29.VI 1914 D. I. Litvinov" (Herb. Fl. URSS N 4536, LE, MW et alibi).

HABIT: A medium-sized or low shrub.

HABITATS: Pine and birch stands, rocks, and damp depressions in the upper forest and subalpine zones at 1,600–2,300 m.

DISTRIBUTION: The Caucasus. This is a rather rare plant. Its area consists of three isolated fragments: in Turkish Armenia (5 known locations), Dagestan (13 findings), and Balkaria (2 locations). (Fig. 43.)

NOTE. According to its morphological characters, *S. pseudodepressa* occupies a kind of intermediate position between *S. bebbiana* and *S. iliensis*. However, it can be identified with neither of these species. A completely isolated distributional area is one more argument in favor of its distinctiveness.

Sect. 16. *Arbuscella*

Seringe ex Duby, 1828, in DC. Bot. Gall. 2 ed.: 426 (p. p.).

T y p u s: *Salix arbuscula* L.

Low or medium-sized shrubs. Shoots typically of reddish colors. Floriferous buds different from vegetative ones, either slightly or considerably; in the latter case, attenuating into beaks. Most typical leaves contrastingly bicolorous: lustrous, dark green above, glaucous or whitish beneath, their veins very straight and slender. Leaf margins uniformly
178 denticulate, rarely subentire. Catkins precocious to serotinous. Nectary solitary. Ovary acute, mostly covered with appressed sericeous trichomes, attenuating into distinct style.

This is a very compact, natural, and distinct group, which consists of some 16–18 species, primarily, from the Old World (there are two or three American species). The majority of species are restricted to subarctic and subalpine areas and have comparatively

small geographical ranges. The affinity with the sections *Glabrella* and *Nigricantes* is quite obvious; connection with *Vimen* is also possible.

Key to Species

1. Floriferous buds significantly different from vegetative ones, 7–12 mm long. Catkins precocious or subprecocious, sessile or stalked; stalks short, stout (about 1 mm thick), with a few underdeveloped leaflets. Bracts black, 1.5–3 mm long, densely covered with straight trichomes exceeding bract apex by 1–1.5 mm or more. Male catkins in bloom more than 10 mm thick. Dry anthers 0.6–0.7 mm long. (Subsect. *Bicolores*) . . . 2
— Floriferous buds not that much different from vegetative ones, 4–7 mm long. Catkins coetaneous or serotinous, borne on slender, foliated stalks. Bracts mostly pale or brownish, rounded at apex, to 1.5 (rarely 2) mm long, sparsely covered with thin, uneven trichomes exceeding bract apex often not more than by 1 mm. Male catkins in bloom less than 10 mm thick. Dry anthers 0.3–0.4 mm long. (Subsect. *Arbusculae*) 7
2. Stipules mostly fully developed, narrowly lanceolate or linear-subulate, often persistent after leaf abscission. Leaves rhomboid-elliptic, equally acuminate at base and apex, entire or with very obscure, shallow denticles, their veins slender, very regularly parallel to each other. Bracts acute. Styles mostly not shorter than 1 mm . . . . . 78. **S. pulchra**
— Either leaves exstipulate or stipules obliquely semicordate, conspicuously inequilateral. Leaves of different shape or leaf margins and veins not as above 3
3. Capsule stipes 0.6–1.8 mm long, not shorter than nectaries 4
— Capsule stipes 0.2–0.5 mm long, not longer than nectaries 5
4. Young leaves (and mostly shoots) pubescent. Veins of second and third order prominent beneath, especially on young leaves, so that leaves resemble those of species from section *Nigricantes* or *Vetrix*. Bracts mostly brown . . . . . 77. **S. basaltica**
— Young leaves and shoots glabrous or covered with very sparse, fugacious pubescence. Only veins of second order prominent beneath. Bracts mostly black . . . . . 76. **S. phylicifolia**
5. Leaves mostly broadest distinctly above middle of blades, large (40–80 mm long). Female catkins in fruit 50–80 mm long. Bracts and capsules ascending obliquely upward, not deflected. Stigmas 0.6–0.7 mm long, linear, two-parted . . . . . 79. **S. kikodseae**
— Leaves lanceolate or elliptic, acute both at base and apex, broadest about their middle. Female catkins in fruit 25–50 mm long. In mature catkins, bracts mostly deflected backwards. Capsules deflected at right angle to rachises, mostly starting from time of flowering. Stigmas 0.3–0.5 mm long, two-lobed 6 *179*
6. Leaves entire, or very vaguely dentate, or coarsely and rather irregularly dentate. Female catkins rather loose at base. Styles 0.6–1.0 mm long . . . 81. **S. divaricata**
— All leaves delicately serrulate; serration acute, regular nearly all along leaf margins. Female catkins compactly flowered at base. Styles 0.7–1.5 mm long . . . . . 80. **S. tianschanica**

7(1). Leaf margins more or less revolute and undulate-dentate, 40–80 mm long. Catkins serotinous, their bracts rufescent-brown. Ovaries glabrous, either entirely or in their upper part . . . . . 89. **S. rhamnifolia**

— Leaf margins neither revolute nor undulate. Ovaries entirely pubescent 8
8. Leaves narrowly elliptic or sublinear (4–8 times as long as broad), delicately and sharply serrulate, frequently covered with longitudinally appressed silvery trichomes. Inferior leaves often broader than ordinary and superior ones. Floriferous buds very different from vegetative ones, lanceolate, with flat beaks, mostly blackening by winter time. Catkins coetaneous or, more often, subprecocious, mostly on leafless or scantily foliated stalks, their bracts typically blackish . . . . . 88. **S. boganidensis**
— Leaves not as above, 1.5–4 times as long as broad. Floriferous buds usually without distinct beaks, not blackening. Catkins coetaneous or serotinous 9
9. Leaves with numerous stomata above 10
— Leaves without stomata above 12
10. Floriferous buds conspicuously different from vegetative ones. When catkins expand from buds, bracts already blackish-brown or black, their width 1–1.5 mm in female flowers . . . . . 84. **S. kazbekensis**
— Floriferous buds inconspicuously different from vegetative ones. Bracts pale or brownish, up to 1 mm broad 11
11. Leaves with rounded denticles and small, inconspicuous glands. Their reticulation very distinct, composed of delicate veins . . . . . 82. **S. arbuscula**
— Leaves with very dense, acute denticles bearing large white glands; reticulation not that conspicuous . . . . . 83. **S. foetida**
12(9). Low shrub with short branches. Leaves small (20–40 mm long), entire or with very slender, acute denticles. Styles 0.6–1.2 mm . . . . . 85. **S. waldsteiniana**
— Branches rather elongated. Styles 0.1–0.4 mm 13
13. Floriferous buds 4–7 mm long. Leaves 30–70 mm long, mostly oblanceolate, crenate-dentate. Bracts brownish . . . . . 86. **S. saposhnikovii**
— Floriferous buds 3–5 mm long, scarcely different from vegetative ones. Leaves 20–40 mm long, mostly broadly elliptic, entire or serrulate. Bracts pale . . . . . 87. **S. dshugdshurica**

180

Subsect. *Bicolores*

A. Skv. subsect. nova. Novosti sist. vyssh. rast. a. 1968 describetur.
T y p u s: *Salix phylicifolia* L.

Floriferous buds greatly different from vegetative ones, large (7–12 mm long), lanceolate, their beaks flattened. Catkins precocious or subprecocious, sessile or stalked; stalks short, stoutish, leafless or nearly leafless. Bracts black or blackish-brown, 1.5–3 mm long, pubescent on both sides, their trichomes dense, white, and straight. Male catkins in full bloom more than 10 mm in diameter. Dry anthers 0.6–0.7 mm long, oval.

76. **S. phylicifolia** L. 1753, Sp. pl.: 1016 (p. p.: excl. var. ß); Ledeb. 1850, Fl. Ross. **3**, 2: 611; Wimmer, 1866, Salic. Eur.: 70; Anderss. 1867, Monogr. Salic.: 131 (p. p.); Seemen, 1909, in Aschers. et Graebn. Synopsis **4**: 140; Krylov, 1930, Fl. Zap. Sib. **4**: 750 (p. p.: excl. pl. altaic. et Sib. Or.); Perfilyev, 1936, Fl. Sev. kr. **2–3**: 35; Nazarov, 1936, Fl. SSSR **5**: 71; Floderus, 1931, Salic. Fennosc.: 45; id. 1939, Ark. bot. **29A**, 18: 1; Buser, 1940, Ber. Schweiz. bot. Ges. **50**: 707; Nazarov et al. 1952, Fl. URSR **4**: 33; Shlyakov, 1956, Fl. Murm. **3**: 80; Rech. f. 1964, Fl. Eur. **1**: 48; Krall, Viljasoo, 1965,

Eestis Kasv. pajud: 50. —*S. bicolor* Ehrh. ex Willd. 1796, Berlin. Baumz.: 339; Floderus, 1939, op. cit. **29A**, 18: 6; Dostá l, 1950, Květ. ČSR **2**: 893; Beldie, 1952, Fl. Rom. **1**: 294; Pawłowski, 1956, Fl. Tatr **1**: 187; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 84; id. 1964, op. cit. **1**: 48. —*S. hegetschweilerii* Heer, 1840, in Hegetschweiler, Fl. Schweiz.: 963 (p. p.: altera pars est *S. hastata* L. —cf. Buser, 1887: 66); Floderus, 1939, op. cit. **29A**, 18: 15; Janchen, 1956, Catal. fl. Austr. **1**: 20; Rech. f. 1957, op. cit. **3**, 1: 85; id. 1964, op. cit. **1**: 48, p. p. saltem. —*S. rhaetica* Kern. ex Anderss. 1867, op. cit.: 136. —*S. bifax* Wołoszczak, 1888, Öst. bot. Z. **38**: 225. —*S. arbuscula* auct. non L.: Wolf, 1900, Izv. Lesn. in-ta **5**: 91; Zapałowicz, 1908, Consp. Galic. **2**: 63. —*S. tatrorum* Zapałowicz, 1908, op. cit. **2**: 65. —? *S. hibernica* Rech. f. 1963, Öst. bot. Z. **110**: 340; id. 1964, op. cit. **1**: 48; Stelfox, 1965, Irish Natur. J. **15**, 2: 25.

T y p u s: "In Sueciae borealibus. Fl. Lapp. N 358 et tab. 8 fig. E: Fl. Suec. N 793".

Ssp. **rhaetica** (Flod.) A. Skv. comb. nova. —*S. bicolor* ssp. *rhaetica* Flod. 1939, Ark. bot. **29A**, 18: 10. —*S. bicolor* Willd. 1796. —*S. hegetschweilerii* Heer, 1840. —*S. rhaetica* Anderss. 1867. —*S. bifax* Wołoszczak, 1888. —*S. tatrorum* Zapałowicz, 1908.

T y p u s: "Tirol, Sellrainer Tal: Kerner, Herb. Öst. Weid. N 119 a, b" (W, FI! et alibi). Eadem planta e loco classico in Fl. Exs. Austro-Hungarica N 3857 edita. (LE! MW! et alibi).

Ssp. *rhaetica* is different from the major subspecies in elliptic leaves, smaller catkins, and more explicit staminate pubescence.

HABIT: A medium-sized shrub.

HABITATS: Lighted forests, forest edges, clearings, banks of streams and lake shores, damp lowlands and depressions, edges of wetlands; also, willow shrublands in tundras (together with *S. glauca* and *S. lanata*). Being rather indifferent to the quality of the bedrock, it occurs on acidic as well as basic substrates, stony and peaty grounds, rather dry and paludal ones, and so on. However, at the southern limit of its area, it is found almost exclusively in paludal lowlands.

DISTRIBUTION. There are two major areas. The main subspecies has a continuous distributional range in northern Europe and West Siberia; the subspecies *rhaetica* has a discontinuous area scattered over the mountains of Central Europe. The solid part includes Iceland, Scotland, northern Ireland, and most of Scandinavia (except the very south). The southern boundary of the continuous area approximates the line connecting Riga, Moscow, Murom, Nizhniy Novgorod, and Perm; deviating south to Magnitogorsk in the Urals, it again runs northwards toward Turinsk, then approximately via Tobolsk, Tara, and Kolpashevo. The eastern limit is somewhere in-between the Taz and Yenisei (there are also samples from the Yenisei collected near Dudinka). In the western Yamal, it reaches 72° N, missing, however, from the Yugorskiy Peninsula, Vaygach, and possibly the Novaya Zemlya, where it is substituted by *S. pulchra*. Kolguyev Island and the entire Kanin and Kola peninsulas are included in the north. *181*

The ssp. *rhaetica* occurs sparsely and not abundantly in the upper forest and subalpine zones of the Vosges, Harz, Sudetes, Alps, Tatras, and Eastern Carpathians (in Ukraine, at Chornogora). (Fig. 45.)

In Scotland and Iceland, it ascends to 600 m; in northern Norway (Tromsö), to 900 m; in the Khibins, to 600 m; in the Northern Urals (Denezhkin Kamen), to 1,000 m; in the Prepolar Urals (the Shchugor Basin), to 600 m; in the Polar Urals (the Sob and Khadata

basins), to 300–400 m. In the Tatras, its range is 1,600–1,900 m; in the Alps, 1,400–2,000 m.

NOTE. *S. phylicifolia* was erroneously reported for the territories of East Siberia including Yakutia (e. g., Karavayev 1958, Popov 1959), the Altai and Tien Shan (Krylov 1930, Polyakov 1960), and the Caucasus (Grossheim 1945). These data are to be attributed to other species.

Some European authors (Floderus 1939; Rechinger 1957, 1964) treated plants from the mountains of Central Europe as distinct species: *S. bicolor* and *S. hegetschweilerii*. I examined available Central European samples of *S. phylicifolia* and related species from the herbaria of St. Petersburg, Prague, Wien, Mü nchen, Paris, Florence, and Stockholm (LE, PR, W, M, P, FI, S). My opinion agrees with that of R. Buser (1940: 707 et seq.): we
182 cannot accept *S. bicolor*, *S. rhaetica*, and *S. hegetschweilerii* as distinct species. On the other hand, according to my opinion, the plants from the Pyrenees and French Massif Central, which were included in *S. bicolor* by B. Floderus and K. Rechinger, are to be treated as a distinct species *S. basaltica* (see the next species).

In the material that I got from Wien, there were four curious samples collected by A. Neumann and K. Rechinger in the Ötztaler Alps (Gurgl Valley). Both K. Rechinger and A. Neumann identified those samples as *S. hegetschweilerii*. Yet A. Neumann (personal communication) assumed that the species was approximating the section *Nigricantes* rather than *S. phylicifolia*. In fact, the samples appeared to exhibit characters of *S. phylicifolia* along with those of *S. mielichhoferii* and *S. glabra* (for instance, their capsules were glabrate or glabrous). They were probably hybrid plants (of three female samples, two had underdeveloped capsules). Another possibility is that they represented a restricted endemic species, not yet recognized. If this is the case, it is still absolutely impossible to identify it with *S. hegetschweilerii*. The problem needs further investigation.

The description of *S. hibernica* Rech. f. from northeastern Ireland was based on only two samples that were different from *S. phylicifolia* in their broader leaves and shorter capsule stipes, according to K. Rechinger. I did not have a chance to examine those samples; according to the description, the distinctness of that species appears to be doubtful.

77. **S. basaltica** Coste, 1896, Bull. Soc. Bot. Fr. **43**: 509. —? *S. semicordata* Dulac, 1867, Fl. Haut. Pyren.: 147. —*S. altobracensis* Coste, 1896, op. cit. **43**: 511. —*S. phylicifolia* auct. fl. Galliae centr. et Mont. Pyren. non L.: Coste, 1906, Fl. Fr. **3**: 268; Rouy, 1910, Fl. Fr. **12**: 211 (excl. pl. e Mont. Vosges); Görz, 1929, Saul. Catal.: 36; Cadevall, Font, 1933, Fl. Catal. **5**: 182; Vicioso, 1959, Salic. Españ: 93. —*S. bicolor* auct. non Willd.: Floderus, 1939, Ark. bot. **29A**, 18: 6 (p. p.: quoad pl. pyren. et Galliae centr.); Chassagne, 1956, Invent. Auvergne **1**: 232; Rech. f. 1964, Fl. Eur. **1**: 48 (p. p.: quoad pl. pyren. et Galliae centr.). —? *S. cantabrica* Rech. f. 1962, Öst. bot. Z. **109**: 374.

T y p u s: "Tourbières du plateau Aubrac, lisière supérieure du bois de Rigambal; montagne des Truques; sommet du bois de Laguiole. —J. Soulier et H. Coste" (P, vidi specim. ex Laguiole).

HABIT: A small or medium-sized (0.75–3 m) shrub.

HABITATS: Damp and peaty places.

DISTRIBUTION: The French Massif Central and Pyrenees at 1,000–1,800 m. It might also occur in the Cantabrian Mountains in northwestern Spain (see the note). (Fig. 45.)

NOTE. I examined 25 non-duplicate samples of *S. basaltica*; they provided enough evidence in favor of treating *S. basaltica* as a distinct species. It seems rather strange that

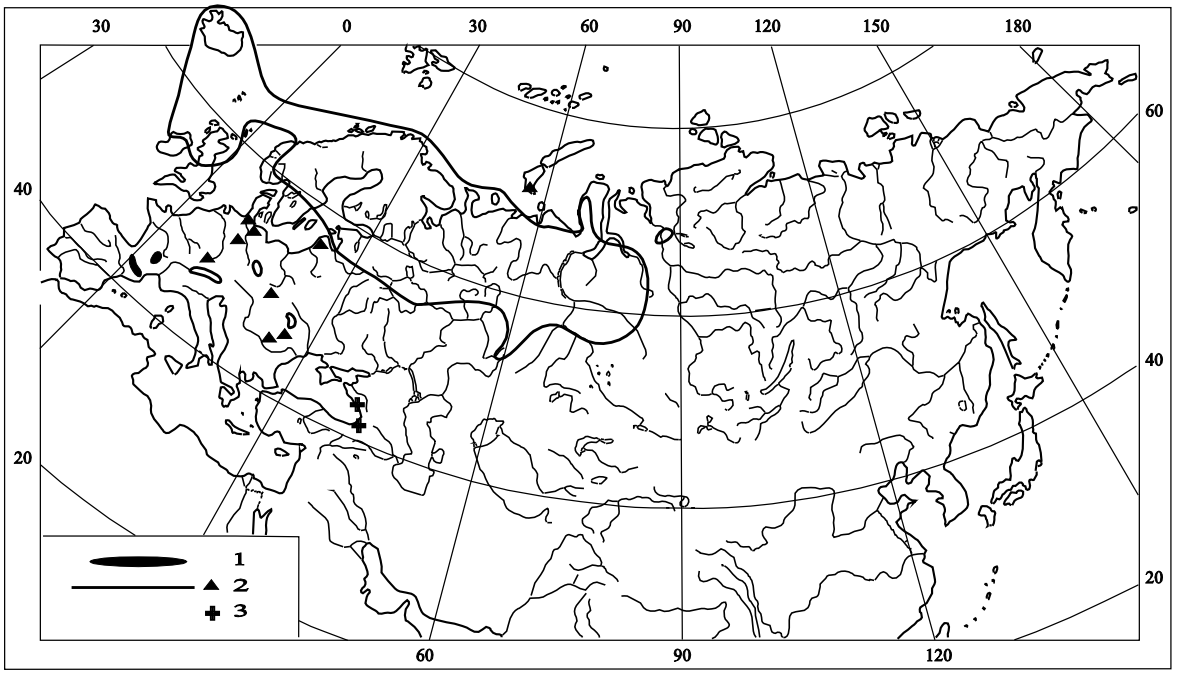

Fig. 45. Distributional areas of *Salix basaltica* Coste (*1*), *S. phylicifolia* L. (*2*), and *S. kikodseae* Goerz (*3*)

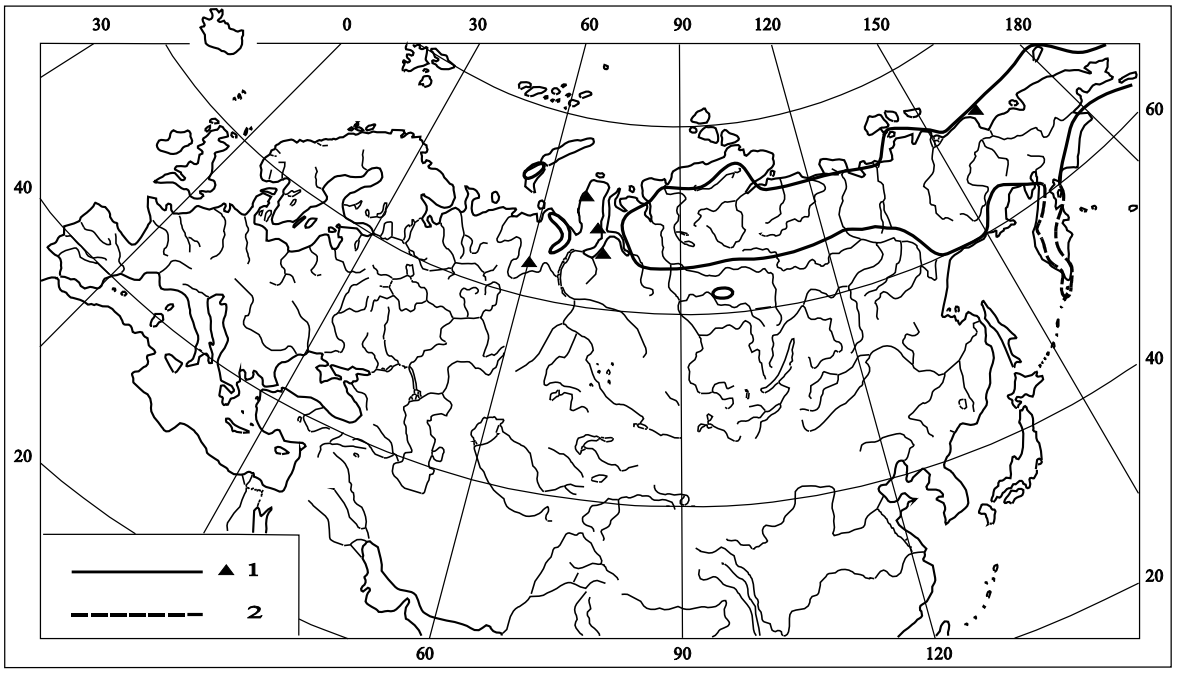

Fig. 46. Distributional areas of *Salix pulchra* Cham. (*1*) and *S. pulchra* ssp. *parallelinervis* A. Skv. (*2*)

the West European authors, who tried to segregate *S. bicolor* and *S. hegetschweilerii* as distinct species without providing enough reasons, at the same time, never recognized such a good species as *S. basaltica*. The author of the species, H. Coste, considered *S. basaltica* to be a hybrid of *S. pentandra* and *S. aurita*, a combination that was never encountered and is hardly possible. He treated another species, *S. altobracensis*, which he described together with *S. basaltica*, as a hybrid of *S. pentandra* and *S. cinerea* (an equally impossible combination). As it is implied by an investigation of H. Coste's plants, *S. altobracensis* is nothing else but *S. basaltica*. Neither B. Floderus nor M. Chassagne admitted the hybrid nature of *S. basaltica* and *S. altobracensis* and assigned both to *S. bicolor* (Floderus 1939, Chassagne 1956). Apparently, A. Neumann was the only one who recognized *S. basaltica* as a distinct species (Neumann in litt.).

183 The plants from the Vosges are clearly different from *S. basaltica* and undoubtedly belong to *S. phylicifolia* ssp. *rhaetica*.

S. cantabrica Rech. f. was described from the Cantabrian Mountains (northwestern Spain). Since the description was based on a single specimen, it remains dubious. Most probably, it is nothing other than *S. basaltica*.

In the literature, one can find the name *S. semicordata* Dulac. mentioned as a synonym of "*S. phylicifolia*" from the Pyrenees (Rouy 1910, Vicioso 1951, Chassagne 1956). If this is true, then the correct name for *S. basaltica* is *S. semicordata*. I have not yet had an opportunity to verify if this is right.

78. **S. pulchra** Cham. 1831, Linnaea **6**: 543; Coville, 1901, Proc. Wash. Acad. **3**: 319; Schneider, 1919, J. Arn. Arb. **1**: 70; Floderus, 1933, Ark. bot. **25A**, 10: 5; id. 1939, ibid. **29A**, 18: 20; Nazarov, 1936, Fl. SSSR **5**: 46; Hultén, 1943, Fl. Al. **3**: 547; Raup, 1959, Contrib. Gray Herb. **185**: 88; Skvortsov, 1961, Bull. MOIP **66**, 4: 30; id. 1966, Spisok rast. Gerb. fl. SSSR **91**: N 4534. —*S. taimyrensis* Trautv. 1847, in Middendorff, Reise Sibir. 1, **2**: 27 et tab. 5, 6; Ledeb. 1850, Fl. Ross. **3**, 2: 616. —*S. arctica* var. *taimyrensis* Anderss. 1868, in DC. Prodr. **16**, 2: 287; Krylov, 1930, Fl. Zap. Sib. **4**: 771. —*S. boganidensis* Trautv. 1847, in Middendorff, Reise Sibir. 1, **2**: 154 (p. p.: quoad. pl. in tab. 3 depictas). —*S. boganidensis* var. *latifolia* Trautv. 1879, Acta Horti Petropol. **6**, 1: 34. —*S. fulcrata* Anderss. 1867, Monogr. Salic.: 139 (p. p.: quoad pl. e America septentr. tantum, nec ad pl. e Kamtchatka, nec in fig. 73 depicta). —*S. parallelinervis* Flod. 1926, Ark. bot. **20A**, 6: 35; Komarov, 1929, Fl. Kamch **2**: 14; Nazarov, 1936, op. cit. **5**: 73. —*S. anadyrensis* Flod. 1933, op. cit. **25A**, 10: 9 et fig. 3; Nazarov, op. cit. **5**: 69.

T y p u s: "Promontorium Espenbergii, inque insula Laurentii —Chamisso" [S (fide Floderus 1939), LE (insula Laur.)!].

Ssp. **parallelinervis** (Flod.) A. Skv. 1961, Bull. MOIP **66**, 4: 31. —*S. parallelinervis* Flod. 1926, Ark. bot. **20A**, 6: 35.

T y p u s: "Kamtchatka: Opala volc.; fluv. Tolmatchevaja; inter Petropavlovsk et Avatcha —Svenska Kamtchatka exped. N 2224, 3879, 1038" (S!).

The subspecies is different in its shorter stipules and subprecocious catkins borne on short stalks.

HABIT: A shrub to 1.5–3 m tall in favorable conditions; it may be as well completely procumbent when growing in severe environment.

HABITATS: Open larch and poplar forests, *yernik*'s, banks of streams, various depressions, edges of wetlands, meadows, as well as tundras of various kinds, like moss-,

lichen-dominated, or graminoid, tussocky, hillocky, stony, and polygonal, except extremely paludal ones and those in high arctic regions.

DISTRIBUTION: Southern Island of the Novaya Zemlya, the Yugorskiy Peninsula, Polar Urals; the Prepolar Urals (scattered); the Lower Taz, and Gydanskaya Tundra. East of the Yenisei, it becomes very common growing nearly all across the tundras and barren heights. In the north, it reaches the mouth of the Pyasina, Lake Taimyrskoye, the mouths of the Olenek, Lena, and Yana, and islands Bolshoy Lyakhovskiy, Chetyrekhstolbovoy, and Wrangel. It is sparsely distributed across the northern forest belt reaching the Chunya River, the drainage divide between the Olenek and Upper Vilyuy, and Zhigansk. It is rather common on the barren heights of the Northeast reaching Okhotsk, Magadan, and the territory south of Verkhoyansk. The easternmost point is Cape Dezhnev.

Ssp. *parallelinervis* is distributed on Kamchatkan barren heights (starting from Koraga) and Paramushir.

In the Prepolar Urals (the Shchugor Basin), it is found at 900 m; in the Polar Urals (the Sob Basin), it ascends to 500 m; on the Kamchatka Peninsula, to 1,000 m. (Fig. 46.)

S. pulchra is a common species in Arctic North America reaching the Coronation Gulf as the easternmost point.

NOTE. *S. pulchra* is rather polymorphous, especially in certain parts of its area, such as the Indigirka, Kolyma, Anadyr, and Penzhina basins. There, along with plants common *185* to other Eurasian area parts, one can often find specimens with rather dense shoot pubescence, and sometimes even ones with pubescent leaves, particularly, the lower leaf surface. The pubescent forms are frequently characterized by rather large sizes and comparatively stout shoots. These powerful plants were described under the name of *S. anadyrensis* Flod. Yet, on the same territory, one can find perfectly normal *S. pulchra* which is absolutely identical to that from the Novaya Zemlya, Taimyr, or Chukotka, as well as all kinds of transitional forms. Therefore, we cannot segregate *S. anadyrensis* in a distinct species or even subspecies. Samples from the Lower Lena also occasionally exhibit conspicuous pubescence.

Plants that appear to be "intermediate" between *S. pulchra* and *S. phylicifolia* are rather common in the Lower Yenisei Basin, west of it (around the Ob and Taz Inlet), and particularly in the Polar Urals. These specimens may be of hybrid nature.

79. **S. kikodseae** Goerz, 1928, Feddes Repert. Beih. **52**: 133; id. 1930, Feddes Repert. **28**: 123; Skvortsov, 1961, Bull. MOIP **66**, 4: 31; id. 1966, Trudy Bot. in-ta AN ArmSSR **15**: 129. —*S. phylicifolia* auct. fl. caucas. non L.: Görz, 1934, Feddes Repert. **36**: 229; Grossheim, 1945, Fl. Kavk. 2 ed. **3**: 18; Dmitriyeva, 1959, Opred. rast. Adzhar.: 427; Makhatadze, 1961, Dendrofl. Kavk. **2**: 17.

T y p u s: Batumskiy District, the Machakhlis-Tskhali River Gorge, near the Settlement of Yefrat. 7.VII 1913. E. I. Kikodze [in Russian] (LE!).

HABIT: A small (?) shrub.

HABITATS: Moist slopes in the subalpine zone.

DISTRIBUTION. This willow is one of the rarest in Eurasia. So far, only seven samples are known, of which five are from Adzharia (including Turkish Adzharia) and two from Abkhazia. (Fig. 45.)

80. **S. tianschanica** Rgl. 1880, Acta Horti Petropol. **6**: 471; Nazarov, 1936, Fl. SSSR **5**: 84; Skvortsov, 1961, Bull. MOIP **66**, 4: 31; id. 1962, Bot. mat. Gerb. in-ta bot. AN UzbSSR **17**: 66.

T y p u s: "Tian-Schan, in valle f. Tekes super., 6500', VII 1857 Semenov" (LE!).

HABIT: A shrub 1–3 m tall.

HABITATS: Openings and exposed slopes in the spruce forest zone, particularly, its upper part. Occasionally, it forms very extensive pure shrublands in the ecotone between the spruce forest and alpine zones on well-watered northern slopes.

DISTRIBUTION: The Tien Shan (the ranges Ketmen, Zailiyskiy, Kungey Alatau, and all those south of Lake Issyk-Kul including the Atbashi Range as the westernmost and the Halik Tau on the Chinese territory as the easternmost one). Presumably, it is not found any farther in China (there are only two samples from the Chinese Tien Shan). Besides, there are isolated localities in the Kirgizskiy Range and Chimgan.

It is encountered as high as 3,200 m, presumably, never descending lower than 1,800 m. (Fig. 47.)

NOTE. *S. tianschanica* is omitted in the "Flora of Kazakhstan" (Polyakov 1960). Probably, P. Polyakov considered it to be "*S. arbuscula*".

81. **S. divaricata** Pall. 1788, Fl. Ross. **1**, 2: 80; Turcz. 1854, Fl. Baic.-Dah. **2**: 388; Nazarov, 1936, Fl. SSSR **5**: 47; id. 1937, Fl. Zabayk. **3**: 212; Grubov, 1955, Konsp. fl. Mong.: 100; Skvortsov, 1961, Feddes Repert. **64**: 81; Malyshev, 1965, Fl. Vost. Sayana: 108. —*S. brevijulis* Turcz. 1854, op. cit. **2**: 387; Nazarov, 1936, op. cit. **5**: 80; id. 1937, op. cit. **3**: 200. —*S. leptoclados* Anderss. 1867, Monogr. Salic.: 144 et tab. 7 fig. 79; Nazarov, 1936, op. cit. **5**: 83. —*S. metaformosa* Nakai, 1919, Bot. Mag. Tokyo **33**: 42; id. 1930, Fl. sylv. Kor. **18**: 142 et tab. 30. —*S. orthostemma* Nakai, 1919, op. cit. **33**: 43; id. 1930, op. cit. **18**: 143 et tab. 31.

T y p u s: "In summo alpium Davuriae cacumine Sochondo lecta a cl. Sokolof" (LE!). The original label by N. Sokolov is still attached to the sample. It says: "On the top of Mount Sokhondo, amidst debries".

186 Ssp. **kalarica** A. Skv. comb. nova. —*S. pulchra* ssp. *kalarica* A. Skv. 1961, Bull. MOIP **66**, 4: 31.

T y p u s: "ad fluv. Kalar cursum superiorem prope lacum Ammudin, 5.VIII 1932. N. Savicz" (LE).

The subspecies is different in its large (up to 80 mm long) leaves that frequently are sericeous beneath.

HABIT: A shrub, either prostrate, appressed to substrate or upright, 1–2 m tall (in favorable conditions).

HABITATS: Taluses, moist slopes, banks of streams, and such, on and around barren heights. It may occasionally descend to foothills along cold and moist minor valleys and via wetlands.

DISTRIBUTION: The Altai and Tuva (rare, solitary findings on barren heights); the Khangai (more frequently); the east of the Eastern Sayans (rather frequently, ascending to 2,350 m, according to L. Malyshev, 1965); the Kentei and Borshchovochnyy ranges (most frequently); the coast of Lake Baykal and Stanovoye High Plateau including the Olekma Basin; the Stanovoy and Dzhugdzur ranges; the Amga and Aldan basins (found occasionally); the barren heights of North Korea (a disjunct fragment of the area).

Ssp. *kalarica* is restricted to the northeastern part of the species area: it is distributed from the Vitim River to Dzhugdzur Range. (Fig. 47.)

NOTE. The species is rather variable on and around the Stanovoye High Plateau. The segregation of the ssp. *kalarica* is the first and rough attempt to depict this variability. There is definitely necessity in further detailed study of the species in that part of its area.

Subsect. *Arbusculae*

Hayek, 1908, Fl. Steierm. **1**: 162, emend. A. Skv.
T y p u s: *Salix arbuscula* L.

Floriferous buds not much different from vegetative ones, 4–7 mm long. Catkins coetaneous or serotinous, borne on slender, foliated stalks. Bracts mostly pale or brownish, 1.5 (rarely 2) mm long, sparsely covered with thin, uneven trichomes exceeding bract apex often by not more than 1 mm. Male catkins in full bloom less than 10 mm in diameter. Dry anthers 0.3–0.4 mm long.

82. **S. arbuscula** L. 1753, Sp. pl.: 1018 (p. p.: var. γ tantum); id. 1755, Fl. Suec. 2 ed.: 348; Fries, 1840, Bot. not.: 205; Ledeb. 1850, Fl. Ross. **3**, 2: 622 (p. p.: quoad pl. europ.); Wimmer, 1866, Salic. Europ.: 102 (p. p.: excl. pl. centrali-europ.); Krylov, 1930, Fl. Zap. Sib. **4**: 752 (p. min. p.: quoad nonnullas pl. uralens. tantum); Floderus, 1931, Salic. Fennosc.: 99; Perfilyev, 1936, Fl. Sev. kr. **2–3**: 34; Nazarov, 1936, Fl. SSSR **5**: 79 (p. p.: excl. pl. caucas. et sibir.); Shlyakov, 1956, Fl. Murm. **3**: 103; Skvortsov, 1961, Bull. MOIP **66**, 4: 32; Rech. f. 1964, Fl. Eur. **1**: 51. —Non *S. arbuscula* auct. fl. Europae centralis, Caucasi et Sibiriae.

T y p u s: "In Lapponiae campis arenosis. Fl. Lapp. N 360 et tab. 8 fig. M".

HABIT: A low (0.2–1.2 m), intensely branching shrub with slender shoots.

HABITATS: Gravelly and stony slopes, moraines, deluvial debries, as well as sandy grounds. Although it may occur on bedrock of variable acidity, basic one is preferred; all of southernmost localities appear to be associated with basic bedrock.

DISTRIBUTION: The mountains of Scotland (at 400–800 m) and the Scandinavian Peninsula (to 800 m in the south and 0–400 m in the north). In the Russian north, it is distributed very sparsely: in the Khibins (few localities at 300–400 m); on Kolguyev Island (many findings in its different parts); in the basin of the Pinega, the right tributary of the Northern Dvina (on limestone and gypseous rock); in the Prepolar Urals (on limestone of the western slope); in the Northern Urals (occasionally, on basic rock across the barren heights reaching Denezhkin Kamen as the southernmost point, found at 1,000 m there); and in the Southern Urals (the only one finding on Mount Iremel). There is also one finding reported from the Lower Ob (south of Salekhard), and another doubtful sample from Gydanskaya Tundra on the northeastern coast of the Yuratskaya Inlet. (Fig. 48.)

83. **S. foetida** Schleich. ex Lam. et DC. 1805, Fl. fr. 3 ed. **3**: 296; Gaudin, 1836, Syn. fl. helvet.: 265; Rech. f. 1938, Feddes Repert. **45**: 92; id. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 108; id. 1964, Fl. Eur. **1**: 52; Janchen, 1956, Catal. fl. Austr. **1**: 103. — *S. arbuscula* auct. non L.: Wimmer, 1866, Salic. Eur.: 102 (p. p.); Rouy, 1910, Fl. Fr. **12**: 213; Cadevall et Font, 1933, Fl. Catal. **5**: 181; Buser, 1940, Ber. Schweiz. bot. Ges. **50**: 714; Vicioso, 1951, Salic. Españ: 95. —?? *S. glaucescens* Moench, 1802, Method. Suppl.: 116.

T y p u s: "Schleicher, Exs. Helvet., cent. I, N 95" (n. v.).

HABIT: A rather low shrub (30–120 cm, occasionally to 2 m).

HABITATS: Damp hollows and small drainage wetlands, moraines, pebbly bottoms of valleys, mostly on siliceous substrate in the subalpine and alpine zones.

DISTRIBUTION: The Alps at 1,600–2,600 m (from the Maritime Alps to Tirol reaching the Upper Piave River in the east); the Pyrenees (much more rare than in the Alps). (Fig. 48.)

NOTE. *S. glaucescens* Moench. was cited as a synonym by G. Rouy (1910). I did not have an opportunity to verify that name.

84. **S. kazbekensis** A. Skv. 1961, Feddes Repert. **64**: 78; id. 1961, Bull. MOIP **66**, 4: 27; id. 1966, Trudy Bot. in-ta AN ArmSSR **15**: 130. —*S. arbuscula* auct. fl. caucas. omnium, non L.

T y p u s: "Circa Montem Kazbek, prope pag. Gherghety, regio subalpina, alt. 2500–2600 m, 12.VIII 1937, M. Nasarov" (MW).

HABIT: A low shrub.

HABITATS: Rocks, taluses, pebbles, glacial moraines, banks of streams, lake shores, alpine spring fens and meadows, *Rhododendron* shrublands, and occasionally birch and even pine forests in the subalpine and alpine zones, rarely in the upper forest zone (1,700–3,300 m).

DISTRIBUTION: All of the Greater Caucasus from the Fisht-Oshten Massif to the Andiyskiy Range and Salavat Pass southwest of Kuba (common nearly everywhere in the western half and comparatively rare and sparse in the east). In his notes, A. Grossheim showed a number of localities at the extreme southeastern part of the Main Range (Baba Dag); yet I did not see any samples from that region. Neither could I find any plants from the Lesser Caucasus. (Fig. 49.)

85. **S**. **waldsteiniana** Willd. 1806, Sp. pl. **4**, 2: 679; Schinz, Keller, 1900, Fl. Schweiz.: 137; Hirc, 1904, Rad Jugosl. Akad. **159**: 161; Rech. f. 1938, Feddes Repert. **45**: 90; id. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 109; id. 1964, Fl. Eur. **1**: 52; Buser, 1940, Ber. Schweiz. bot. Ges. **50**: 711; Janchen, 1956, Catal. fl. Austr. **1**: 103. —*S. arbuscula* auct. non L.: Wimmer, 1866, Salic. Eur.: 102 (p. p.: quoad var. α *waldsteiniana*); Beck, 1906, Glasnik zem. muz. Bosni i Herceg. **18**: 98; Hayek, 1924, Feddes Repert. Beih. **30**, 1: 85; Stoyanov, Stefanov, 1948, Fl. Blg.: 319.

T y p u s: "*S. myrsinites*? —Kitaibel in litt. —In alpibus Croatiae" (Hb. Willdenow — B, n. v.).

HABIT: A low shrub with short branches.

HABITATS: Moist slopes, taluses, and rocks of the upper forest, subalpine, and lower alpine zones, mostly, on carbonate substrates.

DISTRIBUTION: The eastern part of the Alps from Canton Unterwalden to the Wiener Wald (900–2,000 m); the mountains of the former Yugoslavian territory from Slovenia to Crnagora (Montenegro); northern Albania; and western Bulgaria including the Vitocha, Rila, and Stara Planina. In the Balkans, its altitudinal range is 1,250–2,300 m. Apparently, all data in the old literature concerning findings in the Carpathians are erroneous. (Fig. 49.)

86. **S. saposhnikovii** A. Skv. 1961, Feddes Repert. **64**: 77; id. 1961, Bull. MOIP **66**, 4: 26; Malyshev, 1965, Fl. Vost. Sayana: 108; Koropachinskiy, Skvortsova, 1966, Der. i kustarn. Tuvy: 71. —*S. arbuscula* auct. non L.: Krylov, 1930, Fl. Zap. Sib. **4**: 752 (p. p.); Polyakov, 1960, Fl. Kazakhst. **3**: 33 (p. p.); Cherepnin, 1961, Fl. yuzhn. ch. Krasnoyar. kr. **3**: 15. —*S. phylicifolia* auct. non L.: Krylov, 1930, op. cit. **4**: 750, p. p. quoad pl. altaicas.

189

T y p u s: "Altai, ad font. fluv. Balykty-su, tundra montana muscoso-lichenosa, 28.VII 1915, P. N. Krylov" (MW, TK).

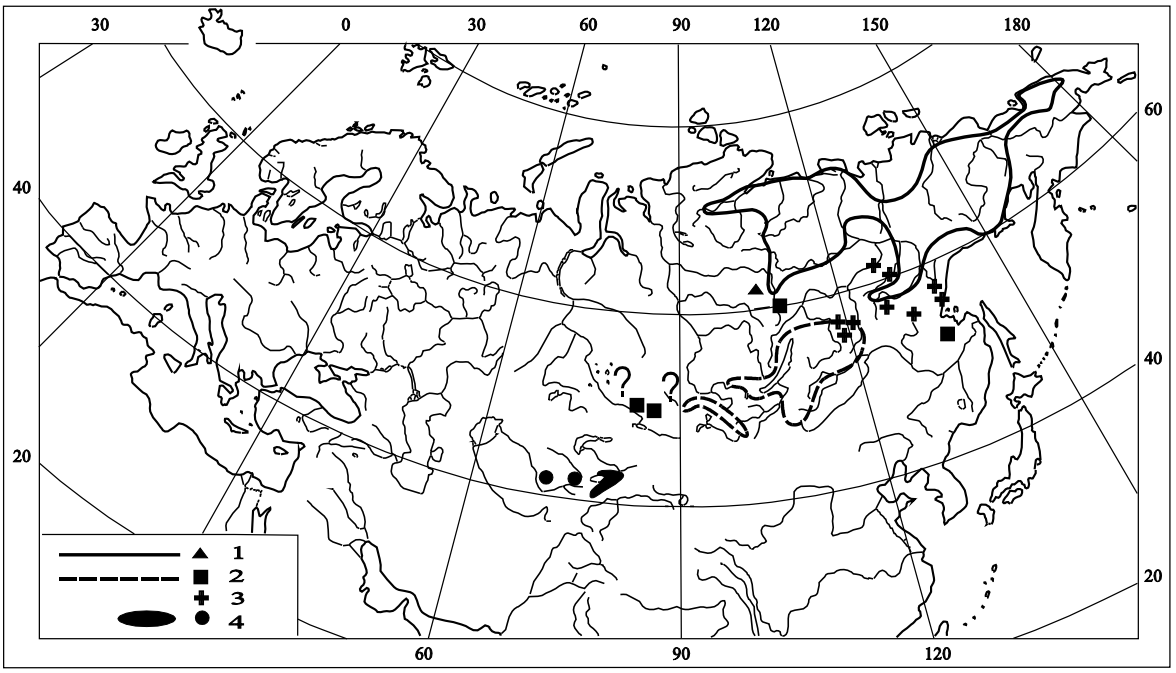

Fig. 47. Distributional areas of *Salix boganidensis* Trautv. (*1*), *S. divaricata* Pall. (*2*), *S. divaricata* ssp. *kalarica* A. Skv. (*3*), and *S. tianschanica* Rgl. (*4*)

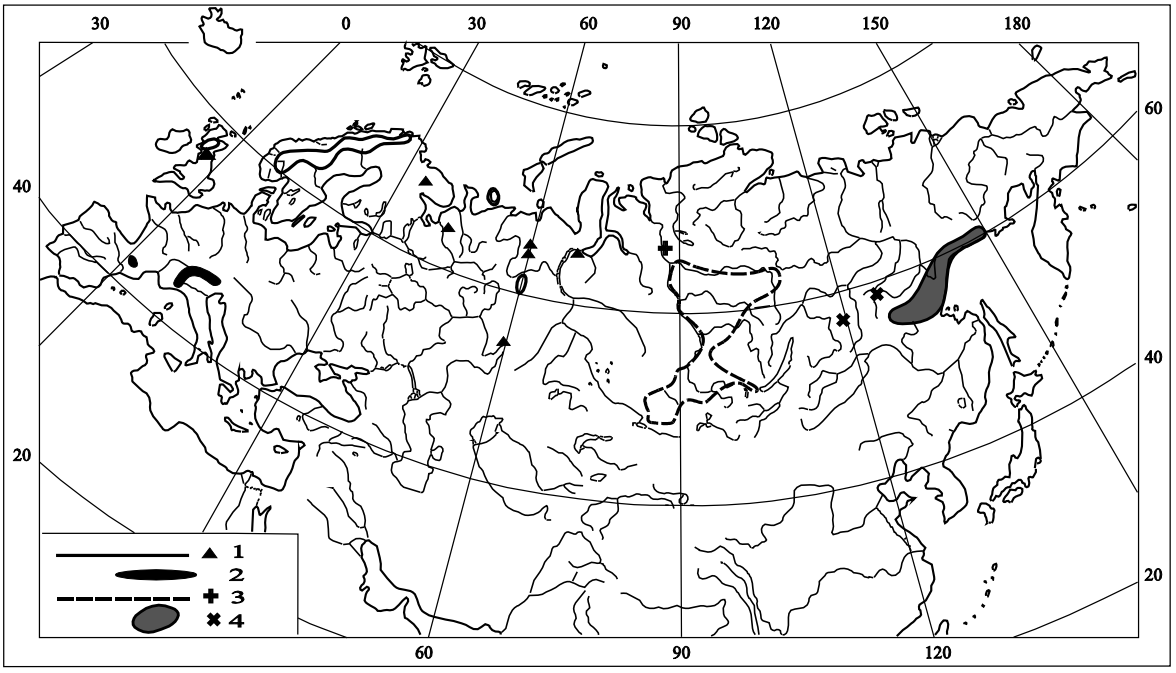

Fig. 48. Distributional areas of *Salix arbuscula* L. (*1*), *S. foetida* Schleich. ex Lam. et DC. (*2*), *S. saposhnikovii* A. Skv. (*3*), and *S. dshugdshurica* A. Skv. (*4*)

HABIT: A low or medium-sized shrub.

HABITATS: Alpine tundras, banks of streams, stony and sodded slopes within the alpine and subalpine zones (reaching 2,100–2,200 m in the Altai and Sayans). Occasionally, it may descend to the forest zone and grow there at damp hollows.

DISTRIBUTION: The Altai, Kuznetskiy Alatau, Western Sayans and the western part of Eastern Sayans (reaching the Pogranichnyy Range); also, in the Yeniseiskiy Kryazh and on the Central Siberian Plateau reaching the Nizhnyaya Tunguska in the north, the Upper Chunya and Upper Vilyuy Basin (the Ulakhan-Vava River) in the east. (Fig. 48.)

87. **S. dshugdshurica** A. Skv. 1961, Feddes Repert. **64**: 80; id. 1961, Bull. MOIP **66**, 4: 27. —*S. arbuscula* auct. fl. Sibir. p. p.

T y p u s: "Montes Dshugdshur, lariceto-betuletum in valle fluv. Matang. 16.IX 1953. V. N. Vassiljev" (LE).

HABIT: A small shrub with slender branches and small leaves, much alike *S. arbuscula.*

HABITATS: Bogs, *yernik*'s, larch forests with *Sphagnum* ground cover, and rock debris mostly in the lower part of the barren heights zone and upper forest zone (to 1,600 m).

DISTRIBUTION: The coast of the Sea of Okhotsk almost to the Tauyskaya Inlet, Yudomo-Mayskoye High Plateau, Dzhugdzur, Stanovoy, and Aldano-Uchurskiy ranges, and the eastern Stanovoye High Plateau. So far, only some thirty localities are known. It appears to be somewhat more common around Ayan. (Fig. 48.)

NOTE. This is a comparatively rare species that is distributed in a rather inaccessible region, therefore, it is still poorly known. More collections and observations are needed to clarify its morphology, ecology, and geographical distribution. Particularly, its delimitation from *S. boganidensis* in terms of morphology as well as geography has to be investigated. Early in spring, plants of the latter species may occasionally develop short and broad leaves that look very similar to those of *S. dshugdshurica*. Since the catkins in the two species also look alike, herbarium samples may be easily confused. However, *S. dshugdshurica* appears to be very different from *S. boganidensis* in ecological as well as geographical characteristics.

88. **S. boganidensis** Trautv. 1847, in Middendorff, Reise Sibir. 1, **2**: 154 (p. p.: quoad pl. fol. angustis subtus pilosis in tab. 2 depictas, nec in tab. 3); id. 1877, Acta Horti Petropol. **5**, 1: 105; id. 1878, op. cit. **5**, 2: 557. —*S. boganidensis* var. *angustifolia* Trautv. 1879, Acta Horti Petropol. **6**, 1: 34. —*S. chlorostachya* (non Turcz.) Trautv. 1877, op. cit. **5**, 1: 104. —*S. kolymensis* Seemen, 1908, Feddes Repert. **5**: 18; Nazarov, 1936, Fl. SSSR **5**: 75; Skvortsov, 1961, Bull. MOIP **66**, 4: 33.

T y p u s: "Ad. fl. Boganida a. 1843. —A. Middendorff" (LE!).

HABIT: A small tree (to 5 m tall at the Upper Kolyma) or shrub that can grow tall or low depending on environmental conditions.

HABITATS: River valleys and terraces (larch stands, chosenia groves, *yernik*'s; also, fresh alluvial deposits, mostly pebbles). It is more rare outside valleys. This is the only species in the section *Arbuscella* that clearly demonstrates a tendency to inhabit alluvial substrates. At the same time, it is obviously a mountainous species. A proof of the species' mountainous nature is, first of all, its confinement to pebbly deposits and avoidance of sandy ones or fine soil; and also its marginal penetration to arctic regions versus significant invasion up the mountains, even at high latitudes.

It ascends to 600 m in the northern Verkhoyanskiy Range near Sakhandzha; to 1,100 m in the Moma Range, close to the Arctic Circle.

DISTRIBUTION: The Taimyr Peninsula (the Kheta and Lower Kotuy basins), the Anabar, Olenek, and Vilyuy basins, a part of the Nizhnyaya Tunguska Basin; the Amga and Aldan basins; along the Lena downstream of Zhigansk. It is distributed nearly everywhere in the Verkhoyanskiy Range and east of it, reaching the Anadyrskiy Range, yet missing from the Penzhina and Anadyr basins except some tributaries of the Belaya. (Fig. 47.) *190*

In Subarctic and Arctic North America, there is a species of very close filiation, *S. arbusculoides* Anderss.

89. **S. rhamnifolia** Pall. 1788, Fl. Ross. **1**, 2: 84; Skvortsov, 1957, Bot. mat. Gerb. Bot. in-ta AN SSSR **18**: 35, 36; id. 1961, Bull. MOIP **66**, 4: 33; Cherepnin, 1961, Fl. yuzhn. ch. Krasnoyar. kr. **3**: 15; Sergiyevskaya, 1961, Fl. Zap. Sib. **12**: 3224. —Non *S. rhamnifolia* auct.: Hook. Arnott, 1841, Bot. Beechey Voy.: 117; Ledeb. 1850, Fl. Ross. **3**, 2: 612; Anderss. 1867, Monogr. Salic.: 169; Nazarov, 1936, Fl. SSSR **5**: 120. —*S. chlorostachya* Turcz. 1854, Fl. Baic.-Dah. **2**, 2: 373; Nazarov, op. cit. **5**: 76; id. 1937, Fl. Zabayk. **3**: 199; Grubov, 1955, Konsp. fl. Mong.: 100; Karavayev, 1958, Konsp. fl. Yak.: 82 (p. p.); Popov, 1959, Fl. Sredn. Sib. **2**: 803; Malyshev, 1965, Fl. Vost. Sayana: 108. —*S. podophylla* Anderss. 1867, op. cit.: 142; Nazarov, 1936, op. cit. **5**: 77.

T y p u s: "E Selengia missa" (Hb. J. G. Gmelin —LE!). In Gmelinii Flora Sibirica vol. 1 tab. 35 fig. 1A (1747) depicta. Cf. Skvortsov, 1957.

HABIT: A medium-sized shrub.

HABITATS: Mostly valley meadows, wet spots in flood plains of large rivers; wet, but not paludal bottoms of *pad*' s. It is quite common in somewhat saltish meadows and also in *zapadina*' s amidst the steppe vegetation. Growing primarily, at low elevations, it may reach the lower barren heights zone via suitable habitats (to 2,200 m in the Eastern Sayans). In Mongolia, it even ascends to *Cobresia* alpine meadows (to 2,600 m in the central Khangai).

DISTRIBUTION: The Altai (from Seminskiy Pass to the Kobdo River in Mongolia); southern Tuva; northern Mongolia including the Khangai and Kentei with their piedmont areas; Prebaykalia and Transbaykalia to the Tungir River in the east; southern Yakutia (the Aldan and Lena upstream of Yakutsk). The westernmost parts of the continuous area are the Kan and Lower Angara basins. An isolated part of the area is found at the northern foot of the Kuznetskiy Alatau, one more at the Lower Nizhnyaya Tunguska and Lower Yenisei. Some few isolated localities are known in these areas along the beaches of the named rivers and the Kureyka. One more disjunct area fragment is in the Weichang north of Beijing. (Fig. 49.)

NOTE. Plants from the Lower Yenisei are different from the rest in their broad elliptic leaves and completely glabrous capsules; besides, all of them grow on the beach, a habitat that is very unusual on the whole, within the entire area of *S. rhamnifolia*. If we assume that the populations at the lower reaches of the Yenisei have appeared merely due to seed dispersal by water, then the origin of the plants at the Lower Nizhnyaya Tunguska still remains unclear, as there is no *S. rhamnifolia* at the upper reaches of that river. The source of the population at the Kureyka is even more vague. It is very reasonable to assume that the Lower Yenisei fragment constitutes a distinct taxon of an infraspecific or probably even specific rank. However, there is not enough evidence to make the conclusion.

Plants from the Altai are also rather special. Their leaves are small, elliptic, and spiny serrate (as opposed to oblanceolate, crenate-serrate leaves in the rest of the species). Neither in this case can we speak of segregating even a subspecies, as there is not enough grounds: nice samples with catkins are missing from collections.

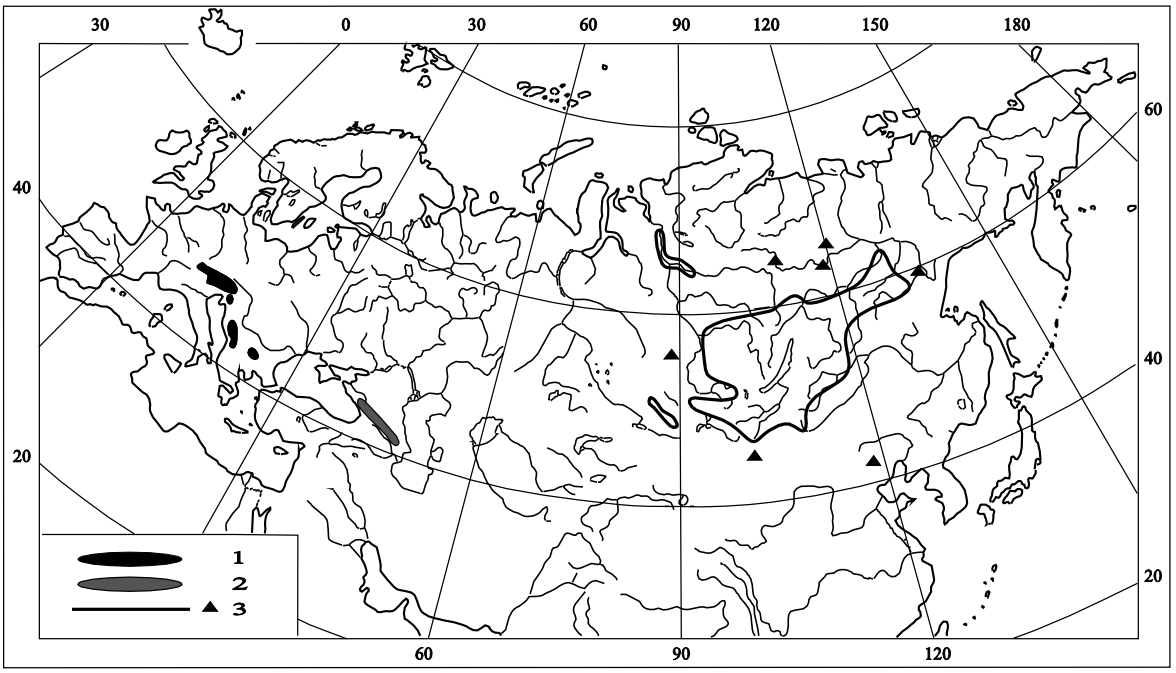

Fig. 49. Distributional areas of *Salix waldsteiniana* Willd. (*1*), *S. kazbekensis* A. Skv. (*2*), and *S. rhamnifolia* Pall. (*3*)

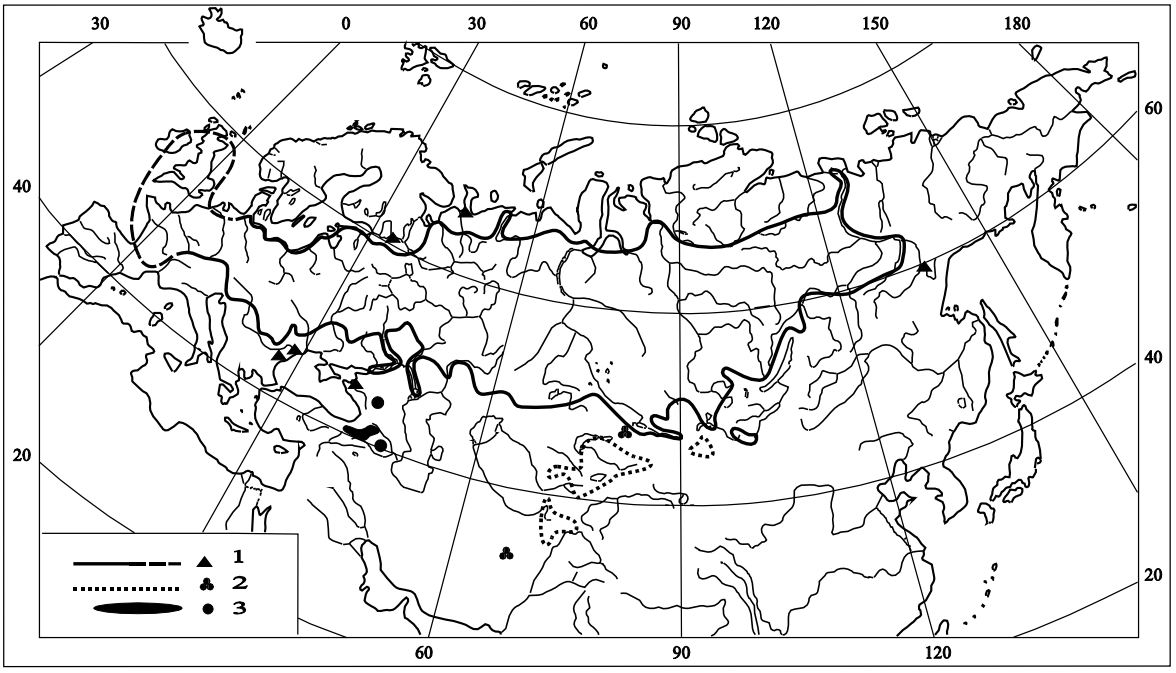

Fig. 50. Distributional areas of *Salix viminalis* L. (*1*), *S. turanica* Nas. (*2*), and *S. armeno-rossica* A. Skv. (*3*)

Sect. 17. *Vimen*

Dum. 1825, Bijdr. Natuurk. Wetensch. **1**, 1: 56 (p. p.).
T y p u s: *S. viminalis* L.

Trees or rather tall shrubs. Shoots mostly elongated, flexible, virgate. Floriferous buds strikingly different from vegetative ones, oval to nearly cylindrical, not flattened, their apices either straight or bent toward shoots. Stipules linear or falcate. Petioles that embrace floriferous buds usually become abruptly ventricose by fall. Leaves mostly narrow, with many parallel veins prominent beneath, entire or finely denticulate, usually silvery or silky beneath. Catkins precocious or subprecocious. Nectary solitary, rectangular or, more often, linear, 0.6–1.5 mm long. Capsules mostly short-stipitate or sessile, acute; styles elongated, stigmas two-parted.

Some 12–13 species are distributed in forested regions within the temperate climate belt (nine in and around this country, one in the Himalayas, and two or three in North America). The overwhelming majority of species are restricted to alluvial habitats. This is a very natural and compact section. The only species that stands somewhat apart is *S. udensis*, which approximates the section *Arbuscella* in some of its characters, such as short nectaries, elongated capsule stipes, scanty leaf pubescence. Close relations of *Vimen* with *Subviminales* and *Villosae* are obvious; those with *Canae* are also possible; others are more vague (most probable of them is one with *Arbuscella* via *S. udensis*, *S. boganidensis*, and *S. pantosericea*).

Key to Species

1. Bracts 1.0–1.8 × 0.5–0.8 mm, mostly puberulent; ovaries and stamens conspicuously protruding from pubescence. Ovaries finely pubescent with appressed trichomes and usually become deflected at right angle to catkin rachises as early as flowering period. Mature capsules 4.0–5.5 mm, their stipes 0.5–1.5 mm long, longer or just scarcely shorter than nectaries. Leaves not densely pubescent, often glabrous, frequently emarginate, crenate at margins . . . . . 98. **S. udensis**
— Bracts mostly larger and with longer pubescence, ovaries and stamens not protruding much from pubescence. Ovaries mostly densely pubescent, positioned at acute angle to rachises. Capsule stipes not longer than 0.5–0.6 mm, at least twice as short as nectaries 2
2. Leaves conspicuously revolute, entire, occasionally undulate at margins; marginal glands sparse, all or majority of them removed from leaf margin to upper leaf surface (extramarginal type). Bracts black or brown, mostly obtuse. Anthers 0.4–0.7 mm long. Capsules mostly sessile, not compressed 3
— Mature leaves flat or subrevolute, entire or, more often, serrulate; glands on denticles directly at leaf margins. Bracts black, mostly acute. Anthers 0.6–1.0 mm long. Capsules often compressed, mostly stipitate; stipes to 0.5–0.6 mm long 6
3. Bracts brown or even rufescent, at least in lower parts of catkins. Styles 0.4–0.5 mm long, shorter than stigmas or, very rarely, as long as stigmas. Stigmas 0.8–1.5 mm long . . . . . 90. **S. viminalis**
— All bracts mostly black. Styles 0.8–2.0 mm long, longer than stigmas 4
4. Two- and three-year-old shoots tawny-brown. Leaves very gradually narrowly acuminate, intensively dark green, rather lustrous above, not undulate at margins.

Lower surface clothed with trichomes lying mostly parallel to midrib, more or less overlapping lateral veins. Styles mostly at least twice as long as stigmas . . . . . 93. **S. schwerinii**

— Two- or three-year-old shoots mostly light green. Leaves dull green or grayish-green, mostly puberulent above. Leaf margins mostly undulate (nearly always, in epicormic shoots). Styles nearly as long as stigmas or not more than twice as long 5

5. Leaves stipulate on vigorous shoots. Leaf trichomes beneath comparatively short, nearly none of them parallel to midrib; veins mostly conspicuous against pubescence. Bracts black, 1.0–1.8 mm broad . . . . . 91. **S. turanica**

— Leaves exstipulate even on vigorous shoots, pubescent beneath; their long, silvery trichomes lying parallel to midrib usually well developed; veins hidden in pubescence. Bracts mostly brownish, black at apices, 0.8–1.3 mm broad . . . . . 92. **S. armeno-rossica**

6(2). Alpine shrubs or small trees. Petioles that embrace floriferous buds either not or only slightly ventricose. Mature capsules 4–6 mm long 7

— Trees or tall shrubs of large river valleys and lowlands. Leaves 80–150 mm long. Petioles that embrace floriferous buds usually abruptly ventricose by fall. Mature capsules 7–9 mm long . . . . . 94. **S. dasyclados**

7. Floriferous buds shortly ovoid. Leaves broad (3 to 5 times as long as broad), rather pubescent above, although not as much silvery as beneath . . . 97. **S. pantosericea**

— Floriferous buds broadly elliptic or lanceolate. Leaves dark green, glabrous above, upper leaf surface strikingly different from lower one; the latter silvery pubescent 8

8. Distorted shrub. Leaves mostly entire, narrowly (ob-)lanceolate or linear-lanceolate, mature ones puberulent or glabrescent. Capsules somewhat compressed . . . . . 95. **S. sajanensis**

— Usually small, long-branched tree. Leaves finely denticulate, lanceolate, broadly lanceolate, or elliptic, all densely silvery pubescent beneath. Mature capsules considerably compressed . . . . . 96. **S. argyracea**

90. **S. viminalis** L. 1753, Sp. pl.: 1021; Ledeb. 1850, Fl. Ross. **3**, 2: 605; Wimmer, 1860, Salic. Eur.: 36; Wolf, 1930, Fl. Yu.-V. **4**: 45; Nazarov, 1936, Fl. SSSR **5**: 132; Nazarov et al. 1952, Fl. URSR **4**: 54; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 118; id. 1964, Fl. Eur. **1**: 52; Andreyev, 1957, Der. i kustarn. Mold. **1**: 73; Rasinš, 1959, Ivy Latv.: 112; Polyakov, 1960, Fl. Kazakhst. **3**: 25. —*S. serotina* Pall. 1776, Reise **3**: 759; id. 1788, Fl. Ross. **1**, 2: 77; Floderus, 1933, Ark. bot. **25A**, 11: 28, 29. — Non *S. serotina* auct.: Goerz, 1934, Feddes Repert. **26**: 26; Shlyakov, 1956, Fl. Murm. **3**: 118. —*S. gmelinii* Pall. 1788, op. cit. **1**, 2: 77; Ledeb. 1850, op. cit. **3**, 2: 606 (p. max. p. saltem!); Teploukhov, 1901, in Petunnikov, Krit. obz. Mosk. fl. **3**: 26 (p. max. p.); Syreishchikov, 1907, Ill. fl. Mosk. gub. **2**: 33; Krylov, 1930, Fl. Zap. Sib. **4**: 740; Perfilyev, 1936, Fl. Sev. kr. **2–3**: 40; Krall, Viljasoo, 1965, Eestis kasv. pajud: 72 —non *S. gmelinii* auct. fl. caucas. nec fl. extremiorient. —*S. polia* Schneid. 1916, in Sarg. Pl. Wilson. **3**, 1: 174; Hao, 1936, Syn. Chin. *Salix*: 89. —*S. veriviminalis* Nasarov, 1936, op. cit. **5**: 134. — *S. rossica* Nasarov, op. cit. **5**: 135; id. 1949, Fl. BSSR **2**: 44; Polyakov, 1960, op. cit. **3**: 26; Cherepnin, 1961, Fl. yuzhn. ch. Krasnoyar. kr. **3**: 18; Sergiyevskaya, 1961, Fl. Zap. Sib. **12**: 3222; Rech. f. 1964, op. cit. **1**: 52; Koropachinskiy, Skvortsova, 1966, Der. i kustarn. Tuvy: 83. —*S. splendens* (Turcz.) Nasarov, 1936, op. cit. **5**: 136 (p. p.); Sergiyevskaya, 1961, op. cit. **12**: 3222. — *S. rufescens* (Turcz.) Nasarov, 1936, op. cit. **5**: 137. —*S. strobilacea* (E. Wolf) Nasarov,

193

op. cit. **5**: 141. —? *S. semiviminalis* E. Wolf, 1905, Izv. Lesn. in-ta **13**: 51 et tabl. 4 (vel *S. viminalis* × *S. caprea*?).

T y p u s: "In Europa ad pagos. Fl. Suec. N 813".

HABIT: A tall shrub or multi-stemmed, wide-crowned tree to 6–8–(10) m.

HABITATS: River banks, mostly fresh deposits, either sandy or pebbly, near the running water. In older parts of flood plains, it is gradually replaced by other species. Also, ruts, ditches, and such, in areas of sufficient moisture on sandy soil. Mostly, on the plain; if ascending to mountains, then primarily along large rivers with wide valleys.

DISTRIBUTION. Natural boundaries in Western Europe are not yet clarified. Presumably, most of England and southeastern Ireland; also presumably, most of France (except its southeastern part); Belgium, Holland, Germany, eastern Austria, Slovenia, most of Hungary and Romania, Czechia, Slovakia, Poland. It is absent from the Alps; reports from Pyrenees and former territory of Yugoslavia (except Slovenia) are doubtful. It is absent from all of Scandinavia including Finland and Denmark and probably also from northern Holland. The northern area boundary runs via northern Estonia, southern Leningradskaya Oblast, Belozersk, the Onega River; then along the southern boundary of the forest-tundra belt toward the Polar Urals. There are some few solitary locations in the Svir and Vodla basins. From the forest-tundra, it penetrates to tundra belt along large rivers. Behind the Urals, in the north the area boundary runs from the Ob mouth to the mouth of the Taz, the Upper Olenek and Lower Lena; in the east, along the Lena and Aldan to the lower reaches of the Maya; in the south, via the Middle Aldan, Lower Olekma, Upper Lena (yet never reaching Lake Baykal), detouring the Eastern Sayans, entering Tuva and Mongolia (the Khangai) via the Western Sayans, reaching Tsetserlig as the southernmost point. The species area embraces nearly all of the Altai, reaching Chinese territory along the Black Irtysh, then via the Tarbagatay, Bayan-Aul, and the Ulutau, the boundary runs to the Mugodzhary and crosses the Ural River (south of Uralsk), Volga (south of Saratov), Don (around Voronezh), Dnieper (around Cherkassy), Dnestr, and Prut (around Kishinev). Besides that solid area, there are invasions down the Volga and Don (but not Dnieper!) to the very mouths of these rivers. There is a completely isolated locus at the Lower Kuban River. Also, isolated fragments of the area are encountered in the *plavni* of the Dnestr and Danube.

The species ascends to 900 m in Carpathians; to 600 m in the Southern and Central Urals; in the Altai, it reaches 1,500 m (Lake Markakol) and even 1,800 m (the Kaba River).

NOTE. The species is not completely uniform within its huge distributional range; yet differences are so vague that it is impossible to segregate any taxonomical units.

Plants from the steppes of the Southern Urals and Turgayskoye Plateau are characterized by narrow leaves that are silvery pubescent beneath. Relying upon this purely *194*
external character, M. Nazarov united these narrow-leafed forms with a species from the Far East, *S. schwerinii*, under the name of *S. pseudolinearis*.

Conversely, plants from the Northern Urals and Siberia, particularly those from the Podkamennaya and Nizhnyaya Tunguska basins, are characterized on the average by unusually broad and strongly pubescent leaves, grayish on the upper surface. Forms with still broader leaves are encountered in the southwestern Altai and along the Irtysh upstream of Lake Zaysan. Plants from the Altai are particularly special in their dense lower side pubescence, which sometimes appears to be nearly velutinous rather than sericeous. However, "the typical" *S. viminalis* plants that dominate across the European temperate belt and Southern Siberia are encountered on the Turgayskoye Plateau, in the Altai, Northern Urals, and Siberia along with all kinds of intermediate forms.

There is a common opinion in the literature that *S. viminalis* growing in Russia is not the same as *S. viminalis* L. from Western Europe, but actually another species, *S. gmelinii* Pallas vel Teplouchov = *S. rossica* Nas. This idea was first proposed by F. Teploukhov (Petunnikov 1901) and then supported in the "Flora of the USSR" by M. Nazarov. Yet there are no serious arguments in favor of that notion. Naturally, M. Nazarov was unable to highlight, even approximately, the western limit for *S. rossica* and the eastern one for *S. viminalis.* It is a known fact that C. Linnaeus used cultivated specimens when describing *S. viminalis.* In Russian herbaria, *S. viminalis* from Western Europe is as well represented mostly by samples from cultivated plants. In fact, one cannot even compare the natural range and abundance of the species in Western Europe and this country. Therefore, we cannot expect that features of comparatively few samples known from Western Europe might embrace the whole range of the species morphological diversity within the vast territory including Belarus in the west, the Aldan River in the east, the Altai and Tuva in the south, and the mouths of the Ob and Lena in the north. On the contrary, if the understanding of the species variability range is based on material from Russia and the
195 adjacent territories, then all the West European samples will easily fit within. Taking all these reasons into consideration, we have to treat *S. rossica* as a mere synonym of *S. viminalis.*

A number of "species" described by M. Nazarov in the "Flora of the USSR", such as *S. splendens, S. rufescens,* or *S. strobilacea* were actually varieties proposed by N. Turczaninow and E. Wolf, which then were automatically assigned a species rank. An inspection of authentic specimens made it possible to conclude that most of them were nothing other than *S. viminalis* (in "*S. splendens*", there were also some belonging to *S. schwerinii*).

S. polia Schneid. is a densely pubescent form of *S. viminalis* from the Chinese part of the Black Irtysh.

Authentic specimens of *S. gmelinii* Pall.—plants from the Herbarium of J. Gmelin, the senior—also belong to *S. viminalis.* They had been long neglected till the author discovered them in the Herbarium of the Botanical Institute in St. Petersburg.

The populations from the Lower Volga and presumably also Lower Don and Lower Kuban constitute peculiar ecotypes that are different in their rhythm of the seasonal development: the so-called "late-inudation ecotypes" (Sukachev 1935, 1953; see also chapter 3, section 4). These plants require further investigation. According to my own observations around Volgograd, they are characterized not only by the late bud expansion, but also an unusually large range of variability as far as the time of spring development is concerned. Besides, one can often find catkins in bloom along with almost mature ones on a single specimen, simultaneously. Also, the contingency between the floriferous and vegetative shoot developmental schedule is rather variable. Although P. Pallas described these late-inudation forms as a distinct species, *S. serotina,* he himself admitted that they might be nothing other than a form of *S. viminalis.* Presently, it hardly makes sense to segregate these plants in a taxonomical entity of any rank. The name *S. serotina* was misused when applied to plants from the Caucasus (Görz 1934) and to *S. dasyclados* (Shlyakov 1956).

91. **S. turanica** Nasarov, 1936, Fl. SSSR **5**: 709; Drobov, 1953, Fl. Uzb. **2**: 36; Polyakov, 1960, Fl. Kazakhst. 3: 26; Skvortsov, 1962, Bot. mat. Gerb. In-ta bot. AN UzbSSR **17**: 66; Ikonnikov, 1963, Opred. rast. Pamira: 90. —*S. viminalis splendens* 1° *songarica* Anderss. 1868, in DC. Prodr. **16**, 2: 265. —*S. viminalis* auct. fl. As. Mediae, non L.: Kar. et Kir. 1842, Bull. Soc. Nat. Moscou **15**: 182; Regel, 1880, Acta Horti

Petropol. **6**: 467; et al. —*S. stipularis* auct. fl. As. Mediae, non Sm.: Kar. et Kir. 1842, l. c.; Regel, 1880, op. cit. **6**: 468.

T y p u s: "Songaria ad ripas fl. Ili et Ajaguz leg. Schrenk" (LE!).

HABIT: A tall shrub or small tree (to 10 m).

HABITATS: Banks of rivers and small streams in *tugai*, mostly near the running water on sandy or pebbly deposits.

DISTRIBUTION: The Upper Zeravshan River, western Gissarskiy Range, nearly all of the Pamirs, Karakorum, and Hindu Kush. There are also specimens from central Afghanistan (Bamian Province). In the described part of the area, it is found at 1,400–3,800 m. The species area also embraces nearly all of the Tien Shan including its Kirghiz and Chinese parts (except the Kuraminskiy and Karatau ranges), where it presumably does not ascend higher than 2,000–2,200 m. Indeed, from the northern slopes, it descends to the piedmont and even lowland, reaching Lake Biylikol, the Chu River (around Bystrovka), and the very Lower Ayaguz via the Ili, Karatal, and Lepsa rivers. There are a few findings in southwestern Mongolia.

NOTE. Plants in the Pamir-Alay, Hindu Kush, and Karakorum are different from those in the Tien Shan and Prebalkhashia: the former ones grow mostly as trees, have yellowish bark and comparatively broad leaves; the latter are mostly tall shrubs with grayish bark and leaves shaped very much alike those in *S. viminalis*. It might be reasonable to treat the plants from the Pamir-Alay, Hindu Kush, and Karakorum as a distinct subspecies.

92. **S. armeno-rossica** A. Skv. 1966, Trudy Bot. in-ta AN ArmSSR **15**: 30. — *196*
S. viminalis auct. fl. As. Min. et Caucasi, non L. —*S. gmelinii* (non Pall.) Goerz, 1930, Feddes Repert. **28**: 127; id. 1930, in Grossheim, Fl. Kavk. **2**: 5. —*S. serotina* (non Pall.) Goerz, 1934, Feddes Repert. **36**: 26, 228. —*S. rossica* Nasarov in schedis, ined.

T y p u s: "Armenia turcica (olim Rossiae distr. Kaghyzman), in ripis fl. Kjaklik, 11.V 1914. leg. S. Turkewicz" (LE).

HABIT: A tall shrub or small tree.

HABITATS: River pebbles at 1,200–2,200 m.

DISTRIBUTION: The central northern slope of the Greater Caucasus (around the summit of Beshtau); Dzhavakheti (a number of localities); Armenia (the Marmarik River and Dzhermuk Resort); Turkish Armenia (mostly Kars and Erzurum). (Fig. 50.)

93. **S. schwerinii** E. Wolf, 1929, Izv. Gl. bot. sada SSSR **28**: 421. —*S. viminalis* auct. non L.: Trautv. et Mey. 1856, in Middendorff, Reise Sibir. 1, **2**: 78; Regel, Tiling, 1858, Fl. Ajan.: 117; Seemen, 1903, Salic. Jap.: 50; Schneider, 1916, in Sarg. Pl. Wilson. **3**, 1: 157; Nakai, 1930, Fl. sylv. Kor. **18**: 175. —*S. viminalis* var. *angustifolia* Turcz. 1854, Fl. Baic.-Dah. **2**, 2: 379. —*S. viminalis* var. *yesoë nsis* Schneider, 1916, op. cit. **3**, 1: 158; Miyabe, Kudo, 1921, Icon. forest tr. Hokk. **1**: N 17. —*S. gmelinii* auct. non Pall.: Floderus, 1926, Ark. bot. **20A**, 6: 56; Hultén, 1928, Fl. Kamtsch. **2**: 13; Komarov, 1929, Fl. Kamch. **2**: 18; Görz, 1933, Feddes Repert. **32**: 387; Karavayev, 1958, Konsp. fl. Yak.: 83 (p. p.); Popov, 1959, Fl. Sredn. Sib. **2**: 795 (p. max. p. saltem). —*S. yesoë nsis* Kimura, 1931, Bot. Mag. Tokyo **45**: 28; id. 1931, Sci. Rep. Tohoku Univ. 4 ser. **6**, 2: 190; id. 1934, in Miyabe, Kudo, Fl. Hokk. a. Saghal. **4**: 430; Sugawara, 1939, Ill. fl. Saghal. **2**: 681; Tolmachev, 1956, Der. i kustarn. Sakhal.: 660. —*S. serotina* (non Pall.) Flod. 1933, Ark. bot. **25A**, 10: 11. —*S. stipularis* (non Sm.) Nakai, 1930, op. cit. **18**: 179. —*S. pseudolinearis* Nasarov, 1936, Flora SSSR **5**: 137 (p. p.: quoad pl. dahuricas et extremiorientales tantum!). —*S. rossica* Nasarov, 1936, op. cit. **5**: 135 (p. p.: quoad pl. dahuricas et extremiorientales tantum!). —*S. pet-susu* Kimura, 1937, Symb. Iteol. **4**: 317;

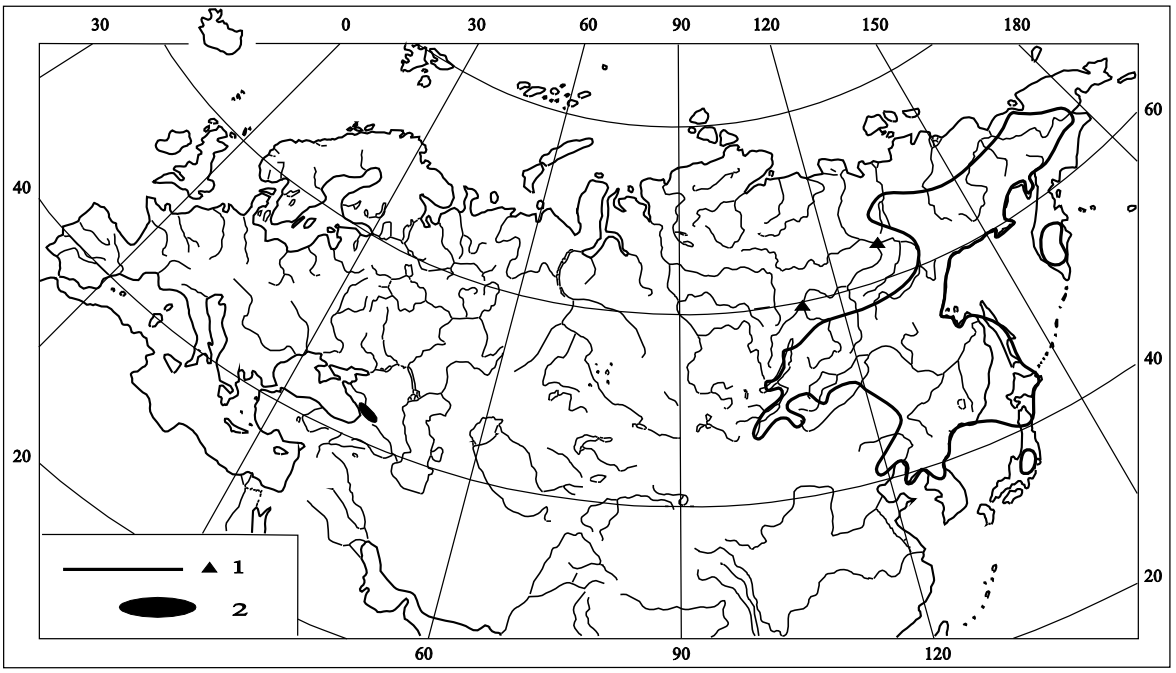

Fig. 51. Distributional areas of *Salix schwerinii* E. Wolf (*1*) and *S. pantosericea* Goerz (*2*)

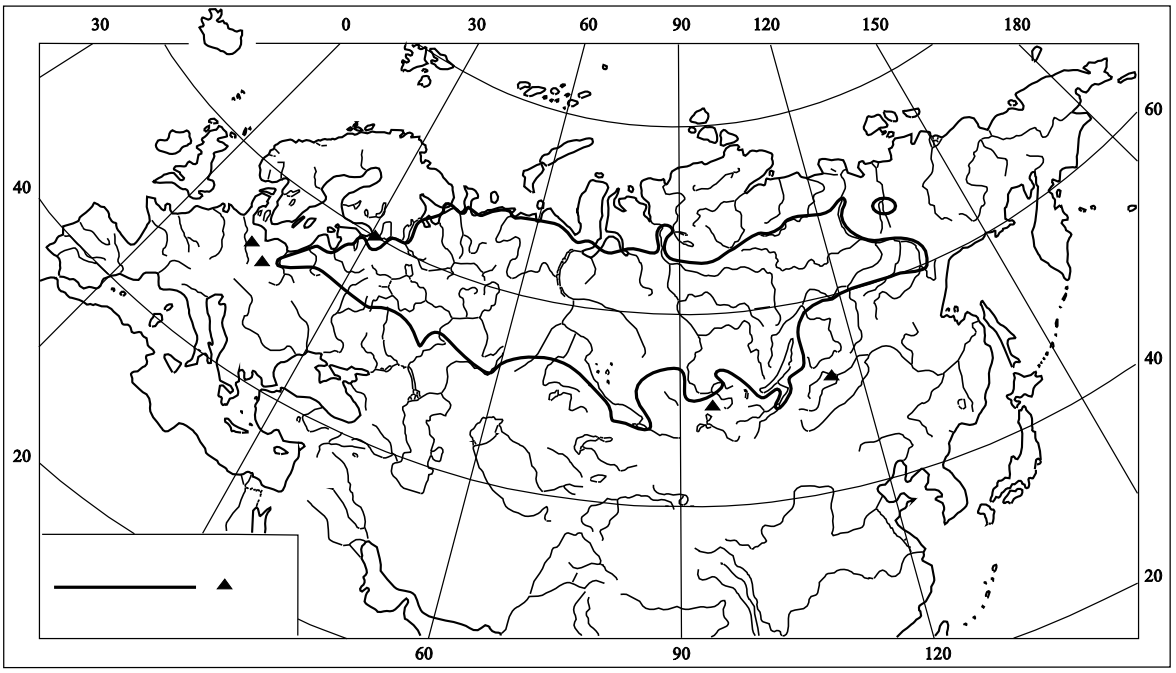

Fig. 52. Distributional area of *Salix dasyclados* Wimm.

Ohwi, 1965, Fl. Jap.: 367. —*S. kinuyanagi* Kimura, 1940, Symb. Iteol. **8**: 401; Ohwi, 1965, op. cit.: 367.

T y p u s: From the Zeya River [in Russian] (the Herbarium of the Academy of Forest Technology in St. Petersburg!). This is probably a cultivated specimen grown in Leningrad (St. Petersburg).

HABIT: A tall shrub or tree to 12 m.

HABITATS: Fresh alluvial deposits along rivers and streams.

DISTRIBUTION: Lake Baykal Coast and Transbaykalia; Mongolia (the Orhon and Upper Kerulen basins); Northeast China, North Korea, and Maritime Province; the Upper Aldan Basin; the Coast of the Sea of Okhotsk; the Yana, Indigirka, Kolyma, Anadyr, and Penzhina basins; the southern half of the Kamchatka Peninsula; Sakhalin; Hokkaido and northern Hondo.

The species does not ascend high in the mountains: it is known to reach 600 m in the Chara (Charskaya) Depression, 800 m in the Sikhote-Alin. (Fig. 51.)

NOTE. This boreal East Asian species is vicarious to *S. viminalis.* Although the areas of the two species get to contact in many regions, they appear not to grow together often.

Plants from Kamchatka, Sakhalin, and Japan are different in comparatively broad leaves; they might be segregated as a variety or subspecies.

94. **S. dasyclados** Wimm. 1849, Flora **32**: 35; Seemen, 1899, in Aschers. et Graebn. Fl. N.-O. Deutsch.: 238; id. 1909, in Aschers. et Graebn. Synopsis **4**: 177; Petunnikov, 1901, Krit. obz. Mosk. fl. **3**: 28; Syreishchikov, 1907, Ill. fl. Mosk. gub. **2**: 35; Litvinov, 1917, in Mayevsk. Fl. Sredn. Ross. 5 ed.: 584; Szafer, 1921, Flora Polska **2**: 45; Krylov, 1930, Fl. Zap. Sib. 4: 743; Perfilyev, 1936, Fl. Sev. kr. **2–3**: 38; Nazarov, 1936, Fl. SSSR **5**: 147; id. 1937, Fl. Zabayk. **3**: 203; Skvortsov, 1955, Bull. MOIP **60**, 3: 126; id. 1964, in Mayevsk. Fl. sredn. pol. 9 ed.: 189; id. 1966, Spisok rast. Gerb. fl. SSSR **91**: N 4541; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 121; Rasinš, 1959, Ivy Latv.: 116; Cherepnin, 1961, Fl. yuzhn. ch. Krasnoyar. kr. **3**: 19; Krall, Viljasoo, 1965, Eesti kasv. pajud: 74. —*S. stipularis* auct. (non Sm. 1803): Trautv. 1832, Nouv. Mém. Soc. natur. Moscou **2**: 374; Ledeb. 1850, Fl. Ross. **3**, 2: 605; Turcz. 1854, Fl. Baic.-Dah. **2**, 2: 380; Meinshausen, 1878, Fl. Ingr.: 317; Martyanov, 1933, Fl. Yuzhn. Yenis.: 144. —*S. acuminata* auct. (non Mill. 1768 nec Sm. 1804): Rupr. 1845, Fl. samojed. cisur.: 53; Ledeb. 1850, op. cit. **3**, 2: 606. —*S. longifolia* auct. (haud Host 1828): Wimmer, 1866, Salic. Europ.: 42; Wolf, 1900, Izv. Lesn. in-ta **4**: 74; Kupffer, 1901, Sched. ad Herb. Fl. Ross. **3**: N 739. —*S. viminalis* var. *nitens* Turcz. 1854, op. cit. **2**, 2: 380 (p. max. p. saltem). —*S. viminalis* var. *splendens* (non Turcz.) Lundström, 1888, K. sv. vet. handl. **22**, 10: 200. —*S. viminalis* auct. non L.: Trautv. 1889, Acta Horti Petropol. **10**: 532; Cajander, 1902, Acta Soc. F. Fl. Fenn. **23**, 1: 3 (p. p.: quoad f. *latifolia*). —*S. burjatica* Nasarov, 1936, op. cit. **5**: 137. —*S. jacutica* Nasarov, 1936, op. cit. **5**: 711 (p. max. p. saltem); Karavayev, 1958, Konsp. fl. Yak.: 84. —*S. serotina* (non Pall.): Shlyakov, 1956, Fl. Murm. **3**: 118; Opred. rast. Komi, 1962: 145.

198

T y p u s: "Silesia: Troppau, Scheitnich" (Wimmer et Krause Herb. Sal. N 7 —LE! et alibi).

HABIT: A tree to 20 m tall and 80–90 cm in stem diameter or a tall shrub.

HABITATS: Near the running water as well as in other parts of river flood plains.

DISTRIBUTION resembles that of *S. viminalis* very much. However, there are substantial differences: in the west, the species does not reach farther than northeastern Poland; there are also some solitary locations in Silesia and Brandenburg. The southern

limits of the area are in northern Belarus and the northern part of the chernozem belt; in the northwest, it reaches the Neva River, Lake Onega, and southeastern coast of the Kola Peninsula. The northern limit is close to that of *S. viminalis* in Europe as well as Siberia, approximating the limit of the forest-tundra belt with some invasions into tundras along rivers. In landscapes of the European northern forest and forest-tundra belt, it plays a particularly important role being the only large tree amidst the vegetation of river valleys that is composed of low willow thickets and *yernik*'s. It may frequently form real forests in river valleys of Bolshezemelskaya and Malozemelskaya tundras, the Polar Urals, and southern Yamal Peninsula, as well as in the Lower Ob Valley (see, for example, Vekhov, Uspenskiy 1959, where the plant is named *S. gmelinii*). The largest specimens to 20 m tall were encountered in the north. They were found along the Izhma River (Pechora Basin) by V. Andreyev (according to his notes on labels of 1929 collections). Specimens to 6–8 m tall are common in the valleys of the Khadata, Kara, and other rivers in the Polar Urals, where they grow beyond the northern limits of the larch and birch. The easternmost localities of *S. dasyclados* are in Verkhoyansk, at the Lower Maya, Lower Yudoma, and Shilka. The southern boundary runs from Kyakhta around the Eastern Sayans, via Tuva, around the Altai (not going into the mountains, as opposed to *S. viminalis*); then from Lake Zaysan, it proceeds along the Irtysh towards Ishim, Kurgan, Orsk, and Ulyanovsk. (Fig. 52.)

NOTE. Hybrids between *S. viminalis* and species of the section *Vetrix* (mostly *S. caprea* and *S. atrocinerea*) are rather common in Western Europe, in nature and particularly in cultivation. Described under the names *S. stipularis* Sm., *S. acuminata* Sm., *S. longifolia* Host, *S. smithiana* Forbes, and *S. calodendron* Wimm., these hybrids resemble *S. dasyclados*. That was a reason for many authors to treat *S. dasyclados* also as
199 a hybrid (Popov 1959, Rechinger 1964, and others). Yet an enormous distributional area, specific niche, absence of the hybrid segregation, and quite normal seed reproduction make all assumptions on hybrid nature of *S. dasyclados* completely improbable, whether they treat it as a single feral hybrid or a complex of various hybrids.

However, the question is if the authentic F. Wimmer's sample belongs to *S. dasyclados*. Unfortunately, we cannot give a positive answer: the specimen might be of hybrid origin. Strictly speaking, we could rename the species; however, it does not appear to be urgent. In 1866, F. Wimmer mentioned other samples as those belonging to the same species. The samples (which mostly originated from the territory of former East Prussia) were definitely not of hybrid origin. Later, the understanding of *S. dasyclados* was established in the literature in that revised meaning (Seemen 1899, 1909; Petunnikov 1901; and others)[1].

95. **S. sajanensis** Nasarov, 1936, Fl. SSSR **5**: 710; id. 1937, Fl. Zabayk. **3**: 206 and fig. 117; Popov, 1959, Fl. Sredn. Sib. **2**: 797; Cherepnin, 1961, Fl. yuzhn. ch. Krasnoyar. kr. **3**: 18; Sergiyevskaya, 1961, Fl. Zap. Sib. **12**: 3223; Malyshev, 1965, Fl. Vost. Sayana: 19; Koropachinskiy, Skvortsova, 1966, Der. i kustarn. Tuvy: 84.

T y p u s: "Montes Sajanenses in alpibus Tunkinensibus, 1929 leg. M. Nasarov N 12450, 12456, 12703" (LE!).

HABIT: A distorted shrub or wide-crowned small tree to 5 m tall.

[1] Following the present strict and formal requirements, the name *S. dasyclados*, apparently, is to be replaced by *S. burjatica* Nasarov, 1936 Fl. SSSR, **5:** 137. —stat. et nom. nov. pro *S. viminalis* var. g Turcz. 1854, Fl. Baic.-Dahur. 2, **2**: 380. Holotypus: LE, originating from the Irkut River (author's note to the English edition).

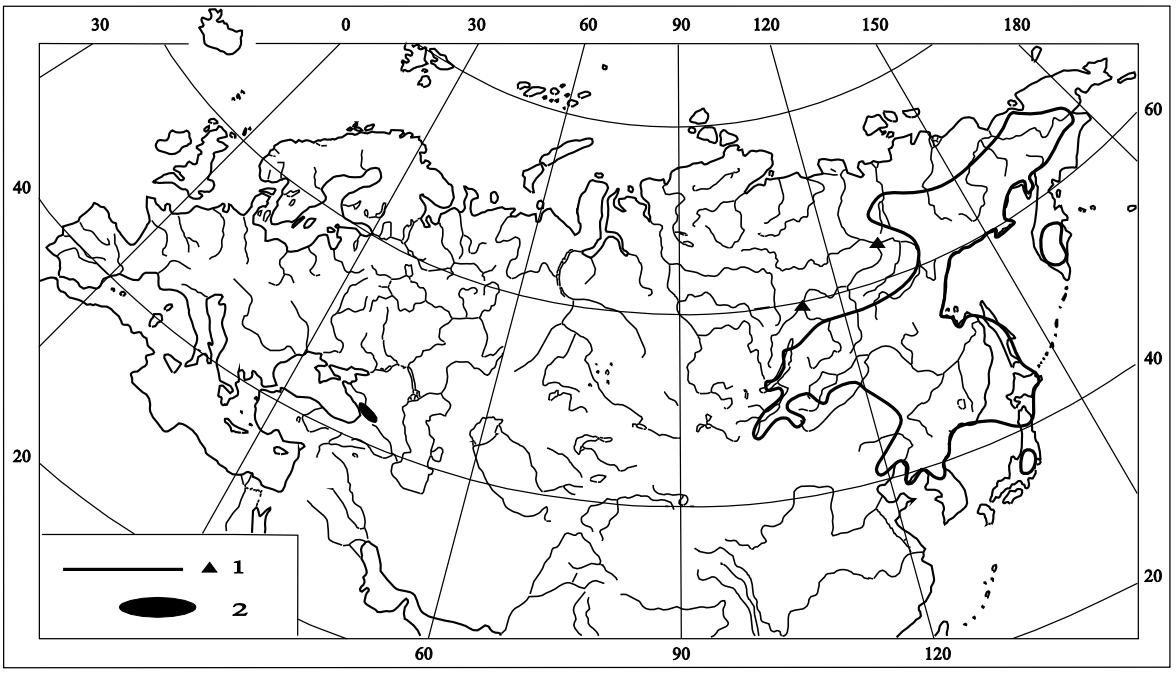

Fig. 53. Distributional areas of *Salix argyracea* E. Wolf (*1*), *S. sajanensis* Nas. (*2*), and *S. udensis* Trautv. et Mey. (*3*)

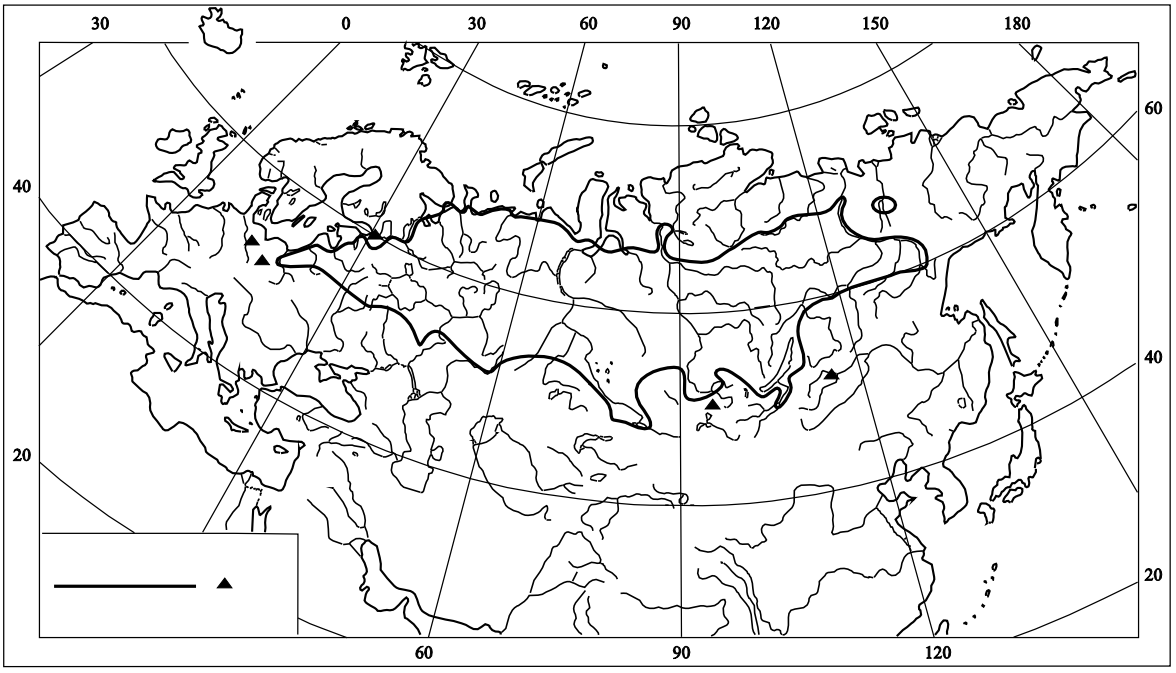

Fig. 54. Distributional areas of *Salix elaeagnos* Scop. (*1*) and *S. gracilistyla* Miq. (*2*)

HABITATS: Stone-fields; also, stony lichen-dominated and stony cushion plant (*Dryas*-dominated) tundras in the subalpine and alpine zones. According to L. Malyshev (1965), it is confined to acidic bedrock (avoiding limestone).

DISTRIBUTION: Nearly all of the Altai (rather sparsely); Western Sayans (rarely); Eastern Sayans and Sangilen (frequently); Barguzinskiy Range. It is found at 1,700–2,200 m (to 2,500 m in Tuva); however, on the Barguzin Coast of Lake Baykal, the place famous for its climatic inversions, it descends as low as the lake level together with other subalpine and alpine willows, such as *S. alaxensis*, *S. rectijulis*, and *S. hastata*. (Fig. 53.)

200

96. **S. argyracea** E. Wolf, 1905, Izv. Lesn. in-ta **13**: 50, tabl. 3; Görz, 1934, Feddes Reppert. **36**: 27; Nazarov, 1936, Fl. SSSR **5**: 143; Polyakov, 1960, Fl. Kazakhst. **3**: 27; Skvortsov, 1962, Bot. mat. Gerb. in-ta bot. AN UzbSSR **17**: 67.

T y p u s: "In Leningrad culta. Provenit e vicin. Pischpeck (Frunse)" (the Herbarium of the Academy of Forest Technology in St. Petersburg!).

HABIT: A small tree or tall shrub.

HABITATS: Banks of alpine streams and rivers in the upper forest and subalpine zones at 1,600–3,200 m (rather scattered).

DISTRIBUTION: The Dzungarskiy Alatau, Chinese Tien Shan, and a part of the Kirghiz Tien Shan including the eastern Kungey Alatau, eastern Zailiyskiy Alatau and the Lower Atbashi (a tributary of the Naryn). (Fig. 53.)

97. **S. pantosericea** Goerz, 1934, Feddes Repert. **36**: 229; Nazarov, 1936, Fl. SSSR **5**: 104; Kolakovskiy, 1939, Fl. Abkhaz. **2**: 22; Grossheim, 1945, Fl. Kavk. 2 ed. **3**: 21; Sosnovskiy, 1947, Fl. Gruz. **3**: 18; Makhatadze, 1961, Dendrofl. Kavk. **2**: 27; Skvortsov, 1966, Trudy Bot. in-ta AN ArmSSR **15**: 132. —*S. argyrophylla* Lakschewitz ex Goerz, 1930, in Grossheim, Fl. Kavk. **2**: 8. —Non *S. argyrophylla* Nutt. 1842.

T y p u s: Kubanskaya Obl., former Kutaisi Governm. [in Russian]. In the original description (Görz 1930), the type specimen was designated only as much as this. In the St. Petersburg Herbarium, there are the following samples, which were supposed to be described by P. Lakschewitz (marked by him): "The Rion Sources, 6,900'. —Sredinskiy N 15, 39"; "distr. Alagir et Radscha —7.IX 1861. Ruprecht"; "Klukhor Pass —11.VII 1905. Litvinov, N 440".

HABIT: A low shrub (0.5–2 m).

HABITATS: Banks of streams and lake shores, *Rhododendron* shrublands, alpine meadows, and glacial moraines within the alpine and subalpine zones (1,900–2,750 m).

DISTRIBUTION: From the Caucasian Preserve (Chugush, Bolshoy Bambak, Abago) to Mamison Glacier. (Fig. 51.) This endemic species of the western Greater Caucasus is rather scantily represented in herbaria so far. I managed to examine 37 samples total, excluding duplicates.

NOTE. *S. pantosericea* resembles species from the section *Arbuscella* in its general habit and ecology; they appear to have still more in common when one considers particular morphological features: their leaves, buds, and so on. Along with *S. udensis*, *S. pantosericea* may be treated as a connecting link between *Vimen* and *Arbuscella*.

98. **S. udensis** Trautv. et Mey. 1856, in Middendorff, Reise Sibir. 1, **2**: 81; Nazarov, 1936, Fl. SSSR **5**: 146. —*S. oblongifolia* Trautv. et Mey. 1856, op. cit.: 81; haud Nazarov, 1936, op. cit. **5**: 72. —*S. fulcrata* Anderss. 1867, Monogr. Salic.: 139 (p. p.: quoad pl. Kamtschat.); Nazarov, 1936, op. cit. **5**: 75 (p. p.?). —*S. phylicoides* Anderss.

1867, op. cit.: 140 (quoad var. *angustifolia* et var. *attenuata* saltem); Floderus, 1933, Ark. bot. **25A**, 10: 11. —*S. sachalinensis* Fr. Schmidt, 1869, Reise Amur.: 173; Seemen, 1903, Salic. Jap.: 53; Miyabe, Kudo, 1921, Icon. forest tr. Hokk. **1**: N 18; Floderus, 1926, Ark. bot. **20A**, 6: 40; Komarov, 1929, Fl. Kamch. **2**: 20; Kimura, 1934, in Miyabe, Kudo, Fl. Hokk. a. Saghal. **4**: 431; Nazarov, 1936, op. cit. **5**: 145; Tolmachev, 1959, Der. i kustarn. Sakhal.: 60; Kimura, 1961, Symb. Iteol. **18**: 141; Ohwi, 1965, Fl. Jap.: 367. —*S. shikokiana* Makino, 1892, Bot. Mag. Tokyo **6**: 49. —*S. aequitriens* Seemen, 1896, Bot. Jahrb. Beibl. **53**: 52; id. 1903, op. cit.: 70. —*S. opaca* Anderss. ex Seemen, 1903, op. cit.: 50; Shirasawa, 1908, Icon. forest tr. Jap. **2**: tabl. 9; Nazarov, 1936, op. cit. **5**: 148. —*S. siuzevii* Seemen, 1908, Feddes Repert. **5**: 17; Wolf, 1911, Trudy SPb. bot. sada **28**, 4: 527; Lakschewitz, 1914, Spisok rast. Gerb. russk. fl. **50**: N 2488; Nakai, 1930, Fl. sylv. Kor. **18**: 180; Nazarov, 1936, op. cit. **5**: 144. —*S. mezereoides* E. Wolf, 1911, op. cit. **28**: 529; Komarov, Alisova, 1931, Opred. rast. Dalnevost. kraya **1**: 426; Nazarov, 1936, op. cit. **5**: 84. —*S. amnicola* E. Wolf, 1911, op. cit. **28**: 529; Komarov, Alisova, 1931, op. cit. **1**: 426. —*S. paramushirensis* Kudo, 1922, J. Coll. Agric. Hokk. Univ. **11**, 2: 97; Hultén, 1928, Fl. Kamtch. **2**: 16; Kimura, 1952, Symb. Iteol. **11**: 192. —*S. parallelinervis* auct. (non Flod.), p. p. saltem: Hultén, 1928, op. cit. **2**: 16; Komarov, 1929, op. cit. **2**: 14; Vasilyev, 1957, Fl. Komandor.: 84. *201*

T y p u s: "Udskoi 15.VI 1844. A. Middendorff" (LE!).

HABIT: A tall shrub or tree; specimens as tall as 30 m were encountered on the Kamchatka Peninsula (Komarov 1929) and ones to 8–10 m, in Magadan Oblast (Starikov 1958).

HABITATS: Banks of rivers, streams, and ditches; also, any exposed and damp habitats on Sakhalin.

DISTRIBUTION. The western boundary of the solid area runs via the Lower and Middle Lena, Upper Aldan, Middle Vitim, Ingoda, and Onon. The area embraces the forested regions of the Northeast China and North Korea; a major part of Japan (Shikoku, Honshu, and Hokkaido); Sakhalin, the Kurils, and Commander Islands; all of the Kamchatka Peninsula; the Coast of the Sea of Okhotsk; the Anadyr, Kolyma, Indigirka, and Yana basins (however, there are no collections available from the very lower reaches of the Kolyma, Indigirka, Yana, neither from the Lena Delta). There are also (isolated?) area parts on the Vilyuy downstream of its confluence with the Nyurba and around Lake Baykal (at the lower reaches of the Irkut and Selenga and in the Barguzin Basin). (Fig. 53.)

It is mostly confined to the lowland and piedmont and much more rarely encountered at lower and intermediary elevations in the mountains. However, it ascends as high as 1,100 m in the Stanovoye High Plateau (Kalarskiy District) and even to 1,600 m in the Sikhote-Alin (the Botchi Basin); also, to 900 m on southern Sakhalin.

NOTE. Some morphological characteristics of the species, such as the scanty or lacking leaf pubescence, elongated stipes of capsules, and short nectaries make it look similar to the species from *Arbuscella*. The vegetative parts may occasionally resemble those in *S. boganidensis* very much. In *S. udensis*, leaves on shortened shoots and even inferior ones on normal shoots may be much broader than ordinary leaves; that makes it look particularly similar to the species from the section *Arbuscella* and has brought about confusion with *S. parallelinervis* Flod.

Sect. 18. *Subviminales*

(Seemen) Schneider, 1904, Handb. **1**: 65.

T y p u s: *Salix gracilistyla* Miq.

Shrubs or small trees. Floriferous buds strikingly different from vegetative ones, lanceolate, attenuating into long beaks. Petioles that embrace floriferous buds become abruptly ventricose by fall. Stipules broad, eglandular above. Leaves silvery pubescent beneath, pubescence mostly confined to veins, making them conspicuous. Catkins precocious, sessile, densely flowered, their bracts strongly pubescent. Nectary solitary, linear; stamen filaments glabrous, distinct or more or less connate. Capsules subsessile, not large, pubescent. Styles long (1.5–4 mm), several times exceeding two-lobed stigmas.

This is a very small East Asiatic group consisting of one species in this country and probably only one more, *S. blinii* Levl., in South Korea. It might be more reasonable to treat it as a subsection of *Vimen*.

99. **S. gracilistyla** Miq. 1867, Ann. Mus. Lugd.-Bat. **3**: 26 et seorsum Prolusio fl. Jap.: 214; id. 1871, Bijdr. fl. Jap. **4**: 5; Franch. et Sav. 1875, Enum. Jap. **1**: 461;
202 Koidzumi, 1913, Bot. Mag. Tokyo **27**: 92; Nakai, 1930, Fl. sylv. Kor. **18**: 104; Nazarov, 1936, Fl. SSSR **5**: 129; Ohwi, 1965, Fl. Jap.: 368. —*S. thunbergiana* Blume ex Anderss. 1868, in DC. Prodr. **16**, 2: 271; Komarov, 1903, Fl. Manchzh. **2**, 1: 30; Seemen, 1903, Salic. Jap.: 61; Komarov, Alisova, 1931, Opred. rast. Dalnevost. kr. **1**: 422. —*S. graciliglans* Nakai, 1916, Bot. Mag. Tokyo **30**: 274; id. 1930, Fl. sylv. Kor. **18**: 102. —*S. gracilistyloides* Kimura, 1926, Bot. Mag. Tokyo **40**: 8; id. 1928, ibid. **42**: 571. —*S. nakaii* Kimura, 1926, op. cit. **40**: 637. —*S. melanostachya* Goerz, 1933, Feddes Repert. **32**: 121.

T y p u s: "In Japonia detexit Buerger; Nagasaki —Oldham N 527, 719; Japonia —Pierot" (L, U, n. v.; fragmenta specim. Oldhamii N 527, 719 —LE!).

HABIT: A tall shrub or small tree.

HABITATS: Banks of streams and rivers, mostly small ones.

DISTRIBUTION: Southern Amurskaya Oblast (the Zeya downstream of Svobodnyy and Bureya downstream of Cheugda); the Amgun Basin; Maritime Province and nearly all of Khabarovsk Province, except the Lower Amur; the extreme southern part of Sakhalin (Yuzhno-Sakhalinsk); Japan (all the four large islands); North Korea and South Korea; eastern Northeast China. A solitary finding on the Kamchatka Peninsula is very peculiar. The label on the specimen, which was identified by V. Komarov as *S. caprea*, says: "along the Goltsovka R., in the vicinity of Bolsheretsk —8.V.1909, Zelenin". In the southern Sikhote-Alin, the species ascends to 900 m. (Fig. 54.)

Sect. 19. *Canae*

Kerner, 1860, N.-Öst. Wied.: 222.

T y p u s: *Salix elaeagnos* Scop.

Tall shrubs or, more frequently, small trees. Shape of buds and leaves similar to that in *Vimen* (*S. viminalis, S. schwerinii, S. udensis*); however, leaves with dense white tomentose pubescence beneath. Catkins coetaneous, slender, cylindrical, their bracts white, large, persistent. Nectary solitary, shortly rectangular or square. Stamen filaments more or

less pubescent at base and partially connate. Capsules on short stipes, not large, lanceolate, acute; styles and stigmas elongated. *203*

The section appears to be represented by a single species. Being very close to the section *Vimen* in the vegetative parts structure, the species of the section *Canae* is strikingly different in the habit of its catkins. Therefore, it must be treated as a distinct entity connected with *Vimen* and *Villosae*.

100. **S. elaeagnos** Scop. 1772, Fl. Carn. 2 ed. **2**: 257; Hayek, 1924, Prodr. Balc. **1**: 86; Vicioso, 1951, Salic. Españ: 76; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 122; id. 1964, Fl. Eur. **1**: 53; Maire, 1961, Fl. Afr. Nord **7**: 65; Skvortsov, 1966, Trudy Bot. in-ta AN ArmSSR **15**: 133. —*S. incana* Schrank, 1789, Baier. Fl. **1**: 230; Wimmer, 1866, Salic. Eur.: 25; Boiss. 1879, Fl. Or. **4**: 1187; Camus, 1904, Saul. Eur. **1**: 221; Seemen, 1909, in Aschers. et Graebn. Synopsis **4**: 189; Buser, 1940, Ber. Schweiz. bot. Ges. **50**: 637; Nazarov et al. 1952, Fl. URSR **4**: 53.

T y p u s: "In montibus Carnioliae, ad scaturigines et rivulos" (n. v.).

HABIT: A small tree (to 8–10 m, rarely to 12 m); occasionally a tall shrub.

HABITATS: Coarse pebbles of large rivers; occasionally, moist stony slopes and scarps, bottoms of narrow gorges, etc. at intermediate and low levels in the mountains, sometimes descending to foothills. A calciphilic species.

DISTRIBUTION: Mountains of Northern Africa (rarely; Rif, at 1,500 m; the Middle Atlas, at 2,000 m); most of the Iberian Peninsula (except the southwestern part); southern France; all of the Alps (to 1,800 m); the mountains of the western Balkan Peninsula to the Peloponnese Peninsula; Bulgaria (800–1,600 m); the Southern, Eastern, and Western Carpathians (to 1,200 m); the Ukrainian Carpathians (mostly, in warm valleys, scattered, presumably not higher than 700–800 m). In northern Asia Minor, it occurs at 750–1,900 m. (Fig. 54.)

Sect. 20. *Villosae*

Rouy, 1910, Fl. Fr. **12**: 200.

T y p u s: *Salix lapponum* L.

Shrubs or occasionally short-stemmed trees. Floriferous buds strikingly different from vegetative ones. Leaves elliptic or (ob-)lanceolate, entire or subdentate, more or less pubescent as well as shoots (covered with dense white tomentum); cataphylls and inferior leaves more or less silvery beneath. Catkins precocious or subprecocious, densely pubescent, rather thick. Nectary solitary. Capsules sessile or on short stipes, densely white pubescent; styles mostly elongated.

This boreal-arctic Eurosiberian-American group consists of five species (four in the Old World and one, *S. candida* Fluegge, in North America). Its relations to *Vimen* are obvious, connections with *Canae* and *Lanatae* are probable.

Key to Species

1. Leaf petioles embracing floriferous buds not ventricose. Floriferous buds oval or ovoid, obtuse, their apices not bent toward shoots. Catkins subprecocious, stalked; stalks leafy, with a few cataphylls. Capsule stipes 0.5–1.0 mm long, almost as long as shortly rectangular nectaries. Style length + stigma length = 0.7–2.0 mm 2

— Leaf petioles embracing floriferous buds become abruptly ventricose by fall. Floriferous buds pointleted or attenuating into beaks bent toward shoots. Catkins
204 precocious, mostly quite sessile. Capsule stipes not longer than 0.5 mm, at least twice as short as nectaries. Nectaries narrowly rectangular or linear. Style length + stigma length = 1.4–4.0 mm 3

2. Due to impressed veins, leaves rugose above, their broadest part mostly above middle of blades. Veins, at least lateral ones, distinct beneath. Anthers 0.5–0.6 mm long. Style length + stigma length = 0.6–1.2 mm . . . . . 103. **S. krylovii**

— Leaves not rugose above, their broadest part mostly about blade middle. Uniform pubescence makes veins nearly inconspicuous beneath. Anthers 0.6–0.7 mm long. Style length + stigma length = 1.2–2.0 mm . . . . . 104. **S. helvetica**

3. Annotinous shoots 1.4–2 mm thick. Stipules mostly lacking or rudimentary. Leaves not large, mostly 10–20 mm broad, dull or grayish due to pubescence above. Female catkins 30–70 mm long when ripen . . . . . 101. **S. lapponum**

— Annotinous shoots 2–3 mm thick. Stipules mostly well developed. Leaves large, mostly 20–40 mm broad, bright green above. Female catkins 70–130 mm long when ripen . . . . . 102. **S. alaxensis**

101. **S. lapponum** L. 1753, Sp. pl.: 1019; id. 1755, Fl. Suec. 2 ed: 350; Ledeb. 1850, Fl. Ross. **3**, 2: 617 (p. p.: excl. pl. altaic. et Sibiriae Or.); Wimmer, 1866, Salic. Eur.: 38 (p. p.: excl. syn. *S. helvetica* Vill.); Camus, 1904, Saul. Eur.: 147; Wolf, 1930, Fl. Yu.-V. **4**: 46; Krylov, 1930, Fl. Zap. Sib. **4**; 765; Floderus, 1931, Salic. Fennosc.: 132; Perfilyev, 1936, Fl. Sev. kr. **2–3**: 32; Nazarov, 1936, Fl. SSSR **5**: 65; Pawłowski, 1946, O niekt. wierzb.: 4; Montserrat, 1950, Collect. bot. **2**, 3: N 24; Vicioso, 1951, Salic. Españ: 86; Nazarov et al. 1952, Fl. URSR **4**: 32; Shlyakov, 1956, Fl. Murm. **3**: 114; Chassagne, 1956, Invent. fl. Auvergne **1**: 253; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 114; id. 1964, Fl. Eur. **1**: 52; Polyakov, 1960, Fl. Kazakhst. **3**: 34. — *S. daphneola* Tausch, 1837, Flora **20**: 343. —*S. helvetica* ssp. *marrubifolia* (Tausch) Flod. 1943, Sv. bot. tidskr. **37**: 77 —nom nov. pro *S. arenaria* θ *marrubifolia* Tausch, 1837, Flora **20**: 339; Rech. f. 1957, op. cit. **3**, 1: 118 (quoad pl. sudeticas). — *S. marrubifolia* Rech. f. 1964, op. cit. **1**: 52 (p. p.: excl. pl. Mont. Tatrarum). — *S. arenaria* auct. plur. vetustiorum (non L.): Trautv. 1832, Salic. Frigid.: 287; Tausch, 1837, op. cit. **20**: 337–339; et al.

T y p u s: "In alpibus Lapponiae ubique. Fl. Lapp. N 366 et tab. 8 fig. T; Fl. Suec. N 808".

HABIT: A shrub to 1.5 m tall; rarely, to 2.0–2.5 m.

HABITATS: Eutrophic and mesotrophic wetlands, damp and paludal meadows and forest openings, paludal forests. It is particularly common in the forest-tundra belt and subalpine zone of northern mountains, where it forms extensive shrublands typical for these regions together with other willows, such as *S. phylicifolia*, *S. glauca*, and *S. lanata*. In the southern part of the area as well as at most paludal and peaty habitats, *S. lapponum* dominates the thickets giving way to *S. glauca* and *S. phylicifolia* at dryer places, *S. lanata* and *S. glauca* in the north.

DISTRIBUTION. The primary (solid) area embraces nearly all of Scandinavia (except southern Sweden) as well as the forest and forest-tundra belts in European Russia and West Siberia with some scattered locations in the forest-steppe belt. The southern area limit is

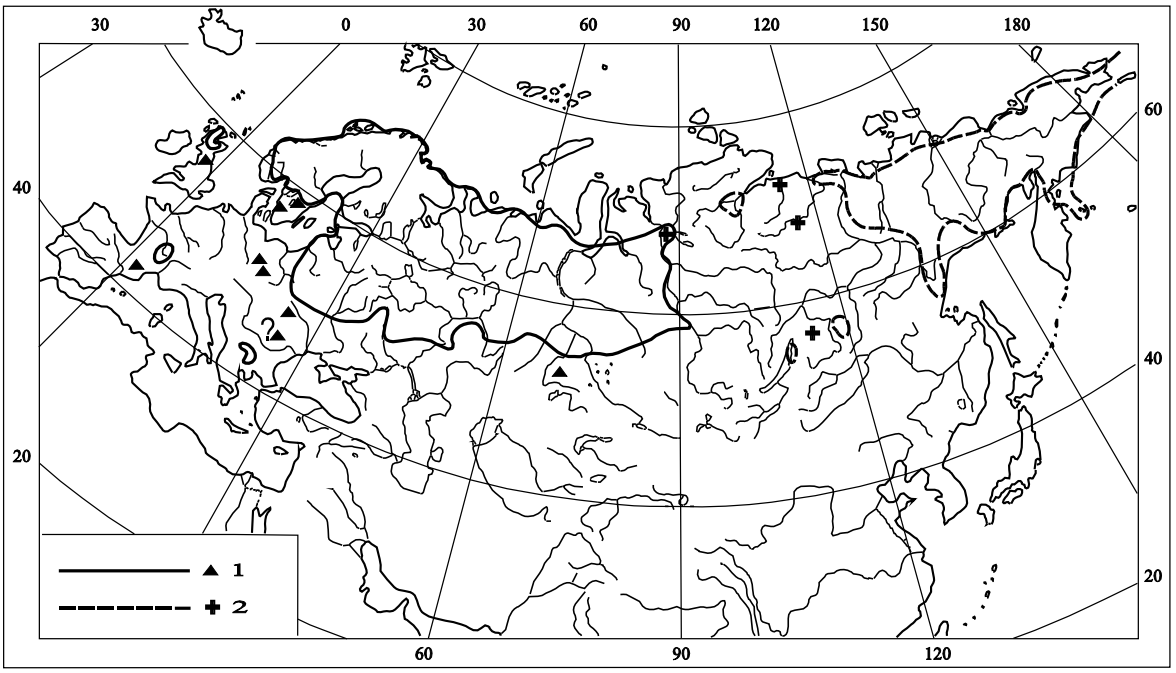

Fig. 55. Distributional areas of *Salix lapponum* L. (*1*) and *S. alaxensis* Coville (*2*)

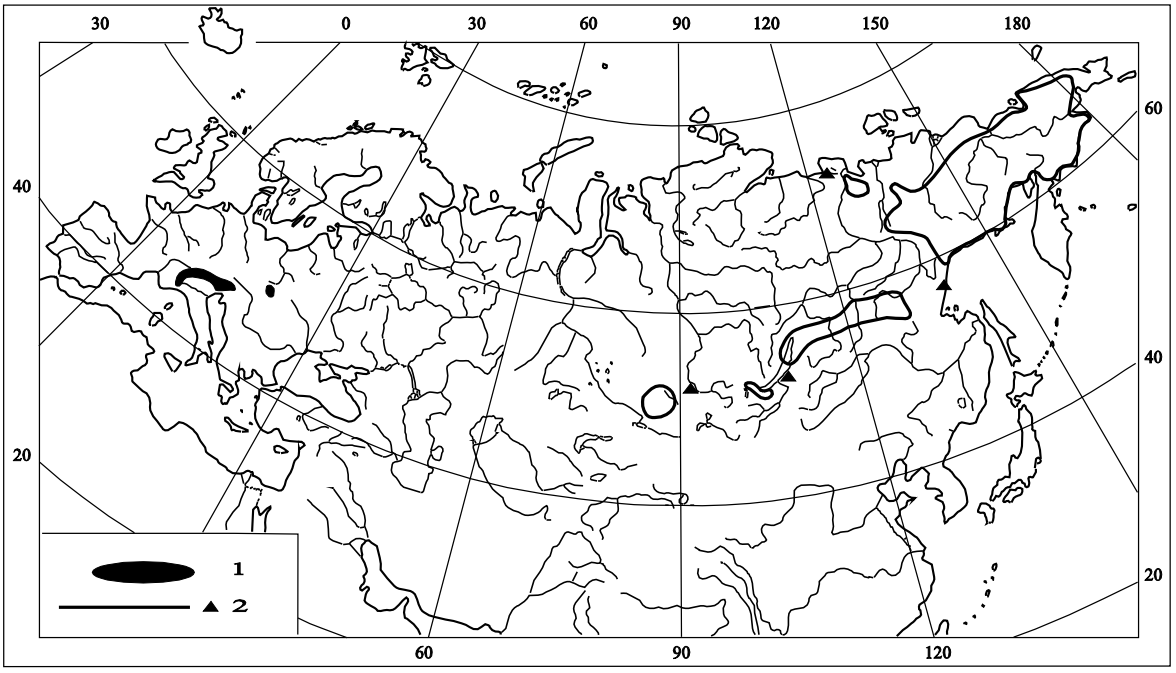

Fig. 56. Distributional areas of *Salix helvetica* Vill. (*1*) and *S. krylovii* E. Wolf (*2*)

found around Lvov, Kiev, Novgorod-Severskiy, Voronezh and Borisoglebsk, Samara, Chelyabinsk, Kurgan, Ishim, in northern Barabinskaya Steppe, Tomsk, and the Ket Basin with scattered locations in the Kazakh Uplands and northern piedmont of the Altai (the Salairskiy Kryazh, Kulundinskiy Bor). The eastern area boundary runs along the Yenisei reaching the eastern bank of the river only around Igarka and Dudinka. The northernmost parts of the area are the Ob Inlet, southern Yamal Peninsula, Kara Basin, and Lower
205 Pechora, as well as all of the Kanin and Kola peninsulas. However, the species is absent from Kolguyev, Vaygach, the Yugorskiy Peninsula, and Novaya Zemlya. In the west, the area boundary reaches beyond the former USSR territory only in Scandinavia and eastern Poland.

In the Northern Urals (Denezhkin Kamen), it ascends to 900 m; in the Polar Urals (the Sob Basin), to 300 m; in the Khibins, to 500 m; in Norway (around Tromsö), to 1,100 m (Benum 1958).

In addition to that major area, there is a number of large and small fragmentary parts in European mountains: in Scotland and northern England (at 600–900 m); the eastern Pyrenees (2,000–2,400 m); French Massif Central (1,000–1,750 m); Sudetes (1,200–1,500 m); Eastern Carpathians (a solitary finding on a peatbog at the foot of Goverla); western Bulgaria (in the Vitocha, Rila, and Rhodopes at 1,800–2,500 m); Macedonia. (Fig. 55.)

All data from East Siberia and the Altai are to be attributed to *S. krylovii*.

NOTE. It is remarkable that the species is missing from the Alps and Western Carpathians, where it is replaced by *S. helvetica* Vill. Yet plants from the Pyrenees, Massif Central, Sudetes, Goverla, and Bulgaria are true *S. lapponum*. I had an opportunity to examine samples from all of these regions and came to this conclusion, although some authors (Pawłowski 1946; Rechinger 1957, 1964) had had other opinions on this matter.

The segregation of *S. marrubifolia* Rech. f. (1964) appears to be completely unjustified. B. Floderus (1943) found out that the so-called "*S. lapponum*" from the Tatras was actually *S. helvetica*. B. Floderus segregated plants from the Tatras in a subspecies: *S. helvetica* ssp. *marrubifolia* (Tausch) Flod. The segregation of the subspecies appears to be quite reasonable; however, I. Tausch's epithet was mistreated when applied to the Tatran plants, because the authentic Tausch's plants (PR! LE!) had originated from the Sudetes and were actually *S. lapponum*. Then K. Rechinger assigned a species rank to the ssp. *marrubifolia*; according to his treatment, plants from the Sudetes and Tatras both
206 belong to that species. Hence, *S. marrubifolia* is actually a mixture of two different species: *S. lapponum* from the Sudetes (including the type of *S. marrubifolia*) and *S. helvetica* from the Tatras.

102. **S. alaxensis** Coville, 1900, Proc. Wash. Acad. **2**: 280; id. 1901, ibid. **3**: 311 et tab. 34 (nom. nov. pro *S. speciosa* Hook. et Arnott non Host); Hultén, 1943, Fl. Al. **3**: 539; Raup, 1947, Sargentia **6**: 158; id. 1959, Contrib. Gray Herb. **185**: 76; Porsild, 1951, Botany S.-E. Yukon: 145. —*S. speciosa* Hook. et Arnott, 1838, in Hook. Fl. Bor.-Amer. **2**: 145; eid. 1841, Bot. Beech. voyage: 130; Ledeb. 1850, Fl. Ross. **3**, 2: 625; Nazarov, 1936, Fl. SSSR **5**: 66; id. 1937, Fl. Zabayk. **3**: 210. —Non *S. speciosa* Host, 1828, *Salix*: 5 (quae est *S. triandrae* L. forma). —*S. lapponum* (non L.) Rgl. et Tiling, 1858, Fl. Ajan.: 118. —*S. lapponum* var. *ajanensis* Trautv. 1877, Acta Horti Petropol. **5**: 106; *S. longistylis* Rydb. 1901, Bull. N. Y. Bot. Gard. **2**: 163; Porsild, 1951, op. cit.: 145.

T y p u s: "Alaska, Kotzebue Sound, a. 1826 —captain Beechey" (K? n. v.).

HABIT: A vigorous, usually quite tall shrub with stout branches. In favorable conditions, it may grow as a small (to 6 m) short-stemmed tree with a wide crown.

HABITATS: Banks of mountain streams, flood plains of small and large rivers, nearly always close to running water; occasionally, taluses and runoff hollows with underground watercourses.

DISTRIBUTION: The alpine and subalpine zones of the Stanovoye High Plateau (sparsely; in the Kodar Range, to 1,800 m; in the Barguzinskiy Range, down to Lake Baykal level due to temperature inversions). The northern East Siberia from Dudinka to the Lower Anabar and Middle Olenek (sparsely). All of the Northeast from the Lena Delta, Verkhoyanskiy Range, Maya Basin, and Ayan to the very eastern Chukchi Peninsula (rather common); the Koryakskoye High Plateau, Karaginskiy and Bering islands. Yet it is missing from the Kamchatka Peninsula south of Koraga, Arctic Ocean islands, and northern coast of the Chukchi Peninsula. (Fig. 55.)

It is as well distributed in the arctic and subarctic regions of Alaska and Canada reaching the Hudson Bay.

103. **S. krylovii** E. Wolf, 1911, Trudy SPb. bot. sada **28**: 537 (nom. nov. pro *S. pseudolapponum* Wolf non Seemen); Krylov, 1930, Fl. Zap. Sib. **4**: 767; Nazarov, 1936, Fl. SSSR **5**: 65; Polyakov, 1960, Fl. Kazakhst. **3**: 34; Cherepnin, 1961, Fl. yuzhn. ch. Krasnoyar. kr. **3**: 15; Malyshev, 1965, Fl. Vost. Sayana: 107; Skvortsov, 1966, Spisok rast. Gerb. fl. SSSR **91**: N 4540. —*S. lapponum* auct. ross. vetustior. non L.: Ledeb. 1850, Fl. Ross. **3**, 2: 617 (quoad. pl. altaic. et baicalens.); Turcz. 1854, Fl. Baic.-Dah. **2**, 2: 289. —*S. speciosa* var. *trautvetteriana* Anderss. 1868, in DC. Prodr. **16**, 2: 276. —*S. lapponum* var. *trautvetteriana* (Anderss.) Glehn, 1876, Acta Horti Petropol. **4**: 80. —*S. pseudolapponum* E. Wolf, 1909, in Krylov, Fl. Alt. **5**: 1226. — Non *S. pseudolapponum* Seemen, 1900, Bot. Jahrb. Beibl. **65**: 28 (quae est *S. glaucae* forma). —*S. baicalensis* Turcz. ex Nasarov, 1937, Fl. Zabayk. **3**: 210; Popov, 1959, Fl. Sredn. Sib. **2**: 805. —*S. baicalensis* Turcz. in sched. inedit.; Floderus, 1933, Arc. bot. **25A**, 10: 11 (nom. nud.). —*S. helvetica* Vill. ssp. *krylovii* Flod. 1943, Sv. bot. tidskr. **37**: 75.

T y p u s: The alpine zone of the Altai [in Russian]. The description is based on samples from the Herbarium of the University of Tomsk (TK).

HABIT: A medium-sized or low shrub (to 2–2.5 m tall).

HABITATS: Stony taluses and screes, stony tundras, cirques, shallow drainage wetlands, damp depressions, *yernik*' s, banks of streams, flood plains of larger rivers (in the latter case, usually not close to running water); also, larch and poplar stands (in the undergrowth and at edges). Some contingency with acidic bedrock. Similarly to many other alpine willows distributed in the extreme Northeast, this species reaches high elevations in the mountains though not expanding its range to high latitudes.

DISTRIBUTION: The Altai (in the alpine and subalpine zones, to 2,500 m); the Western Sayans (only two findings known); Eastern Sayans (in the southeastern part only, at 1,700–2,200 m); Khamar-Daban (700–2,000 m); Baykalskiy Range; Stanovoye High Plateau (to 1,800–1,900 m); Aldanskoye High Plateau; Lower Lena; across the Northeast from the southern Verkhoyanskiy Range and Ayan to Cape Schmidt and Ugolnaya Gavan. In the Upper Kolyma Basin, *S. krylovii* ascends to 900 m. It is missing from the Kamchatka and Chukotka peninsulas. (Fig. 56.) *207*

NOTE. M. Nazarov (1937) was first to use the name *S. baicalensis* Turcz. on legitimate grounds, although it had been introduced much earlier. Before 1937, it had been a nomen nudum. For more detail, see the appropriate note in the "Arctic Flora of the USSR", 5.

104. **S. helvetica** Vill. 1789, Hist. pl. Dauphin. **3**: 783; Wimmer, 1866, Salic. Eur.: 89; Camus, 1904, Saul. Eur. **1**: 151; Buser, 1940, Ber. Schweiz. bot. Ges. **50**: 719;

Floderus, 1943, Sv. bot. tidskr. **37**: 73 (excl. ssp. *krylovii*); Pawłowski, 1946, O niekt. wierzb.: 4; id. 1956, Fl. Tatr **1**: 186; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 116; id. 1964, Fl. Eur. **1**: 52. —*S. marrubifolia* Rech. f. 1964, op. cit. **1**: 52 p. p.: quoad pl. Mont. Tatrarum.

T y p u s: "Suisse (Helvetia)" (n. v.).

HABIT: A low shrub (0.8–2.0 m), its branches short and stout.

HABITATS: Moist slopes, cirques, bottoms of depressions, and rocks in the subalpine and alpine zones. Occasionally, it may form shrublands, either solely or together with *S. glauca*, *S. hastata*, *S. foetida*, and *S. breviserrata*. The species is associated with acidic substrate.

DISTRIBUTION: The Alps (from the Maritime Alps to Tirol, at 1,700–2,700 m); the Tatras (rarely, confined to granite, at 1,600–2,000 m). (Fig. 56.)

NOTE. B. Floderus (1943) and B. Pawłowski (1946) both noticed that the plants from the Tatras, which had been treated as *S. lapponum*, were actually *S. helvetica*. However, the epithet "*marrubifolia* Tausch" was misused by B. Floderus when he applied it to those plants (see the note to *S. lapponum* above).

Sect. 21. *Lanatae*

Koehne, 1893, Dendrol.: 87, 93 (p. p.).

T y p u s: *S. lanata* L.

Shrubs with stout, usually densely pubescent branches. Floriferous buds strikingly different from vegetative ones, thick. Stipules subequilateral to slightly inequilateral. Leaves broad, entire or densely denticulate, usually more or less pubescent, their reticulation prominent beneath. Catkins precocious, sessile, their bracts clothed with long trichomes. Nectary solitary. Stamen filaments glabrous. Capsules sessile or subsessile, acute; styles elongated, stigmas linear.

The section consists of two or three Eurasiatic species (besides the two ones in this country, there is, presumably, *S. nuristanica* A. Skv., which is very poorly known so far) and also some two or three American species. However, the delimitation of *Lanatae* and other related groups (first of all, *Hastatae*, which is very abundant in species in the New World) has not yet been fully accomplished within the flora of North America.

The relation of *Lanatae* to the section *Hastatae* is quite obvious; *S. recurvigemmis* resembles *Myrtosalix* in some of its characters, such as lustrous leaves or ovaries clothed with strongly refractive trichomes. Indeed, the section *Myrtosalix* might be as well related to *Hastatae*, as it was already mentioned here.

A North American species, *S. hookeriana* Barr., undoubtedly belonging to *Lanatae*, was erroneously reported from the Anadyr (Floderus 1933) and Zhigansk (Nazarov 1936: 63).

Key to Species

1. Buds ovoid, obtuse. Stipules persistent on leaf abscission. Leaves matte (opaque) above. Ovaries glabrous . . . . . 105. **S. lanata**

— Buds with reclined beaks. Stipules abscising not later than leaves. Mature leaves more or less lustrous above. Ovaries pubescent, at least partially . . . . . 106. **S. recurvigemmis**

105. **S. lanata** L. 1753, Sp. pl.: 1019; Ledeb. 1850, Fl. Ross. **3**, 2: 616; Wimmer, 1866, Salic. Eur.: 2; Krylov, 1930, Fl. Zap. Sib. **4**: 764; Floderus, 1931, Salic. Fennosc.: 130; Perfilyev, 1936, Fl. Sev. kr. **2–3**: 29; Nazarov, 1936, Fl. SSSR **5**: 61; id. 1937, Fl. Zabayk. **3**: 209; Shlyakov, 1956, Fl. Murm. **3**: 112; Popov, 1959, Fl. Sredn. Sib. **2**: 806; Polyakov, 1960, Fl. Kazakhst. **3**: 35; Rech. f. 1964, Fl. Eur. **1**: 48; Malyshev, 1965, Fl. Vost. Sayana: 107. —*S. depressa* L. 1755, Fl. Suec. ed. 2: 352. —Non *S. depressa* Fries. et auct. poster. —*S. richardsonii* Hook. 1838, Fl. Bor.-Amer. **2**: 147 et tab. 182; Coville, 1901, Proc. Wash. Acad. **3**: 315; Floderus, 1933, Ark. bot. **25A**, 10: 8; Nazarov, 1936, op. cit. **5**: 63; Raup, 1943, Sargentia **4**: 112; id. 1959, Contrib. Gray Herb. **185**: 74. —*S. glandulifera* Flod. 1926, in Lindman, Svensk Fanerogam-fl. 2 ed.: 212; id. 1930, Bot. not.: 338; id. 1931, op. cit.: 127; Perfilyev, 1936, op. cit. **2–3**: 30; Nazarov, 1936, op. cit. **5**: 62; Shlyakov, 1956, op. cit. **3**: 110; Rech. f. 1964, op. cit. **1**: 48.

T y p u s: "In alpibus Lapponicis. Fl. Lapp. N 368 et tab. 8 fig. X; tab. 7 fig. 7; Fl. Suec. N 809".

HABIT: A shrub to 2–2.5 m tall in favorable habitats and almost procumbent in severe environmental conditions.

HABITATS: Banks of water courses (from small mountain streams to large rivers on the plain), moist hollows and slopes, flood plains and alluvial plains, damp yet not paludal tundras (on well-moisturized, but well-drained stony, gravelly, or alluvial substrate). Being associated with eutrophic substrate and basic bedrock, it nearly never occurs on bogs and avoids quartzite. It is most common in the forest-tundra and southern tundra, where it may *209* form extensive shrublands, either alone or with *S. glauca*, *S. phylicifolia*, and *S. pulchra*. Outside that major arctic area, the species is much more rare, being occasionally found in alpine zones of mountains.

DISTRIBUTION: Iceland (to 600 m); the Highlands of Scotland (600–900 m); the alpine zone and arctic belt in Scandinavia (to 1,000 m in northern Norway); the Kola Peninsula (the northern and mountainous central parts, reaching 600 m in the Khibins); the Myansielkia Ridge; the Kanin Peninsula, Kolguyev, and the Novaya Zemlya (reaching the Matochkin Shar); Malozemelskaya and Bolshezemelskaya tundras; within the forest belt, the Pechora and Upper Mezen (sporadically); Vaygach, the Yugorskiy Peninsula, and Polar Urals (to 500–600 m); the Prepolar and Northern Urals (occurring at 600–1,200 m in the Northern Urals and reaching Konzhakovskiy Kamen in the south); the Yamal Peninsula (except its northern part). East of these regions, it becomes rather common occurring across the tundra and forest-tundra and sparsely in the northern forest belt and reaching the mouth of the Taz, the Kureyka, and Middle Olenek as southernmost points; Gydanskaya Inlet, Pyasina Mouth, Lake Taimyrskoye, the Anabar and Olenek mouths, and Lena Delta as northernmost points. Some isolated area fragments are found in the Bolshoy Pur and Upper Vilyuy basins. It occurs in the Verkhoyanskiy Range (scattered, ascending to 860 m in its northern part); at the Lower Yana, Lower Indigirka, Middle and Lower Kolyma; in Chaunskaya Inlet and Anadyr basins; on Wrangel Island; on the Chukchi Peninsula; at the Korf Bay, on Koraga and Karaginskiy Island (south of these destinations, it is missing from the Kamchatka Peninsula). Neither are there any samples from the Penzhina and Omolon basins and the Coast of the Sea of Okhotsk. Very sparsely, it is distributed on the barren heights of the Aldanskoye High Plateau, Barguzinskiy Range, Eastern Sayans (1,600–2,200 m), and Altai. (Fig. 57.)

It is very common in Arctic North America.

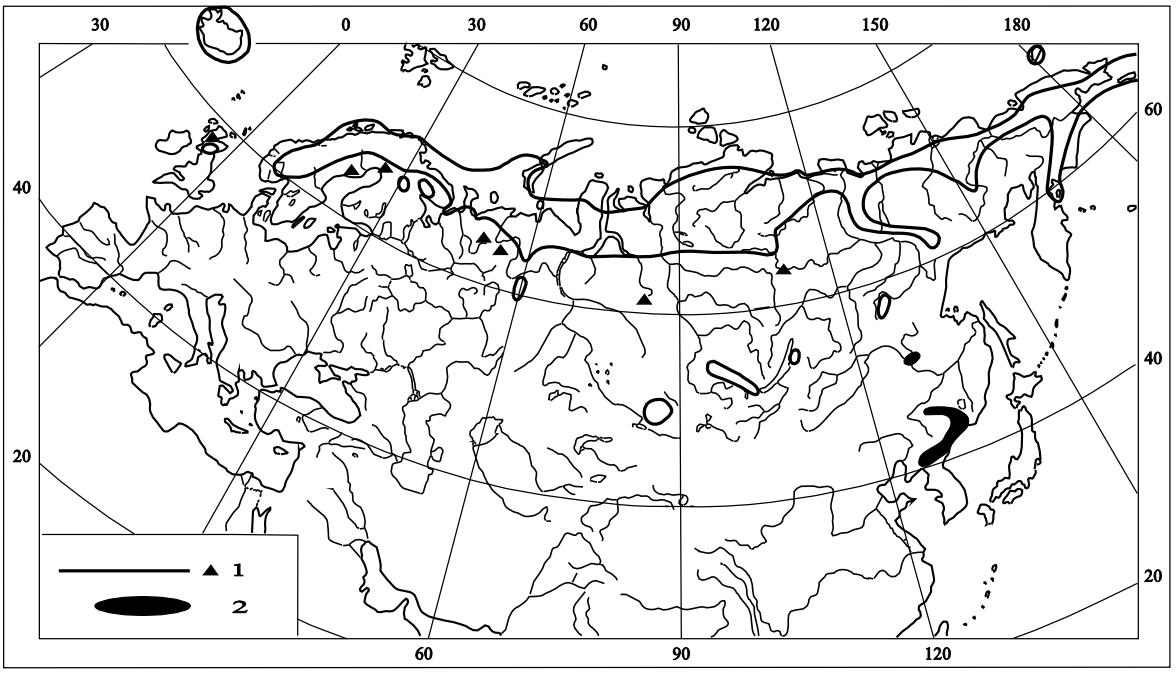

Fig. 57. Distributional areas of *Salix lanata* L. (*1*) and *S. kangensis* Nakai (*2*)

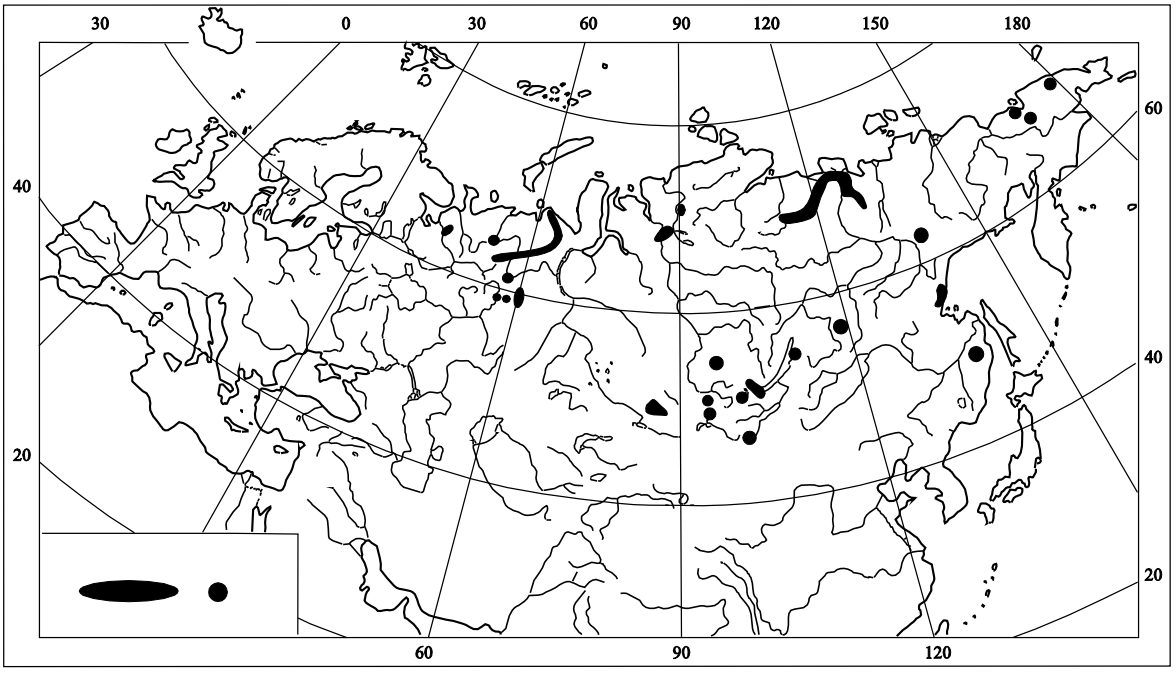

Fig. 58. Distributional area of *Salix recurvigemmis* A. Skv.

NOTE. The plants from North America and Northeast Asia (including the Lena or probably the Khatanga Basin) are different in their catkins, that are whitish with pubescence, and also smaller leaves having less pubescence and fewer denticles. It would make sense to distinguish these plants as ssp. *richardsonii* (Hook.) A. Skv. comb. nova (= *S. richardsonii* Hook. l.c.). The subspecies type is "Fort Franklin on the Mackensie River,—Richardson". Herb. Torrey, GH (n. v.).

106. **S. recurvigemmis** A. Skv. 1956, Sistem. zamet. gerb. Tomsk. un-ta **79–80**: 13 (nomen); id. 1957, Bot. mat. Gerb. Bot. in-ta AN SSSR **18**: 37 et fig. 1–2 (descriptio; hic sphalmate "*recurvigemmata*"); id. 1961, Feddes Repert. **64**: 76; Sergiyevskaya, 1961, Fl. Zap. Sib. **12**: 3228; Opred. rast. Komi, 1962: 147; Malyshev, 1965, Fl. Vost. Sayana: 107; Koropachinskiy, Skvortsova, 1966, Der. i kustarn. Tuvy: 69. —*S. rhamnifolia* auct. non Pallas: Nazarov, 1936, Fl. SSSR **5**: 120; id. 1937, Fl. Zabayk. **3**: 204 (regarding vegetative parts only, as catkins were originating from another species!); Karavayev, 1958, Konsp. fl. Yak.: 83.

T y p u s: "Provincia Perm, prope pag. Dobrjanka in decliviis gypsaceis ad fl. Kama, 21.IV et 24.VIII 1899 leg. F. Teplouchow" (MW).

HABIT: A low, usually rather distorted shrub at times completely appressed to the substrate, at times (in favorable conditions) to 1–1.5 m tall.

HABITATS: Only well-drained, occasionally even fairly dry substrates, like rocky, stony, or gravelly ones in tundras with dwarf-shrub (particularly *Dryas*) or cryptogam vegetation; also in tundras with *Kobresia* cover and spotty tundras. It is clearly restricted to basic bedrock, such as limestone, gypsum, or gabbro.

DISTRIBUTION: Northern European Russia and Siberia (scattered across tundras and occasionally the forest belt, restricted to appropriate rock outcrops); barren heights of South Siberia (also scattered and restricted to suitable substrate). The Pinega, Pechora, and Kama basins (on limestone and gypsum outcrops); the Urals from Konzhakovskiy Kamen to the Yugorskiy Peninsula (in stony tundras); the Lower Yenisei, Pyasina, Middle Olenek, Lower Lena, and northern Verkhoyanskiy Range (on limestone). Following a large gap, it *211*
is again found in the Chauna Inlet Basin, on the Chukchi High Plateau, in the Moma, southern Verkhoyanskiy, and Dzhugdzur ranges, in the northern Sikhote-Alin (Mount Tardoki-Yani), on the Stanovoye High Plateau, and in the Barguzinskiy Range. It is rather common in the Eastern Sayans and Southern Tuva; a number of localities is known in the southern Altai as well as Mongolia: in the Haan Höhey, Khangai, and near Lake Koso (Hövsogöl).

It ascends as high as 1,200 m in the Northern Urals (Konzhakovskiy Kamen and Denezhkin Kamen); in the Eastern Sayans, its range is 1,700–2,300 m; on Mount Tardoki-Yani, 1,500–1,900 m; in the northern Verkhoyanskiy Range, at about 70° N, it reaches 700 m. (Fig. 58.)

Sect. 22. *Daphnella*

Ser. ex Duby, 1828, in DC. Bot. Gall. 2 ed.: 424.

T y p u s: *Salix daphnoides* Vill.

Tall shrubs or trees. Shoots frequently pruinose. Floriferous buds strikingly different from vegetative ones, large, broadly elliptic or lanceolate, their beaks acute or flattened. Leaves persistently stipulate, lanceolate or linear-lanceolate, finely acuminate, flat, regularly and densely serrate at margins, not revolute, their veins not prominent beneath.

Catkins extremely precocious, sessile, plump, cylindrical; bracts black, with dense, long trichomes. Capsules borne on short stipes, acute, gradually attenuating into elongated styles.

This boreal Eurasiatic section is very distinct and small: it contains only four species. One of them, *S. kangensis*, is rather different from the rest, so that it might reasonably represent a monotypic subsection. Filiation of this section is not yet clear. F. Wimmer placed it close to *Lanatae* according to similarity in the catkin structure. Yet connection with *Hastatae*, particularly, the group of *S. pyrolifolia*, *S. rigida* Muhl., and *S. mackenzieana* Anderss. appears to be more probable.

Key to Species

1. Shoots without pruinose bloom. Bast whitish. Floriferous buds narrowly triangular-lanceolate. Stipules free, not adnate. Stamen filaments often more or less connate. Capsules not flattened, frequently rather pubescent . . . . . 110. **S. kangensis**
— Shoots pruinose. Shoot and particularly root bast bright lemon yellow. Floriferous buds broadly elliptic or lanceolate. Stipules adnate to petiole bases. Stamen filaments distinct. Capsules laterally flattened, glabrous 2
2. Stipules broadly elliptic or round, mostly obtuse. Petioles 3–13 mm long, not becoming abruptly ventricose when embracing floriferous buds. Bracts with whitish marginal glands at base. Stigmas 0.8–1.5 mm long . . . . . 109. **S. rorida**
— Stipules lanceolate, acute. Bracts eglandular (lower ones in catkins may be occasionally glandular) 3
3. Shoots more or less pubescent, at least in their upper parts. Annotinous shoots 1.7–2.4 mm thick. Floriferous buds broadly lanceolate, abruptly short-pointed. Petioles embracing floriferous buds become markedly ventricose by fall. Leaves conspicuously pubescent (at least young ones), 10–35 mm broad, 2.5–6 times as long as broad. Capsule stipes 0.3–0.7 mm long, not longer than nectaries. Stigmas 0.4–0.7 mm long, considerably shorter than styles . . . . . 107. **S. daphnoides**
— Shoots glabrous (except the youngest ones that may occasionally be loosely pubescent). Annotinous shoots 1.2–1.8 mm thick. Floriferous buds lanceolate, gradually acuminate. Petioles that embrace floriferous buds not becoming ventricose. Leaves glabrous, 6–20 mm broad, 5–15 times as long as broad. Capsule stipes 0.7–1.5 mm long, longer than nectaries. Stigmas at least as long as styles . . . . . 108. **S. acutifolia**

212

107. **S. daphnoides** Vill. 1789, Hist. pl. Dauphin. **3**: 765 et tab. 50 fig. 7; Wimmer, 1866, Salic. Eur.: 4; Camus, 1904, Saul. Eur. **1**: 227; Seemen, 1909, in Aschers. et Graebn. Synopsis **4**: 167; Szafer, 1921, Fl. Polska **2**: 44; Floderus, 1931, Salic. Fennosc.: 144; Nazarov, 1936, Fl. SSSR **5**: 180; Buser, 1940, Ber. Schweiz. bot. Ges. **50**: 683; Dostá l, 1950, Květ. ČSR **2**: 896; Vicioso, 1951, Salic. Españ: 88; Nazarov et al. 1952, Fl. URSR **4**:60; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 125; id. 1964, Fl. Eur. **1**: 54 (cf. adnot. nostram!); Rasinš, 1959, Ivy Latv.: 106; Krall, Viljasoo, 1965, Eesti kasv. pajud: 64. —Non *S. daphnoides* auct. plur. fl. Sibiriae Or. et Orientalis Extrem. (quae est *S. rorida* Laksch.), nec *S. daphnoides* auct. fl. Himalayae (quae est *S. sericocarpa* Anderss. = *S. oxycarpa* Anderss.). —*S. cinerea* Willd. 1806, Sp. pl. **4**, 2: 690; non L. —*S. pomeranica* Link, 1822, Enum. hort. Berol. **2**: 414. —*S. pulchra* Wimm. 1866, op. cit.: 7.

T y p u s: "Commune dans tout le Champsor, Devoluy, Valgaudemar". Verosimiliter in Hb. U. Grenoble (n. v.). Specimen inscriptum "Dauphiné. Villars" in LE!

HABIT: A straight-stemmed tree to 15 m or tall shrub.

HABITATS: Banks of mountain rivers (on sandy, pebbly, and bouldery alluvia, often together with *S. elaeagnos*, *Myricaria germanica*, and such). It may descend from mountains to lowlands along the largest rivers, like the Rhine or Visla. It is as well found on the loose dune sand.

DISTRIBUTION. The area consists of three disjunct parts, each of them as well more or less fragmented. 1. Mountains of Central and partially Southern Europe: the central Pyrenees (seldom, at 1,600–1,700 m); all of the Alps (to 1,800 m and 2,000 m in the Italian Alps) and surrounding territories of Elsass, a part of Germany, Moravia, and the Sudetes; the Northern Apennines; the Carpathians (rarely and sparsely: in the Western Carpathians, around Skszyczin on the Raba; in the Eastern Carpathians, around Kolomyya; in the Southern Carpathians rarely, in Muntenia). Data from the Danube Valley within Serbia (Španović 1954) appear to be very doubtful. 2. The eastern part of the Baltic Region: the Eastern Baltic Sea Coast in Poland; the Baltic Sea Coast in Kaliningrad Oblast, Lithuania, and Latvia; Hiiumaa and Saaremaa islands. In Latvia, Estonia, (? and Lithuania), it is as well encountered on inland sand, far away from the sea, for example, along the Zapadnaya Dvina and around lakes Chudskoye and Pskovskoye. The dunes of the Karelian Isthmus; sandy shores of Lake Ladoga. 3. Southern Norway and southern Sweden (mostly on pebble deposits of mountain streams, the habitats resembling those in Central Europe). (Fig. 59.)

NOTE. The species has been commonly cultivated for a long time, hence it is often difficult to say if particular localities constitute parts of the natural area. The task becomes even more complicated if one has to make his decision relying only on herbarium collections and not making observations of live plants. Examples of such doubtful area parts are locations in Luxembourg, northeastern Germany, on Gotland Island and at other destinations in southern Sweden, central Poland, Lithuania, Estonia, Pskovskaya and Leningradskaya oblasts. The fact that natural limits of *S. daphnoides* in the Baltic Region are so obscure brings about some confusion in our understanding of relations between *S. daphnoides* and *S. acutifolia*. Plants in the Baltic Region are different from Central European and Scandinavian ones in their shrub-like habit and more pronounced morphological similarity with *S. acutifolia*. They were once segregated under the name of *S. pomeranica* Link or *S. daphnoides* var. *pomeranica* Koch (1828: 23); it appears reasonable to consider them as a subspecies. The name *S. pulchra* Wimm. (non Cham.) is still encountered in dendrological collections. Actually, it is the typical *S. daphnoides* of the Central European type which is cultivated under that name. This is a very vigorously growing tree, its crown of nearly pyramidal shape.

213

The data on *S. daphnoides* distribution in the "Flora Europaea" by K. Rechinger (1964) appear perplexing. There, the species is considered to have natural distribution only in Scandinavia; the Central European part of its area is attributed to naturalization; as for the Baltic part, it is not mentioned at all.

108. **S. acutifolia** Willd. 1806, Sp. pl. **4**, 2: 668; Ledeb. 1850, Fl. Ross. **3**, 2: 601; Wolf, 1930, Fl. Yu.-V. **4**: 44; Krylov, 1930, Fl. Zap. Sib. **4**: 735; Perfilyev, 1936, Fl. Sev. kr. **2–3**: 30; Nazarov, 1936, Fl. SSSR **5**: 181; Grossheim, 1945, Fl. Kavk. **3**: 34; Nazarov et al. 1952, Fl. URSR **4**: 61; Polyakov, 1960, Fl. Kazakhst. **3**: 18; Rech. f. 1964, Fl. Eur. **1**: 54. —Non *S. acutifolia* auct. fl. Asiae Mediae: Wolf, 1903, Trudy SPb. bot.

sada **21**: 195; Fedchenko, 1915, Rastit. Turkest.: 297; Protopopov, 1953, Fl. Kirgiz. **4**: 30; and others. —*S. daphnoides* auct., non Vill.: Perfilyev, 1936, op. cit. **2–3**: 30; and others.

T y p u s: "Hab. ad mare Caspium?" (B?). Live cultivated samples were used for the description.

HABIT: A tall shrub growing occasionally nearly as a tree to 6 m tall.

HABITATS: Loose, unsodded sand only. Consequently, it is almost entirely restricted to valleys of comparatively large rivers within the forest belt. In the steppe belt, it may as well occur apart from river valleys at sandy areas including hillocky ones.

DISTRIBUTION: The southern shore of Lake Onega, the Upper and Middle Northern Dvina Basin (down the Dvina uncluding its delta); the middle reaches of the Mezen; the Indega River in Malozemelskaya Tundra; the Upper Pechora. Nearly all of the Volga Basin
214 including the Kama, Vyatka, and Oka, but excluding the Belaya (down the Volga nearly to its delta). The middle and lower reaches of the Don, Donets, and other rivers of the Azov Upland; the Lower and Middle Dnieper with the tributaries including the Pripyat Basin; up the Dnieper to the mouth of the Berezina; along the Western Bug within Lublin Province (Fijałkowski 1964: 454). The sandy territories of the Northern Caucasus; the Volga-Ural Sands and the Ural River (up the Ural to Orsk); the sandy areas of Western Kazakhstan (nearly reaching the Aral Sea).

It is probably even more favored for cultivation than *S. daphnoides*. It is particularly popular in northern Belarus, Smolensk, Tver, and other oblast's of northwestern European Russia and the Baltic Republics. Hence, it is very difficult to define northwestern area limits when only referring to herbarium material without making numerous observations in nature. Presumably, there are no natural populations in the Neman and Zapadnaya Dvina basins and in Pskov Oblast. It is commonly used for sand fixing in the forest-steppe and steppe belts of southern European Russia and Ukraine, and, to some extent, in Kazakhstan. There is no doubt that findings of this species in northeastern Kazakhstan (Polyakov 1960) are to be considered as those of cultivated plants. All the evidence from West Siberia (Krylov 1930) and Krasnoyarskiy Province (Cherepnin 1961) are as well to be attributed only to feral or cultivated plants. N. Pavlov's (1935: 29) statement that *S. acutifolia* occurs along streams and in valleys of the crystalline area in the Kazakh Uplands appears to be doubtful and is not supported by any collected material. All references for *S. acutifolia* from Middle Asia are based on erroneous identifications, mostly, of *S. tenuijulis*. (Fig. 59.)

NOTE. Many authors (Meinshausen 1878, Floderus 1931, Hultén 1950, Korchagin 1957) considered plants from Lake Ladoga, the dunes of Sestroretsk, Lake Chudskoye, and such, to be *S. acutifolia*. To my opinion, they are to be considered as *S. daphnoides*, whereas *S. acutifolia* distributional area extends only to Lake Onega and the Volga Basin. In other words, I consider the areas of *S. acutifolia* and *S. daphnoides* to be separated and never overlapping. I treat samples of *S. acutifolia* collected within the area of *S. daphnoides* as cultivated or feral. However, that might be a kind of simplification. D. Smalukas showed me his collections from the vicinity of Vilnius, which he considered to be natural *S. acutifolia*. The samples from the Cherekha River near Pskov published in the "Herbarium of the Russian Flora" (N 2476) also appear to have been collected from wild-growing specimens. To make the final decision concerning this problem, one needs more observations in nature, particularly, around Ladoga and Lake Chudskoye and in the vicinity of Pskov.

109. **S. rorida** Lakschewitz, 1911, Spisok rast. Gerb. russk. fl. **46–47**: N 2329; Schneider, 1916, in Sarg. Pl. Wilson. **3**, 1: 155; Nakai, 1918, Bot. Mag. Tokyo **32**: 216;

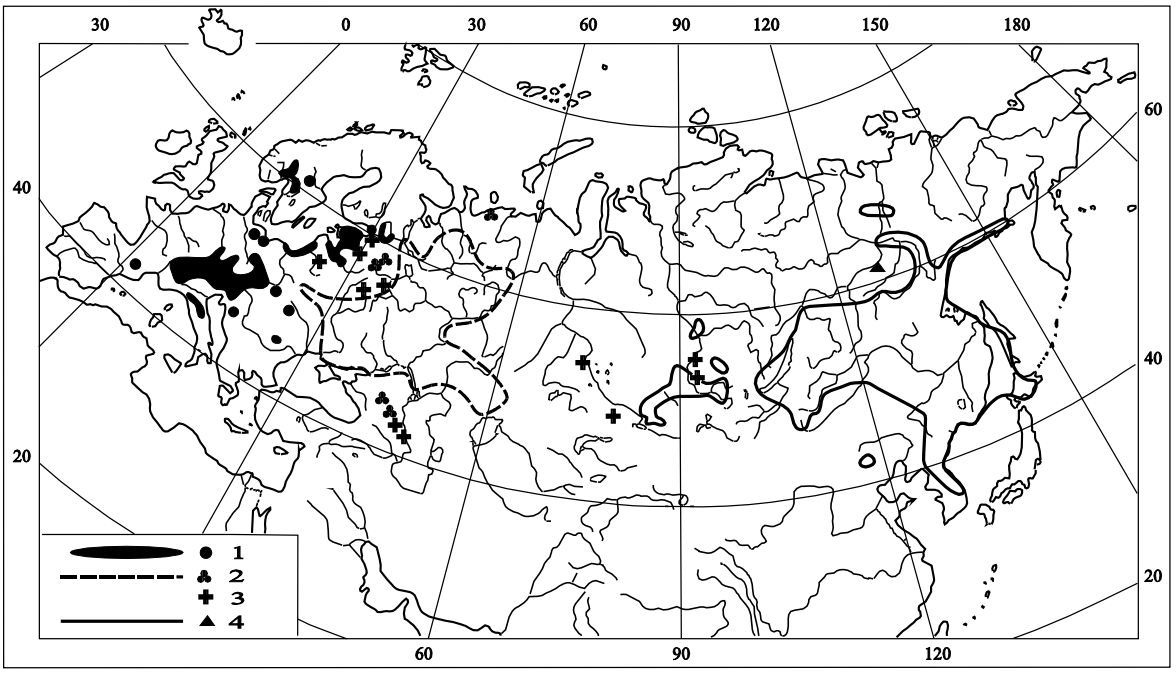

Fig. 59. Distributional areas of *Salix daphnoides* Vill. (*1*), *S. acutifolia* Willd. (*2*), cultivated *S. acutifolia* (*3*), and *S. rorida* Laksch. (*4*)

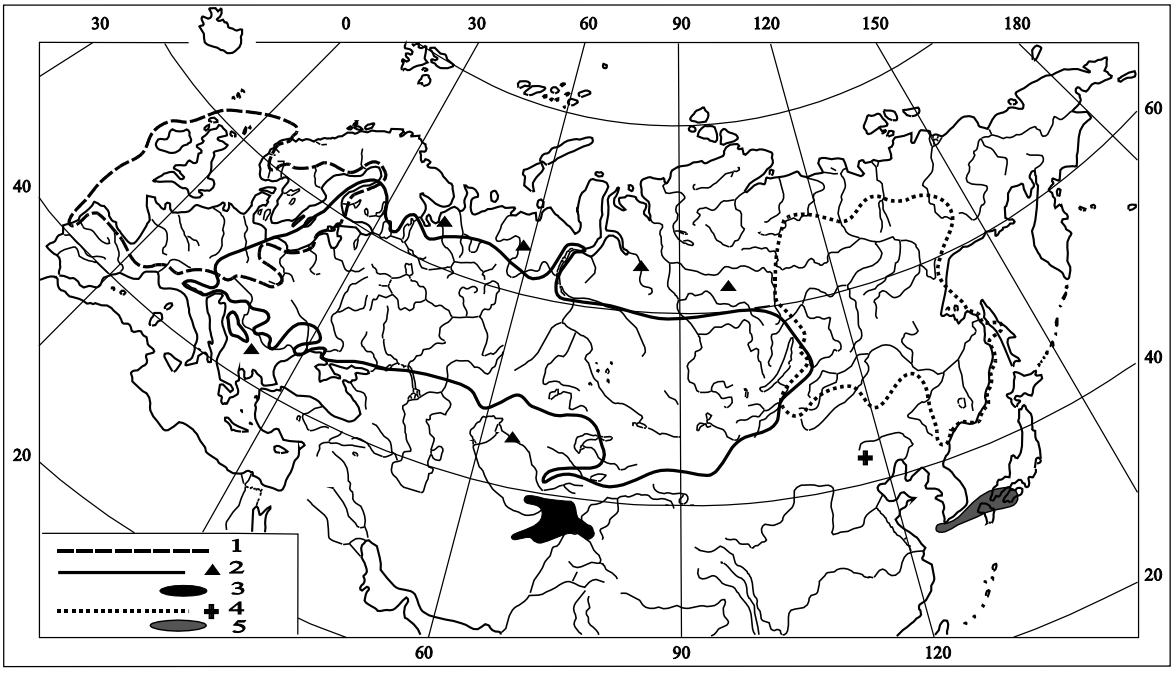

Fig. 60. Distributional areas of *Salix repens* L. (*1*), *S. rosmarinifolia* L. (*2*), *S. rosmarinifolia* ssp. *schugnanica* (Goerz) A. Skv. (*3*), *S. brachypoda* (Trautv. et Mey.) Kom. (*4*), and *S. subopposita* Miq. (*5*)

id. 1930, Fl. sylv. Kor. **18**: 92; Krylov, 1930, Fl. Zap. Sib. **4**: 736; Nazarov, 1936, Fl. SSSR **5**: 182; Popov, 1959, Fl. Sredn. Sib. **2**: 793; Polyakov, 1960, Fl. Kazakhst. **3**: 19; Cherepnin, 1961, Fl. yuzhn. ch. Krasnoyar. kr. **3**: 21; Ohwi, 1965, Fl. Jap.: 367. —*S. daphnoides* auct. non Vill.: Ledeb. 1850, Fl. Ross. **3**, 2: 602 (p. p. quoad pl. altaic. et Sib. Or.); Seemen, 1903, Salic. Jap.: 49; Hao, 1936, Syn. Chin. *Salix*: 84. —*S. acutifolia* (non Willd.) Turcz. 1854, Fl. Baic.-Dah. **2**, 2: 374. —*S. lakschewitziana* Toepffer, 1916, Öst. bot. Z. **66**: 402; Kimura, 1931, Sci. Rep. Tohoku Univ. 4 ser. **6**: 185; id. 1934, in Miyabe, Kudo, Fl. Hokk. a. Saghal. **2**: 681. —*S. roridaeformis* Nakai, 1919, Bot. Mag. Tokyo **33**: 5; id. 1930, op. cit. **18**: 36 (p. p.—sed typo excluso!).

T y p u s: "Prov. Irkutzk, distr. Balagansk, a. 1902. N. Maltzev" (Herb. Fl. Ross. N 2329—LE!, MW! et alibi).

215 HABIT: A tree to 20 m or tall shrub.

HABITATS: Sandy and pebbly banks of rivers and streams (solitary or in small groves).

DISTRIBUTION: The Altai, Kuznetskiy Alatau, Tuva (rarely), Minusinskaya Depression, the Yeniseiskiy Kryazh, and the foothills of the Eastern Sayans (sparsely). It becomes rather common east of Irkutsk and all the way to central and southern Sakhalin. The line of the northern area limit runs via the mouth of the Vitim, Upper Aldan, the territory south of Verkhoyansk, and the northern coast of the Sea of Okhotsk (the area reaching the Yama River). There are some solitary findings at Stolby on the Lena, in Verkhoyanskiy and Sakkyryrskiy districts. The area includes Hokkaido, northern Honshu, the northeastern Korea Peninsula, the major part of Northeast China, the Tola and Upper Kerulen rivers in Mongolia. An isolated part of the area is located on the Weichang Plateau north of Beijing (Jehol).

The species does not ascend high in the mountains never approaching the upper forest limit, reaching 1,200 m in Tuva, 1,300–1,400 m in the Kentei, 900–1,000 m in the Sikhote-Alin, 400 m on southern Sakhalin. (Fig. 59.)

NOTE. The name *S. lakschewitziana* Toepffer was proposed instead of *S. rorida* Lakschewitz merely because the epithet "*rorida*" had been used by M. Gandoger in his infamous "Flora of Europe" (1890: 148). However, as it has been already mentioned here, the names suggested by M. Gandoger do not have validity at any rank.

110. **S. kangensis** Nakai, 1916, Bot. Mag. Tokyo **30**: 275; id. 1930, Fl. sylv. Kor. **18**: 101; Kitagawa, 1939, Lineam. fl. Mandsh.: 159; Liou Tchen ngo, 1955, Ill. Fl. Tr. Shr. Northeast China: 176; Skvortsov, 1960, Bot. mat. Gerb. Bot. in-ta AN SSSR **20**: 85; id. 1966, Spisok rast. Gerb. fl. SSSR **91**: N 4539. —*S. roridaeformis* Nakai, 1919, Bot. Mag. Tokyo **33**: 5; id. 1930, op. cit. **18**: 96. —*S. fenghuanschanica* Chou et Skvortz. 1955, Liou Tchen ngo, op. cit.: 555. —*S. pierotii* auct. non Miq.: Komarov, Alisova, 1931, Opred. rast. Dalnevost. kr. **1**: 426; Nazarov, 1936, Fl. SSSR **5**: 128.

T y p u s: "Korea prov. Heihok (Phyöng-an), Kangei. —R. G. Mills N 301" (TI, n. v.).

HABIT: A small tree (the largest ones I have seen were 8–10 m tall and to 25 cm in stem diameter; there is no doubt that there exist even larger specimens).

HABITATS: Banks of rivers (solitary specimens or small groups of trees growing on solid sandy or pebbly substrate).

DISTRIBUTION: Southern Maritime Province (south and west of Ussuriysk), the southern part of Northeast China; two known localities within Amur Oblast: near Busse on the Amur and near Svobodnyy on the Zeya. (Fig. 57.)

NOTE. *S. roridaeformis* is actually a mixture of *S. kangensis* and *S. rorida* samples. Its type ("At the foot of Mt. Setsurei, Nakai N 6851." — TI!) proved to belong to *S. kangensis. S. rorida* var. *roridaeformis* Kimura, 1931, Sci. Rep. Tohoku Univ. 4 ser. **6**: 187 has nothing to do with *S. kangensis.* Apparently, there is no *S. kangensis* on the Islands of Japan.

Two samples of *S. kangensis* (from Askold Island and Furugelm Island) were mistakenly identified by V. Komarov as *S. pierotii*. Those two samples provided the only ground for listing *S. pierotii* in the guide to the plants of the Russian Far East by V. Komarov and Ye. Klobukova-Alisova (Komarov, Alisova 1931) as well as in the "Flora of the USSR" (Nazarov 1936). Actually, the name *S. pierotii* belongs to a different species (see species 11).

Sect. 23. *Incubaceae* *216*

Kerner, 1860, N.-Öst. Weid.: 264.

T y p u s: *Salix repens* L.

Low shrubs with slender shoots. Floriferous buds rather small, yet distinctly different from vegetative ones, ovoid, frequently positioned at acute angle to shoot. Stipules lanceolate, subequilateral, acute. Leaves subsessile, small, entire or with few shallow denticles, more or less pubescent beneath or on both surfaces; trichomes silvery, appressed, pointing forward; reticulation finely prominent beneath. Catkins precocious or subprecocious, small, round or shortly cylindrical. Capsules stipitate, styles and stigmas very short.

This is a boreal section presented both in the Old and New World. Of four species distributed in the Old World, three are found in this country and one more, *S. subopposita* Miq., in southern Japan.

The American counterpart of the section is less known. Also, relations to other sections need clarification: it is impossible to gain fair understanding of these relations using material from Eurasia alone. We might approach better knowledge of the section's origin after a careful study of the North American willows. According to the structure of the gynoecium, common filiation with *Vetrix* and, on the other hand, with *Myrtilloides* appears to be most probable.

Key to Species

1. Pubescence on young catkins and leaves more or less golden. Capsule stipes 0.5–1.0 mm long, not more than twice as large as nectaries. Ovary pubescence mostly opaque white . . . . . 113. **S. brachypoda**
— Pubescence on young catkins and leaves without golden tint. Capsule stipes 1.0–2.5 mm long, more than twice as long as nectaries. Ovary pubescence mostly grayish and silky or may be lacking at all 2
2. Leaves narrow (5–10 times as long as broad), entire (sometimes with sparse glands but never with denticles). Catkins precocious, sessile (their stalks less than 3 mm long). Bracts black. Capsules entirely pubescent . . . . . 112. **S. rosmarinifolia**
— Leaves broader (1.5–5 times as long as broad), usually at least some of superior ones with few sparse denticles. Catkins subprecocious, female ones on stalks 2–12 mm long.

Bracts mostly blackish, but not completely black, or not black at all. Capsules frequently glabrous or partially pubescent . . . . . 111. **S. repens**

111. **S. repens** L. 1753, Sp. pl.: 1020; Ledeb. 1850, Fl. Ross. **3**, 2: 614 (p. p.); Wimmer, 1866, Salic. Eur.: 114 (p. p.: excl. var. *rosmarinifolia*); Anderss. 1867, Monogr. Salic.: 113; Camus, 1904, Saul. Eur. **1**: 160; Seemen, 1909, in Aschers. et Graebn. Synopsis **4**: 123 (quoad var. *eurepens*); Linton, 1913, Brit. willows: 58; Floderus, 1931, Salic. Fennosc.: 96; Buser, 1940, Ber. Schweiz. bot. Ges. **50**: 674; Vicioso, 1951, Salic. Españ: 126; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 105 (p. p.: quoad subspp. *argentea*, *repens* et *galeifolia*); id. 1964, Fl. Eur. **1**: 51; Rasinš, 1959, Ivy Latv.: 99; Mang, 1962, *Salix*-Sektion *Incubaceae*: 35 et al.; Krall, Viljasoo, 1965, Eesti Kasv. pajud: 55. —*S. argentea* Sm. 1804, Fl. Brit. **3**: 1059. —*S. arenaria* auct. haud L.: Floderus, 1931, op. cit.: 101; Pawłowski, 1946, O niekt. wierzb.: 2; Lawalrée, 1952, Fl. Belg. **1**, 1: 50; Chassagne, 1956, Invent. fl. Auvergne **1**: 250; Rech. f. 1964, op. cit. **1**: 51; Krall, Viljasoo, 1965, op. cit.: 58. —*S. leiocarpa* Mang, 1962, op. cit.: 32.

T y p u s: "Inter montes Sueciae, locis humidis. Fl. Suec. N 814".

HABIT: A low shrub (0.3–1.0 m) with ascending and rooting stems.

217

HABITATS: Slightly sodded or loose sand dunes; sandy and peaty damp meadows; light birch and pine forests; edges of wetlands; bogs (occasionally).

DISTRIBUTION: Within the area under consideration, only the marine zone on the Baltic Coast in Kaliningrad Oblast, Lithuania, Latvia, and on the Estonian islands (most abundantly, on Kurshskaya Kosa). The vicinity of Sestroretsk is one more probable location. In other European countries, it may be found inland, sometimes rather high up in the mountains. The Bothnical Coast of Finland, southern Sweden and southern Norway, the British Isles; coastal Portugal, northern Spain, nearly all of France (excluding the Mediterranean part), Switzerland, Austria, Germany, Czechia, and western Poland.

In Scotland, it ascends to 800 m and to 1,700–1,800 m in the Alps. (Fig. 60.)

NOTE. The species is rather polymorphic. The size of leaves, their breadth-to-length ratio, and the intensity of the leaf pubescence are subject to striking variability. However, it does not appear reasonable to recognize some two or even three species instead of one (adding *S. arenaria* and *S. leiocarpa*). In any large population, one may find a full assortment of these "species" as well as all kinds of intermediate forms. The fact that plants from coastal dunes usually demonstrate more silvery pubescence and a more pronounced creeping habit should not be overemphasized and cannot provide grounds for acknowledgment of *S. arenaria*. It is well known that sea coasts are among those classic habitats that may induce specific ecotypes most frequently. Silvery, round-leafed specimens originating, say, from Portugal and Lithuania may look very much alike; yet they have developed in parallel, absolutely independently, from different populations. To my opinion, *S. arenaria* cannot be treated even in the rank of subspecies (ssp. *argentea* of the English or ssp. *dunensis* of the French).

The easternmost part of the *S. repens* area overlaps the westernmost part of the area of *S. rosmarinifolia* nearly all along the contact line. In Central Europe (southern Germany, Czechia, Poland), there exists a wide zone where it is extremely difficult to discriminate between the two species. Apparently, this is the area where hybridization commonly takes place. In Russia and the Baltic Republics, *S. repens* appears to be more distinct, as it is

218

almost completely isolated there due to its confinement to the dunes of the sea coast. In Finland, however, the situation again becomes more obscure. That relation between

S. repens and *S. rosmarinifolia* might be most reasonably explained in the following way. Originally, there existed a single species, which was divided by the glaciation in Central Europe. The two parts diverged morphologically and, to some extent, ecologically. Yet they were not genetically different enough. After the retreat of the glacier, they shared the territory again, and it was then that the described hybridogeneous transitional zone was formed. Consequently, the treatment of *S. repens* and *S. rosmarinifolia* as two subspecies of a single species is as well acceptable.

112. **S. rosmarinifolia** L. 1753, Sp. pl.: 1020; Ledeb. 1850, Fl. Ross. **3**, 2: 615; Anderss. 1867, Monogr. Salic.: 115 (excl. var. *flavicans*); Nazarov, 1936, Fl. SSSR **5**: 123; id. 1937, Fl. Zabayk. **3**: 198; Pawłowski, 1946, O niekt. wierzb.: 2; Já vorka et Soó 1951, Magyar növ. kéz.: 832; Nazarov et al. 1952, Fl. URSR **4**: 52; Beldie, 1952, Fl. Rom. **1**: 311; Rasinš, 1959, Ivy Latv.: 98; Popov, 1959, Fl. Sredn. Sib. **2**: 800; Polyakov, 1960, Fl. Kazakhst. **3**: 27; Rech. f. 1964, Fl. Eur. **1**: 51; Krall, Viljasoo, 1965, Eesti kasv. pajud: 53. —*S. repens* var. *rosmarinifolia* Koch, 1828, Salic. Eur.: 48. —*S. repens* ssp. *rosmarinifolia* Celak. 1871, Fl. Böhmen **2**: 137; Wolf, 1930, Fl. Yu.-V. **4**: 57; Dostá l, 1950, Květ. ČSR **2**: 892; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 107. —*S. sibirica* Pall. 1788, Fl. Ross. **1**, 2: 78 et tab. 81 fig. 3; Wolf, 1906, Izv. Lesn. in-ta **14**: 193; Lakschewitz, 1914, Spisok rast. Gerb. russk. fl. **50**: N 2465; Nazarov, 1936, op. cit. **5**: 125; id. 1937, op. cit. **3**: 198; Polyakov, 1960, op. cit. **3**: 27; Cherepnin, 1961, Fl. yuzhn. ch. Krasnoyar. kr. **3**: 18; Koropachinskiy, Skvortsova, 1966, Der. i kustarn. Tuvy: 82. —*S. angustifolia* Wulfen, 1789, in Jacquin, Collect. bot. **3**: 48. —*S. repens* ssp. *angustifolia* Neumann ex Rech. f. 1957, op. cit. **3**, 1: 105. —*S. canaliculata* Besser, 1822, Enum. Volhyn.: 77. —*S. volgensis* Anderss. 1868, in DC. Prodr. **16**, 2: 314. —*S. turgaiskensis* E. Wolf, 1912, Feddes Repert. **10**: 477. —*S. schugnanica* Goerz, 1936, Trudy Tadj. bazy AN SSSR **2**: 173; Nazarov, 1936, op. cit. **5**: 126; Skvortsov, 1962, Bot. mat. Gerb. In-ta bot. AN UzbSSR **17**: 67; Ikonnikov, 1963, Opred. rast. Pamira: 90.

T y p u s: "In Europae campis depressis". Fide Smith, 1804, Fl. Brit. **4**: 1062, specimina originalia Linnaeana e vicin. Abo (Turku) proveniunt.

Ssp. **schugnanica** (Goerz) A. Skv. comb. nova. —*S. schugnanica* Goerz, 1936.

T y p u s: "Darwas, Masar—Łipsky N 3816; Schugnan, Schtam—a. 1904 O. et B. Fedtschenko, etc." (LE!).

HABIT: A low or medium-sized shrub (0.3–2.5 m).

HABITATS: Damp and peaty meadows and coppices, eutrophic and mesotrophic wetlands, floating bogs (in conditions of sufficient moisture but poor drainage); also, sand covered with *bor*'s, kettles amidst loose hillocky sand, steppe *zapadina*'s, and *sazy* at high elevations.

DISTRIBUTION: Northern Italy (very rarely); lower Austria, the territory of the former Yugoslavia, Hungary, Romania, Czechia, Slovakia, eastern Germany, Poland, Finland, southern Sweden (?). Within the Russian territory, the northern area border crosses southern Karelia reaching Arkhangelsk and the middle reaches of the Pechora, then traverses the Urals proceeding further east approximately along the 60° latitude (there is one prominence or maybe an isolated locus at the Lower Ob including its estuary). The eastern border is located between Baykal and Chita. In the south, the species reaches Jirgalanta and the Middle Khangai in Mongolia, Sant'anghu (near Hami) in Sinkiang Uighur; then along the Tien Shan, the southern border deviates back to the territory of

Kirghizia and Kazakhstan. The species is rather common in the Eastern and Central Tien Shan. It becomes more rare in the Western Tien Shan, where it is known mostly from the Chatkalskiy Range. From the Kirgizskiy Range and Zailiyskiy Alatau, the border descends
219 to the piedmont plain. Crossing the plain and Lake Balkhash, it proceeds along the northern edge of the Kazakh Deserted Area towards the Bolshiye Barsuki Sands and Mugodzhary, via the northern edge of the Ryn Sands, south of Volgograd, and towards Rostov. So far, the species has not been found in Donbass (the Don Coal Basin) and the northern Azov Upland; however, it is distributed along the Black Sea Coast reaching the mouth of the Danube.

In Bulgaria, Romania, and the former Yugoslavian territory, it ascends to 1,000 m; in Poland (the Tatras), to 900 m. In the Urals, it almost never ascends to the mountains; in the Eastern Sayans, it reaches 900 m; in Tuva, 1,200 m; in the Altai, 1,700 m; in the Zailiyskiy Alatau, 2,500 m; in the Terskey Alatau and on Khan-Tengri, 3,600 m.

Ssp. *schugnanica* is rather common in the Pamir-Alai (ascending to 4,300 m in the Eastern Pamirs); it is also encountered in the Hindu Kush and Karakorum. (Fig. 60.)

NOTE. The species hybridizes with *S. repens* along the western limit of its area (cf. above: the note regarding *S. repens*). Within the rest of its area, *S. rosmarinifolia* demonstrates large morphological variability. Plants from Siberia (particularly those from East Siberia) are different in their leaves, which are on the average broader and mostly less pubescent. Siberian plants are also different in their cylindrical catkins (ones on European plants are nearly always orbicular). Siberian plants were described by P. Pallas as *S. sibirica*; however, it is completely impossible to segregate them even in the rank of subspecies. Plants from the Altai, Mongolia, and the Tien Shan are usually characterized by stout shoots (as stout as in *S. schugnanica*) and large leaves, often with rather prominent veins beneath. That race might be segregated in a taxon, however, there are not enough data to do it now. Of course, *S. rosmarinifolia* needs a thorough monographic study in its Asiatic part, especially within the area between the Pamirs and Tuva.

113. **S. brachypoda** (Trautv. et Mey.) Kom. 1923, Trudy Gl. bot. sada **39**: 49; Komarov, Alisova, 1931, Opred. rast. Dalnevost. kr. **1**: 422; Nazarov, 1936, Fl. SSSR **5**: 122 et 709; Kimura, 1937, Symb. Iteol. **4**: 316; Kitagawa, 1939, Lineam. fl. Mandsh.: 159; Skvortsov, 1966, Spisok rast. Gerb. fl. SSSR **91**: N 4542. —*S. repens* var. *brachypoda* Trautv. et Mey. 1856, in Middendorff, Reise Sibir. 1, **2**: 79. —*S. sibirica* var. *brachypoda* Nakai, 1930, Fl. sylv. Kor. **18**: 158. —*S. repens* auct. non L.: Komarov, Alisova, 1931, op. cit. **1**: 423; Tolmachev, 1956, Der. i kustarn. Sakhal.: 69. —*S. rosmarinifolia* var. *flavicans* Anderss. 1867, Monogr. Salic.: 116. —*S. finalis* Kimura, 1934, in Miyabe, Kudo, Fl. Hokk. a. Saghal. **4**: 451. —*S. flavicans* Hao, 1936, Syn. Chin. *Salix*: 97 (p. p.: excl. pl. Pamir.).

T y p u s: "Ad. fl. Appatyn 1.V; ad fl. Ujan 23.V; Ogus-Baha 25.V; Ulachan-Köch-Ueräch 26.V; ad fl. Solurnaj 3.VI; Udskoj 22.V 1844. —A. Middendorff" (LE, vidi omnia!).

HABIT: A low shrub (0.3–1.5 m).

HABITATS: Damp meadows, edges of wetlands, damp light forests.

DISTRIBUTION. The western area limit is at the Lower Selenga, Mukhtuya on the Lena (not reaching Baykal), the Upper Vilyuy, and Upper Olenek. The northern boundary runs from the Olenek to Verkhoyanskiy District and the Upper Indigirka; in the east, the boundary proceeds from the Upper Indigirka to Ayan. The species area includes the entire

Maritime Province, the northernmost part of the Korea Peninsula, and the major part of Northeast China. In Mongolia, *S. brachypoda* is distributed only in the Kentei and lower reaches of the Orhon. Of the islands, it is known from Bolshoy Shantar and central Sakhalin. There is an isolated area fragment on the Weichang Plateau in Jehol. (Fig. 60.)

NOTE. In Transbaykalia, the species area partially overlaps that of *S. rosmarinifolia*; however, according to available material, the two species remain separated even within the shared territory. In other words, there is no evidence of a hybridogeneous transitional zone, like the one existing between *S. rosmarinifolia* and *S. repens* in Central Europe. Samples of *S. brachypoda* can always be reliably distinguished from those of *S. rosmarinifolia* if the collections are thorough and complete.

Sect. 24. *Flavidae* *220*

Chang et Skvortz. 1955, in Liou Tchen ngo, Ill. Fl. Tr. Shr. Northeast China: 557.
T y p u s (et species unica): *Salix gordejevii* Chang et Skvortz.

This is a monotypic section; the section description matches that of its single species.

Low or medium-sized shrubs with slender, smooth branches. Floriferous buds distinctly different from vegetative ones, ovoid, their apices rather recurved off the shoot. Leaves very short-petioled, linear, distinctly emarginate-serrate all along margins. Catkins precocious or subprecocious, their bracts black, densely pubescent. Nectary solitary, subsquare. Stamen filaments glabrous, either distinct or more or less connate. Capsules sessile, small, ovoid, obtuse, abruptly attenuating into styles; styles 0.5–1.0 mm long.

There is no doubt the section is closely related to *Helix*; indeed, *Flavidae* may even be treated as a subsection of *Helix*. However, the section *Helix* appears to be rather large even without *Flavidae*. Therefore, it is helpful to consider the most isolated parts of *Helix*, the groups *Flavidae* and *Cheilophilae*, as distinct sections.

114. **S. gordejevii** Chang et Skvortz. 1955, in Liou Tchen ngo, Ill. Fl. Tr. Shr. Northeast China: 553 et tab. 63. —*S. flavida* Chang et Skvortz. 1955, ibid.: 557. —*S. mongolica* auct. non Siuzev: Grubov, 1955, Konsp. fl. Mong.: 101 (p. p.); Skvortzov in schedis a. a. 1955–1962 (ined.).

T y p u s: "Mongolia Inter., in arenosis prope rivulum Khandagai-gol, 10.III 1934 T. P. Gordejev; prope Zagan-nor 13.VIII 1934. id." (Hb. Inst. Sylviculturae et Soli Acad. Sinicae Mukden!). Three paratypes were mentioned when the species was first described. A duplicate of one of those paratypes is kept in Moscow ("prov. Liaoning, prope Dschangatai, T. N. Liou N 5461").

HABIT: A spreading shrub with slender branches.

HABITATS: Extensive sand areas only.

DISTRIBUTION. Within the territory of Russia, sandy hills around Borzya Railway Station in Transbaykalia appear to be the only known location. There the plant was first collected by N. Kuznetsov in 1909, and later, in 1949, by L. Sergiyevskaya with colleagues. Central and eastern Mongolia, central arid regions of Northeast China, Jehol and Suiyuan. The species appears to be rather sparsely distributed across the entire area. (Fig. 63.)

Sect. 25. *Helix*

Dum. 1825, Bijdr. Natuurk. Wetensch. **1**, 1: 56.
T y p u s: *Salix purpurea* L.

Medium-sized or large shrubs or small trees. Shoots mostly slender, flexible, virgate. Stipules lanceolate, or subulate, or completely reduced. Leaves mostly narrow, entire or serrulate, flat, their margins not revolute, veins not prominent (however, on drying, veins in mature leaves become equally prominent, filament-like on both sides), upper leaf surface often dotted with stomata. Catkins precocious to serotinous, mostly narrowly cylindrical. Nectary solitary, short, subsquare. Stamen filaments connate, pubescent in lower parts. Capsules small to medium-sized; styles and stigmas short; stigmas often sessile.

This is a large Eurasiatic section consisting of 28 to 30 species. It is widely distributed in comparatively warm regions of the temperate forest belt as well as non-tropical arid regions, particularly, mountainous ones. The majority of species is restricted to Central and East Asia (there are only five species in Europe).

221 Species of this section often differ from each other in rather subtle characters; besides, they are frequently encountered in close proximity to each other, a few of them at a time. Hence, of all the Eurasiatic willows, this section is one of the most difficult (if not the most difficult) to treat. The abundance of synonyms reveals the extent of confusion in this section's taxonomy and the way it was overloaded with unclarified species names. For example, there are five synonyms for *S. kirilowiana*, six for *S. tenuijulis*, eight for *S. miyabeana*, and eleven for *S. pycnostachya*. Relations to other sections are rather obscure. The only group that can be positively placed close to *Helix* is a Himalayan-Chinese section *Denticulatae*.

Within the section *Helix*, one can notice large diversity of morphological types, particularly those of the catkin structure and development. This diversity provides natural grounds for distinguishing four subsections: *Caesiae*, *Purpureae*, *Tenuijules*, and *Kirilowianae*. Of these, the former two are more closely related to each other, as well as the latter two. Hence, there are two major stems within the section, the first one consisting of *Caesiae* and *Purpureae*, the second, *Tenuijules* and *Kirilowianae*. The stems approach each other very closely in some of their representatives, such as *S. vinogradovii* from *Purpureae* and *S. caspica* from *Kirilowianae*; or *S. miyabeana* from *Purpureae* and *S. tenuijulis* from *Tenuijules*. So far, it is difficult to decide whether this proximity is due to a common filiation or it should rather be attributed to the convergence.

Key to Species

1. Bracts pale or rufescent (occasionally some of bracts in catkin blacken by end of flowering), mostly truncate, emarginate, or irregularly dentate at apex. At least some of bracts or all of them fall off by the time capsules ripen 2
— Bracts persistent when capsules ripen 7
2. Floriferous buds distinctly different from vegetative ones, 4–9 mm long. Leaf primordia in buds shorter than catkin primordia. Leaves 45–100 mm long 3

— Floriferous buds inconspicuously different from vegetative ones, 4–9 mm long. Leaf primordia in mature buds at least as long as catkin primordia or longer. Stipules mostly none. Leaves 25–50 mm long 6
3. Capsules glabrous 4
— Capsules pubescent 5
4. Shoots often slightly pruinose. Leaves mostly silky beneath, 4–10 times as long as broad. Bracts pale or pinkish . . . . . 128. **S. kirilowiana**
— Shoots not pruinose. Leaves glabrous, 10–20 times as long as broad. Bracts brownish or blackish . . . . . 131. **S. michelsonii**
5. Mature shoots olivaceous-green or yellow, not variegated, more or less pubescent. Stipules fully developed, lanceolate, 1.0–2.5 mm broad. Bracts pale, never blackening. Capsules mostly obtusish, stigmas subsessile . . . . . 126. **S. olgae**
— Mature shoots glabrous, mostly dark red or reddish-brown, with light yellow variegation in their lower parts; more rarely, entirely yellowish. Stipules none or small, subulate, not more than 1 mm broad. Bracts partially darkening by the end of flowering period, however, becoming mostly pale in mature catkins. Capsules acute, styles usually distinct . . . . . 127. **S. linearifolia**
6(2). Shoots with white waxy bloom. Bracts 1.0–1.5 mm long. Anthers 0.3–0.4 mm long. During flowering period, ovaries narrowly lanceolate, nearly subulate . . . . . 130. **S. capusii** *222*
— Shoots without bloom. Bracts 1.6–3.0 mm long, obcuneate, mostly truncate at apex, completely deciduous immediately after flowering in female catkins. Anthers 0.4–0.6 mm long. Ovaries lanceolate or ovoid-lanceolate . . . . . 129. **S. niedzwieckii**
7(1). Petioles 1–2 (rarely 3) mm long. Leaves opposite, broad, 2–4 (rarely to 5) times as long as broad, their bases broad, more or less cordate 8
— Leaves alternate; if (rarely) opposite, then their shape different and petioles longer 9
8. Upper epidermis strikingly different from lower one only close to leaf margin. Leaf margin symmetrical with respect to upper and lower leaf surface. Mesophyll consists of five cell layers, upper layer constituting about one-third of total mesophyll height . . . . . 121. **S. amplexicaulis**
— Upper epidermis strikingly different from lower one across entire leaf surface. Leaf margin asymmetrical (collenchyma overlapping upper surface more than lower surface). Mesophyll of four cell layers, upper layer constituting nearly half of total mesophyll height . . . . . 122. **S. integra**
9. Leaf petioles 2–5 mm long, leaves opaque on both sides, rather broad (1.5–4.0 times as long as broad), their bases rounded or cordate, stomata lacking from upper leaf surface, leaf margins slightly dentate or entire. Cataphylls broadly elliptic, rounded or cordate at base as well as leaves 10
— Leaves narrower (4 and more times as long as broad). Cataphylls cuneately narrowing towards their bases 11
10. Shrub of medium size. Floriferous buds appressed to shoots, ovoid-lanceolate, conspicuously compressed on adaxial side, their lateral carinas pronounced. Leaves 30–80 mm long. Stamen filaments entirely connate . . . . . 116. **S. kochiana**

— Low shrub. Mature floriferous buds usually positioned at acute angle to shoot, ovoid, nearly not compressed, their carinas obscure. Leaves 10–40 mm long. Stamen filaments not entirely connate . . . . . 115. **S. coesia**

11. Bracts rounded. Nectaries of intensive purple color. Capsule stipes none or not longer than 0.5 mm; capsules shortly ovoid, obtuse, abruptly attenuating into short styles (or stigmas sessile). Stamen filaments pubescent only at very bases 12

— Bracts mostly acuminate or irregularly incised at apices. Nectaries mostly greenish or brownish. Capsule stipes 0.5–1.5 mm long; capsules lanceolate-conoidal, gradually attenuating into styles. Stamen filaments pubescent on lower ¼½of their length 17

12. White waxy bloom on branches and buds becoming particularly intensive by fall. Leaf blades broadest about middle, of same light glaucous-green color on both sides, entire or partially and irregularly serrulate . . . . . 133. **S. ledebourana**

— Branches and buds without waxy bloom. Leaves distinctly bicolorous: green above, more or less glaucescent beneath, serrate all along margins, either regularly or more densely towards apices 13

223

13. Mature annotinous shoots not very flexible, 1.3–2.0 mm thick, frequently having tomentose pubescence; young shoots usually densely short-tomentose. Leaves mostly broadest about middle, nearly regularly serrate all along margins, stomata lacking from the upper surface. Styles conspicuous (0.3–0.5 mm long) . . . . . 123. **S. gilgiana**

— Shoots slenderer (0.7–1.5 mm thick), flexible, glabrous. Leaves broadest considerably above middle; marginal denticles more dense towards apex and sparse towards base 14

14. Floriferous buds 2.5–4.0 mm in diameter, mostly ovoid. Leaves mostly with fully-developed linear-subulate stipules; stomata numerous on upper leaf surface, margins distinctly serrate to very base of blade, in mature leaves conspicuously thickening, callous . . . . . 120. **S. miyabeana**

— Floriferous buds 1.8–2.8 mm in diameter, broadly elliptic or oblong. Leaves exstipulate, serration usually only on their upper half, margins not thickening . . 15

15. Medium-sized shrub (1.0–2.5 m). Floriferous buds broadly elliptic or subovoid, 4–7 mm long; lateral carinas mostly inconspicuous in mature ones. Leaves 190–210 μ thick, their upper surface dotted with numerous stomata, each as large as 18–21μ. Mesophyll mostly of six cell layers. Capsule stipes mostly short (0.2–0.5 mm) . . . . . 118. **S. vinogradovii**

— Tall shrubs or small trees (to 5–6 m). Floriferous buds oblong, their sides almost parallel, in mature ones lateral carinas conspicuous, apices often compressed or bent towards shoot. Leaves 140–170 μ thick, stomata either lacking from upper leaf surface or as large as 15–17 μ. Mesophyll of four or five cell layers 16

16. Floriferous buds 4–8 mm long. First cell layer tallest one in mesophyll. Stalks to 15 mm long in female catkins and to 6 mm in male ones. Bracts strikingly different in male and female catkins: in male, mostly black, densely pubescent, particularly on inside surface, 1.0–1.5 mm broad; in female catkins, bracts less colored, less pubescent, 0.6–1.0 mm broad. Capsules often on short stipes . 119. **S. elbursensis**

— Floriferous buds 6–12 mm long. Second cell layer tallest one in mesophyll. Stalks to 5 mm in female catkins, to 3 mm in male ones. Bracts in male and female catkins not conspicuously different. Capsules sessile . . . . . 117. **S. purpurea**

17(11). Annotinous shoots 0.5–1.0 mm thick, light colored. Stipules either lacking or very small, filamentous. Leaves very narrow (10–20 times as long as broad); if somewhat broader, then broadest part of blade considerably above its middle. Mature capsules 4–5 mm long . . . . . 132. **S. caspica**

— Annotinous shoots 1.0–2.2 mm thick, mostly dark colored. Stipules usually fully developed. Leaves lanceolate or linear-lanceolate (3–10 times as long as broad), broadest about or somewhat above middle. Mature capsules 5–7 mm long 18

18. Leaves mostly distinctly bicolorous, young ones more or less lustrous above when alive; mature ones never densely pubescent. Margins somewhat callously thickening in mature leaves, serration rather coarse, but regular. Bracts mostly obtuse-angled at apices. Ovaries always pubescent . . . . . 124. **S. tenuijulis**

— Leaves mostly concolorous, always dull, either glabrous or pubescent, sometimes rather densely. Leaf margins sharp, not callous; leaves entire or rather irregularly serrate, their denticles very slender. Bracts mostly rounded or irregularly incised at apices. Ovaries glabrous or pubescent . . . . . 125. **S. pycnostachya** *224*

Subsect. *Caesiae*

(Kerner) A. Skv. comb. nova. —Sect. *Caesiae* Kerner, 1860, N.-Öst. Weid.: 205.
T y p u s: *Salix coesia* Vill.

Low shrubs, their branches spreading in different directions. Leaves on short petioles, not large (10–60, rarely to 80 mm long), relatively broad, mostly obtuse or rounded, dull, glaucescent above. Catkins very dense, stalked; stalks short, densely clothed with broad, sessile cataphylls. Stamen filaments connate entirely or partially or, more rarely, distinct. Capsules short-ovoid, obtuse, sessile.

Species of this subsection are typical for non-alluvial habitats. They are distributed in central, rather arid, mostly mountainous regions of Asia (an isolated fragment of *S. coesia* area is accounted in the Alps). Besides the two species distributed in the area under consideration, there are three in China.

115. **S. coesia** Vill. 1789, Hist. pl. Dauphin. **3**: 768 et tab. 50 fig. 11; Kar. et Kir. 1842, Bull. Soc. nat. Moscou **15**: 452; Turcz. 1854, Fl. Baic.-Dah. **2**, 2: 394; Wimmer, 1866, Salic. Eur.: 100; Camus, 1904, Saul. Eur. **1**: 139; Nazarov, 1936, Fl. SSSR **5**: 177; id. 1937, Fl. Zabayk. **3**: 223; Buser, 1940, Ber. Schweiz. bot. Ges. **50**: 697; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 89; id. 1964, Fl. Eur. **1**: 53; Popov, 1959, Fl. Sredn. Sib. **2**: 800; Polyakov, 1960, Fl. Kazakhst. **3**, 19; Skvortsov, 1962, Bot. mat. Gerb. In-ta bot. AN UzbSSR **17**: 68. —*S. sibirica* (non Pall.): Trautv. 1833, in Ledeb. Fl. Alt. **4**: 287; Ledeb. 1850, Fl. Ross. **3**, 2: 622. —*S. myricaefolia* Anderss. 1851, K. sv. vet. handl. **1850**: 483; id. 1860, J. Linn. Soc. **4**: 53; Schneider, 1916, in Sarg. Pl. Wilson. **3**, 1: 172; Parker, 1924, Forest fl. Punjab: 510; Hao, 1936, Syn. Chin. *Salix*: 109. —*S. divergens* Anderss. 1868, in DC. Prodr. **16**, 2: 316; Hook. f. 1890, Fl. Brit.

Ind. **5**: 637. —*S. minutiflora* Turcz. ex Wolf, 1903, Trudy SPb. bot. sada **21**: 141; Krylov, 1930, Fl. Zap. Sib. **4**: 737. —*S. pubescens* Hao, 1936, op. cit.: 108. —*S. tuvinensis* Gudoschn. 1965, Sistem. zamet. gerb. Tomsk. un-ta **83**: 3.

T y p u s: "Sur le Lautaret, le long des ruisseaux" Verosimiliter in Hb. Grenoble, n. v. (specimen inscriptum "Dauphiné —Villars. 1768" —LE!).

HABIT: A low (0.2–1.5 m) shrub, its short branches spreading in different directions.

HABITATS: Damp, occasionally subsaline meadows; *syrt*'s at high elevations, *sazy*, glacial moraines; more rarely, alpine meadows or banks of alpine streams.

DISTRIBUTION: The Alps (rather sparsely at 1,500–2,000 m from Savoy to Italian Tirol). The species area in the Alps closely matches that of the xerophilic vegetation, the way it is depicted by J. Braun-Blanquet (1961). The major part of the area is in Central Asia: the Pamir-Alai (at 3,000–4,200 m rather sparsely from the Range of Peter I to Kzylrabat); Karakorum (3,500–4,200 m). The Tien Shan (1,800–3,100 m): the western ranges (very rare, known only from the Talasskiy Alatau); the central and eastern ranges (more common, including the Dzungarskiy Alatau and Chinese Tien Shan); the extreme
225 eastern spurs (near Hami and in the Range of Humboldt within Nan Shan). The Tarbagatay, Altai, Western and Eastern Sayans, Kuznetskiy Alatau, Tannu-Ola, and mountainous regions of northern Mongolia. Here it becomes common even in the steppes on bottoms of wide valleys, such as Chuyskaya Steppe (1,600–1,800 m), Shargyn-Gobi Desert (1,000 m), and the depression around Lake Ubsa Nuur (800 m).

The species ascends to 2,400 m in Mongolia; to 2,000 m in the Tannu-Ola and Eastern Sayans. At lower elevations, it occurs in Transbaykalia as well as on the Stanovoye and Aldanskoye high plateaus, being very sparsely distributed. (Fig. 61.)

116. **S. kochiana** Trautv. 1836, Salicetum: 26 et tab. 1 (nom. nov. pro *S. pontederiana* Trautv. non Willd.); Ledeb. 1850, Fl. Ross. **3**, 2: 602; Turcz. 1854, Fl. Baic.-Dah. **2**, 2: 375; Anderss. 1868, in DC. Prodr. **16**, 2: 314; Wolf, 1903, Trudy SPb. bot. sada **21**: 143; Krylov, 1930, Fl. Zap. Sib. **4**: 738; Nazarov, 1936, Fl. SSSR **5**: 178; id. 1937, Fl. Zabayk. **3**: 222; Grubov, 1955, Konsp. Fl. Mong.: 100; Popov, 1959, Fl. Sredn. Sib. **2**: 798; Polyakov, 1960, Fl. Kazakhst. **3**: 19; Cherepnin, 1961, Fl. yuzhn. ch. Krasnoyar. kr. **3**: 19; Koropachinskiy, Skvortsova, 1966, Der. i kustarn. Tuvy: 89. —*S. pontederiana* (non Willd. 1806) Trautv. 1833, in Ledeb. Fl. Alt. **4**: 263.

T y p u s: "Ad fl. Karagai, ad fl. Koksam in alpinis, ad fl. Tscharysch in subalpinis, —Ledebour" (Trautv. in Fl. Alt. **4**: 263). The original sample from E. Trautvetter's collection, which is apparently to be considered as the holotype, was labeled just "Altai. Herb. Trautvetter" (LE!).

HABIT: A low or medium-sized (0.5–2.5 m) shrub distinguished by the opaque coerulescent foliage color in live plants.

HABITATS: Damp meadows on bottoms of *pad*'s, lower parts of flood plains, but not close to the flowing water and apart from fresh deposits (mostly at low elevations; however, ascending to the timberline at wide valleys, such as Chuyskaya Steppe or Tunkinskaya Valley).

DISTRIBUTION: The Altai, Western Sayans, and Tuva; the Eastern Sayans and their piedmont (including Krasnoyarsk, Kansk, and Zayarsk in the north); Transbaykalia (reaching the Barguzin, Upper Vitim, and Shilka rivers in the north); northern Mongolia (to 47° N); the northern steppe part of Northeast China; a bit of the Russian territory near Blagoveshchensk; an isolated (?) location near Lake Dalai Nur. (Fig. 61.)

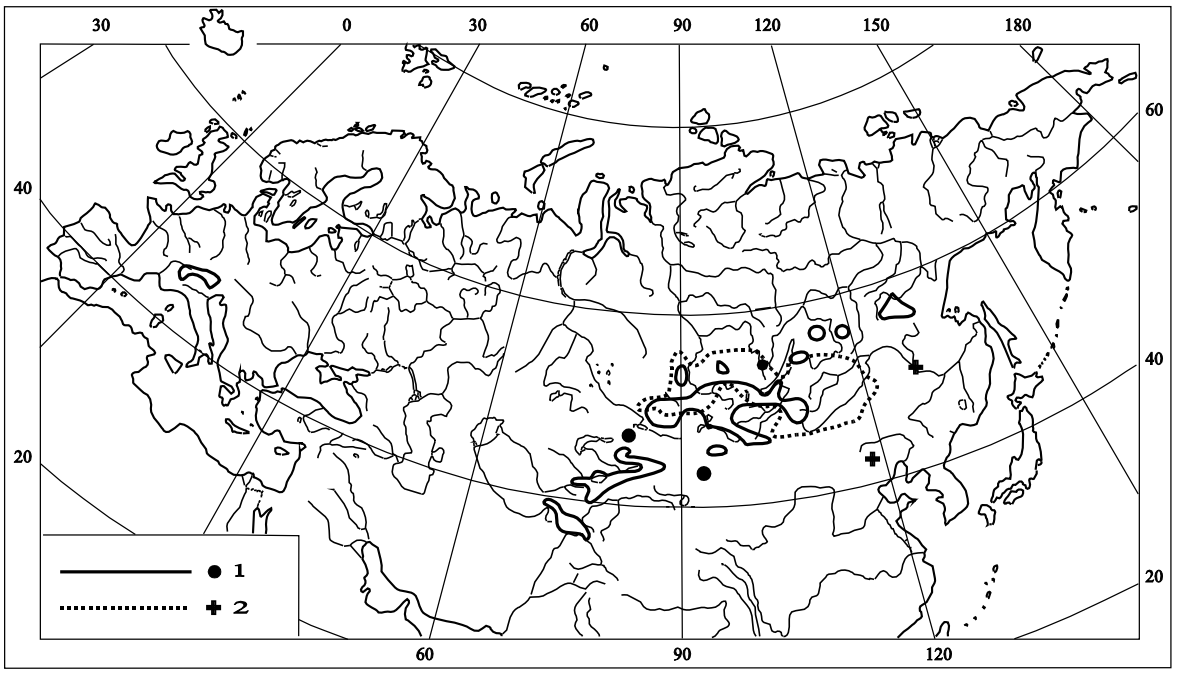

Fig. 61. Distributional areas of *Salix coesia* Vill. (*1*) and *S. kochiana* Trautv. (*2*)

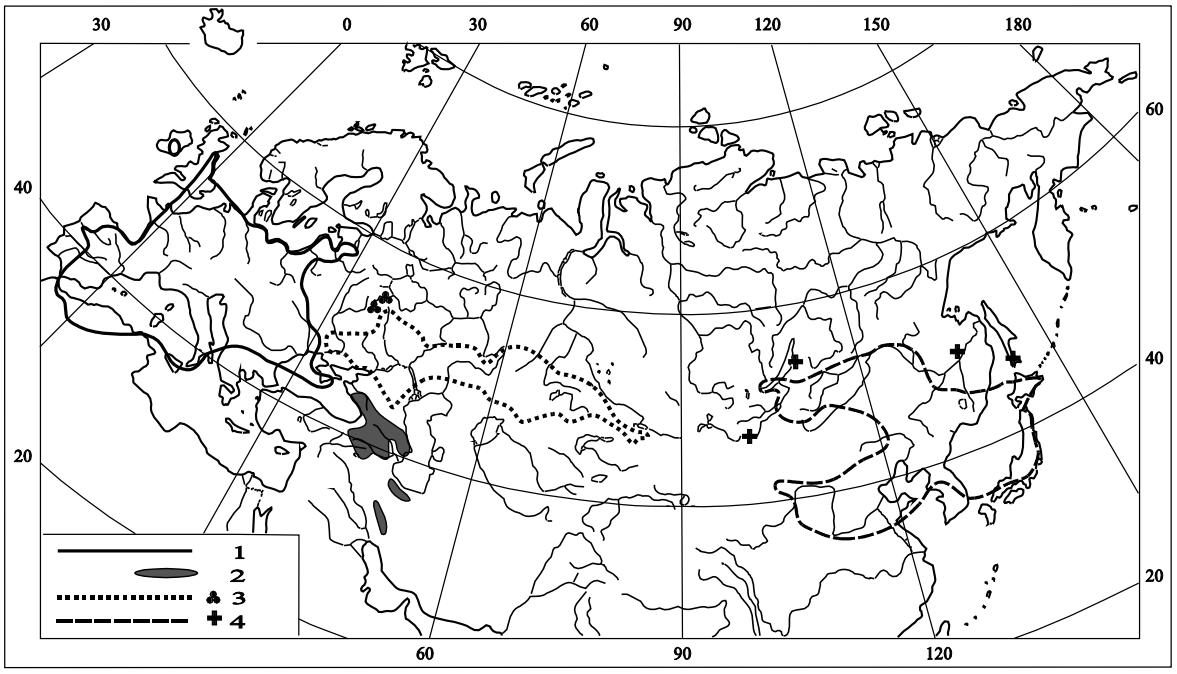

Fig. 62. Distributional areas of *Salix purpurea* L. (*1*), *S. elbursensis* Boiss. (*2*), *S. vinogradovii* A. Skv. (*3*), and *S. miyabeana* Seemen (*4*)

(Hayek) A. Skv. comb. nova. —Sect. *Meliteae* subsect. *Purpureae* Hayek, 1908, Fl. Steierm. **1**: 154.

T y p u s: *S. purpurea* L.

Usually rather tall shrubs or small trees. Floriferous buds strikingly different from vegetative ones (two or three times longer). Leaves usually distinctly bicolorous, bright green above. Catkins precocious or subprecocious, densely flowered, their bracts mostly rounded, black at apices. Nectaries mostly bright purple. Stamen filaments slightly or considerably pubescent at their very bases. Capsules rather small, ovoid, obtuse, sessile or subsessile.

This is a rather large group (10 species) that is distributed within the southern boreal belt and partially in warm temperate regions of Eurasia. The species are very much alike each other, however, well different in their geographical distribution.

117. **S. purpurea** L. 1753, Sp. pl.: 1017; Ledeb. 1850, Fl. Ross. **3**, 2: 502 (p. p.); Wimmer, 1866, Salic. Eur.: 29; Seemen, 1909, in Aschers. et Graebn. Synopsis **4**: 192 (p. p.); Nazarov, 1936, Fl. SSSR **5**: 153 (p. p.); Buser, 1940, Ber. Schweiz. bot. Ges. **50**: 634; Görz, 1947, in Wulf, Fl. Kryma **2**, 1: 120; Vicioso, 1951, Salic. Españ: 67; Beldie, 1953, Fl. Rom. **1**: 290; Nazarov et al. 1952, Fl. URSR **4**: 57 (p. p.); Andreyev, 1957, Der. i kustarn. Mold. **1**: 74; Rasinš, 1959, Ivy Latv.: 118; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 123; id. 1964, Fl. Eur. **1**: 53 (partim); Maire, 1961, Fl. Afr. Nord **7**: 67; Skvortsov, 1966, Novosti sist. vyssh. rast.: 52. —Non *S. purpurea* auct. fl. Graeciae, Asiae Minoris, Caucasi, necnon Rossiae mediae et australis, vel Sibiriae et Orientis Extremis. —*S. caesifolia* Drob. 1941, Bot. mat. Bot. in-ta, Tashk. **3**: 23; id. 1953, Fl. Uzb. **2**: 47.

T y p u s: "In Europae australioribus. Iter Scan. 252; Raj. Angl. 450".

HABIT: A medium-sized or tall shrub that, if not damaged, may often grow as a small tree to 6–8 m tall.

HABITATS: River valleys and banks of streams (in close proximity to the flowing water as well as in other parts of valleys where there is sufficient water supply).

DISTRIBUTION: Northern Africa (mostly in the mountains, to 2,500 m), the major territory of the Iberian Peninsula (except the western part), France, southeastern England, nearly all of the territory of the former Yugoslavia (except Macedonia), northern Bulgaria, Romania, Hungary, Czechia, Slovakia, Austria, Switzerland, Holland, Germany (except Schleswig-Holstein and, probably, a part of the Northern German Lowlands), Kaliningradskaya Oblast, major territories of Lithuania and Latvia (rather common), southern Estonia, the vicinity of Pskov (the Cherekha River), Belarus (its naturalness is doubtful there, being more probable only near the western border), Western Ukraine and Moldavia (not infrequent, particularly in the Carpathians, ascending there to 1,100 m), the mountainous part of the Crimea Peninsula. (Fig. 62.)

In the Alps, the species ascends to 2,200 m (some specimens encountered at 2,400 m); in the Western Carpathians, to 1,350 m. It is missing from Denmark as well as the rest of Scandinavia.

S. purpurea is commonly cultivated across all of Europe, sometimes becoming nearly feral. All findings in the forested regions of central European Russia are to be attributed to

cultivated or feral plants. Data from the forest-steppe and steppe regions of European Russia and Kazakhstan are to be referred to *S. vinogradovii*; those from the Caucasus and Iran, to *S. elbursensis,* those from Transbaykalia and the Far East, to *S. miyabeana*; those from Japan, to *S. miyabeana, S. koriyanagi,* or *S. gilgiana*.

* **S. koriyanagi** Kimura ex Goerz, 1931, Sal. Asiat. **1**: 17; Görz, 1933, Feddes Repert. **32**: 119; Makino, 1956, Ill. Fl. Japan.: 672; Kimura, 1954, Symb. Iteol. **13**: 209; Ohwi, 1965, Fl. Jap.: 368. —*S. purpurea* var. *japonica* Nakai, 1928, Bull. Soc. Dendr. Fr. **66**: 14; id. 1930, Fl. sylv. Kor. **18**: 117; Liou Tchen ngo, 1955, Ill. Fl. Tr. Shr. Northeast China: 185. *227*

T y p u s: "Japonia, Sendai, cult. —28.III et 3.VII 1930 leg. A. Kimura" (Görz, Sal. Asiat. N 18) (LE!, TAK! et alibi).

HABIT: A shrub (or small tree?) known only in female specimens and only in cultivation.

DISTRIBUTION. It is commonly grown in Japan for rod harvesting and as an ornamental plant. It is also known from the Korea Peninsula, Northeast China, southern Sakhalin, and the southern Kurils. Most probably, this is a strict endemic Korean or Japanese species, its natural populations not yet found.

118. **S. vinogradovii** A. Skv. 1966, Novosti sist. vyssh. rast.: 55. —*S. purpurea* auct. non L.: Wolf, 1930, Fl. Yu.-V. **4**: 60; Polyakov, 1960, Fl. Kazakhst. **3**: 20; et al.

T y p u s: "Prov. Lipetsk, ad flum. Tanain (Don) in reservatione naturae "Galitschja Gora", 9.V 1963 leg. S. V. Golitsin" (MW).

HABIT: A medium-sized shrub (1–4 m tall) that appears never to grow as a tree.

HABITATS: River banks and valley meadows in the forest-steppe and steppe belt.

DISTRIBUTION: The forest-steppe and steppe regions of European Russia and Ukraine, including the basins of the Don with Donets and Lower Dnieper in the west. Some isolated fragments are found on the Oka River in Kaluga and Moscow oblasts. The northern area limit is in southern Ryazan Oblast, around Penza and Samara. In the south, the species area reaches the Azov Sea Coast, Kalmykia, and the northern edge of the Ryn Sands. The species is found in the Southern Urals reaching as far north as the Upper Belaya and Uy rivers. Within the forest-steppe and steppe belt of West Siberia and Northern Kazakhstan, the northernmost point is around Kurgan, northeastern limit is the Irtysh River, and southern one matches the southern edge of the Mugodzhary, then running via Karsakpay and the Kzyl-ray Hills. The species also occurs in the Chingiz-Tau Hills and Tarbagatay. (Fig. 62.)

119. **S. elbursensis** Boiss. 1853, Diagn. **12**: 117 (sphalma typographicum: "*elbrusensis*"); Skvortsov, 1966, Trudy Bot. in-ta AN ArmSSR **15**: 134; id. 1966, Novosti sist. vyssh. rast.: 58. —*S. purpurea* auct. omnium florae Caucasicae necnon Iranicae, non L. —*S. tenuijulis* Goerz, 1930, in Grossheim, Fl. Kavk. **2**: 10; id. 1930, Feddes Repert. **28**: 128; id. 1934, ibid. **36**: 30, 238. — Non *S. tenuijulis* Ledeb. — *S. ledebourana* auct. non Trautv.: Görz, 1930, op. cit. **28**: 128; id. 1934, ibid. **36**: 239. —Non *S. ledebourana* Trautv. —*S. roopii* Grossh. 1945, Fl. Kavk. 2 ed. **2**: 23. *228*

T y p u s: "In Monte Elburs prope Derbend. 15.V 1843. —T. Kotschy, Pl. Pers. bor. N 154" (LE! JE! W! et alibi).

HABIT: A medium-sized or large shrub that may as well grow as a tree to 8–10 m tall if there is no major damage.

HABITATS: Banks of rivers and streams, bottoms of hollows, ravines, and valleys with sufficient water supply.

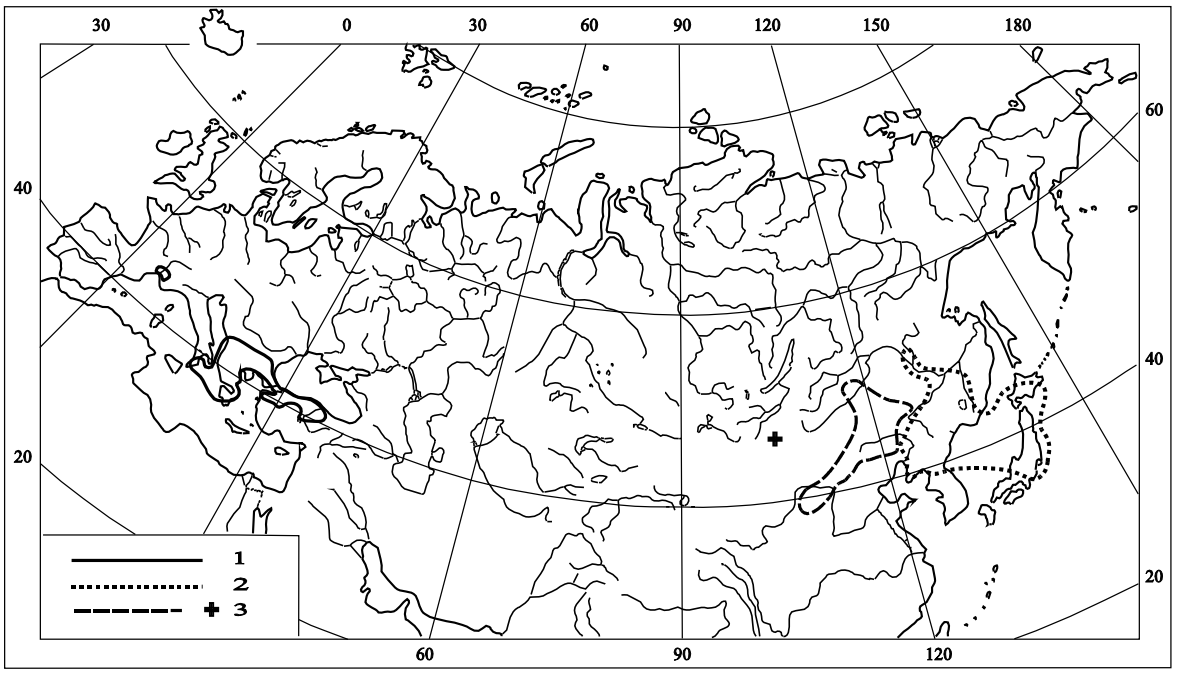

Fig. 63. Distributional areas of *Salix amplexicaulis* Bory et Chaubard (*1*), *S. integra* Thunb. (*2*), and *S. gordejevii* Chang et Skvortz. (*3*)

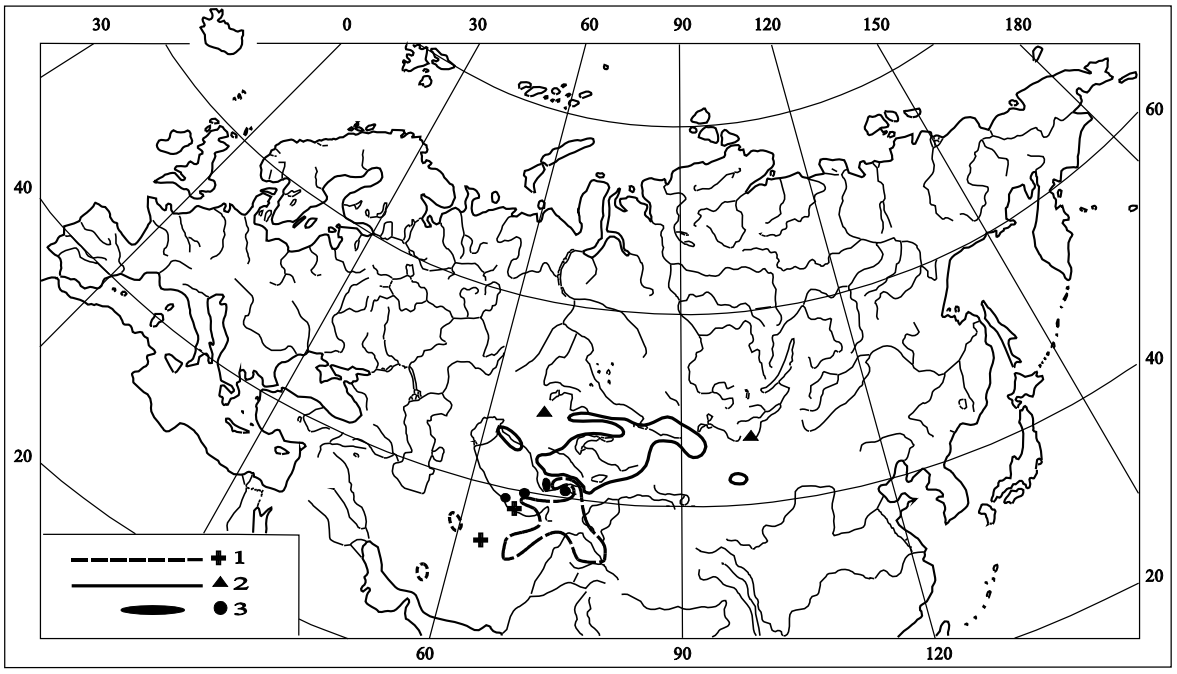

Fig. 64. Distributional areas of *Salix pycnostachya* Anderss. (*1*), *S. tenuijulis* Ledeb. (*2*), and *S. olgae* Rgl. (*3*)

DISTRIBUTION: From the sea level to the upper forest zone (reaching 1,800 m in the Greater Caucasus and 2,000–2,100 m in Armenia). Being encountered across nearly all of the Caucasus, it is more rare in damp, thickly forested areas and more common in dryer ones, such as Kakhetia, Armenia, and Azerbaijan. Within Azerbaijan, it has not been found along the Kura River; neither did I manage to identify any samples from Adzharia and Talysh. Within Asia Minor, it is found only in the eastern part: the eastern Gü mü shane (along the Coroch River), Erzurum, Kars, Van, and Agri provinces of Turkey; the Elburz and Zagros Mountains in Iran. It might also be distributed in Iranian Azerbaijan, but there is no evidence from there. (Fig. 62.)

120. **S. miyabeana** Seemen, 1896, Bot. Jahrb. Beibl. **53**: 50; id. 1903, Salic. Jap.: 57 et tab.12 fig. A-E; Tokubuchi, 1896, Bot. Mag. Tokyo **10**: 69; Miyabe, Kudo 1921, Ic. forest tr. Hokk. **1**: N 19; Kimura, 1934, in Miyabe, Kudo, Fl. Hokk. a. Saghal. **4**: 435; Hao, 1936, Syn. Chin. *Salix*: 113; Ohwi, 1965, Fl. Jap.: 368; Skvortsov, 1966, Novosti sist. vyssh. rast.: 59. —*S. purpurea* auct. fl. Asiae Orient. non L.: Turcz. 1854, Fl. Baic.-Dah. **2**, 2: 375; Schneider, 1916, in Sarg. Pl. Wilson. **3**, 1: 167, p. p.; Hao, 1936, op. cit.: 114. —*S. purpurea* var. *stipularis* Franch. 1884, Pl. David. **1**: 284. —*S. purpurea* var. *smithiana* (non Trautv.) Nakai, 1930, Fl. sylv. Kor. **18**: 115; Liou Tchen ngo, 1955, Ill. Fl. Tr. Shr. Northeast China: 185. —*S. lepidostachya*, Seemen, 1896, Bot. Jahrb. Beibl. **53**: 51; id. 1903, op. cit.: 58; Komarov, Alisova, 1931, Opred. rast. Dalnevost. kr. **1**: 425; Nazarov, 1936, Fl. SSSR **5**: 195; Liou Tchen ngo, 1955, op. cit.: 186. —*S. tenuifolia* (non Smith, 1792) Turcz. ex Wolf 1903, Trudy SPb. bot. sada **21**, 2: 145; Lakschewitz, 1914, Spisok rast. Gerb. russk. fl. **50**: N 2497, 2498; Komarov, Alisova, 1931, op. cit. **1**: 423; Nazarov, 1936, op. cit. **5**: 154; id. 1937, Fl. Zabayk. **3**: 222; Liou Tchen ngo, 1955, op. cit.: 182; Popov, 1959, Fl. Sredn. Sib. **2**: 798. —*S. mongolica* Siuzev, 1912, Trudy Bot. muz. **9**: 90, 135; Komarov, Alisova, 1931, op. cit. **1**: 423; Nazarov, 1936, op. cit. **5**: 156; Liou Tchen ngo, 1955, op. cit.: 179. —*S. dahurica* Turcz. ex Lakschewitz, 1914, op. cit. **50**: N 2496; Komarov, Alisova, 1931, op. cit. **1**: 423; Nazarov, 1936, op. cit. **5**: 155; id. 1937, op. cit. **3**: 220; Liou Tchen ngo, 1955, op. cit.: 185; Popov, 1959, op. cit. **2**: 798. —*S. linearistipularis* Hao, 1936, op. cit.: 102. —*S. gracilior* Nakai, 1936, Rep. First Sci. exped. Manch. 4, **4**: 7. —*S. neotenuifolia* Kimura, 1946, Symb. Iteol. **9**: 85. —*S. sungkianica* Chou et Skvortz. 1955, in Liou Tchen ngo, op. cit.: 552.

T y p u s: "Yezo, prov. Ishikari, Sapporo —a. 1891 leg. Y. Tokubuchi" (B, SAP, n. v.). Specimina authentica depicta: Tokubuchi, 1896, op. cit. tab. 6 —optime; Seemen, 1903, op. cit. tab. 12 fig. A-E —sat bene; Hao, 1936, op. cit. fig. 86 —sat bene.

HABIT: A tall shrub or small tree.

HABITATS: Banks of rivers and streams, flood plains, damp meadows (exhibiting no restriction to alluvial substrates, but on the other hand, no tolerance to water stagnation). The species does not go in the mountains any further than low elevations.

DISTRIBUTION. The northern area boundary runs along the line connecting Irkutsk, the Barguzin River, Chita, Dzhalinda, Svobodnyy on the Zeya, and finally reaching the Iman River (a tributary of the Ussury). The species area includes southernmost Sakhalin, Hokkaido, the northern part of Honshu, the northwestern Korea Peninsula, all of Northeast and North China (Shaanxi, Shanxi, Hopeh, Honan, Shantung, and Suiyuan provinces). It is rather sparsely distributed across northern Mongolia reaching Tsetserlig in the west. In North China, it is encountered mostly as a cultivated plant. T. Nakai (1930: 207) listed this *229* species for the territories of the Amgun and Uda basins, which was definitely a mistake.

On a previous map compiled by the author (Skvortsov 1966), the western area boundary within Mongolia was treated as approximate, shown as a dotted line. Some additional material from the eastern Mongolia and Outer Mongolia has made it possible to draw that segment of the boundary more precisely. (Fig. 62.)

121. **S**. **amplexicaulis** Bory et Chaubard, 1832, Expéd. sci. Morée, **3**, 2: 277; id. 1838, Nouv. fl. Pelop.: 64; Halá csy, 1904, Consp. fl. Graec. **3**: 138; Rech. f. 1943, Fl. Aegaea: 95; Skvortsov, 1966, Trudy Bot. in-ta AN ArmSSR **15**: 133. —*S. purpurea* var. vel ssp. *amplexicaulis* auct.: Boiss. 1879, Fl. Or. **4**: 1186; Hayek, 1924, Prodr. Balc. **1**: 87; Görz, 1930, Feddes Repert. **28**: 128.

T y p u s: "Graecia, Morea, leg. J. B. M. Bory" (P, n. v.).

HABIT: A medium-sized or tall shrub.

HABITATS: River valleys, banks of streams.

DISTRIBUTION: Calabria, the southern Balkan Peninsula (including Albania, Macedonia, and central Bulgaria), northwestern Asia Minor, southeastern France (a fragmentary part, its shape not yet known). (Fig. 63.)

The vertical range is from nearly the sea level to 1,100–1,200 m in Greece and 1,700–1,800 m in Asia Minor.

122. **S**. **integra** Thunb. 1784, Fl. Jap.: 24; Sieb. et Zucc. 1846, Fl. Jap. fam. **4**: 211; Nakai, 1930, Fl. sylv. Kor. **18**: 113; Komarov, Alisova, 1931, Opred. rast. Dalnevost. kr. **1**: 425; Kimura, 1934, in Miyabe, Kudo, Fl. Hokk. a. Saghal. **4**: 434; Nazarov, 1936, Fl. SSSR **5**: 179; Liou Tchen ngo, 1955, Ill. Fl. Tr. Shr. Northeast China: 173; Ohwi, 1965, Fl. Jap.: 367. —*S. purpurea* auct. non L.: Franch. et Sav. 1875, Enum. Jap. **1**: 462; Seemen, 1903, Salic. Jap.: 55 (p. p.). —*S. purpurea* ssp. *amplexicaulis* var. *multinervis* Schneider, 1916, in Sarg. Pl. Wilson. **3**, 1: 168. —*S. multinervis* Franch. et Sav. 1876, op. cit. **2**, 1: 504; Komarov, 1903, Trudy SPb. bot. sada **2**: 25; Hao, 1936, Syn. Chin. *Salix*: 114. —*S. savatieri* Camus, 1904, Saul. Eur. **1**: 326.

T y p u s: "Japonia. Thunberg" (UPS, n. v.).

230 HABIT: A medium-sized shrub (1–4 m). In damp hay-meadows on bottoms and slopes of large *pad*'s, it often has a suppressed habit growing not taller than 0.3–0.8 m due to annual mowing (the same habit is exhibited by *S. brachypoda* and *S. bebbiana*).

HABITATS: Damp lowlands. The species is tolerant to some paludification, at the same time, staying away from alluvial river deposits, particularly fresh ones, so that it is never found close to the flowing water. In the southern Sikhote-Alin, it occurs in damp logged areas and secondary meadows, ascending to 800 m. In China (Liaoning Province), it is encountered at the same height.

DISTRIBUTION: Southern Amur Oblast (going up the Amur to Korsakov and up the Zeya to the mouth of the Tygda); Birobidzhan; the Ussuri Valley (?except the lower reaches) and southern Maritime Province (reaching the Sudzukhe River in the east); the southeastern part of Northeast China; the northern Korea Peninsula (reaching Pyongyang in the south); Hokkaido and the major part of Honshu. (Fig. 63.)

123. **S**. **gilgiana** Seemen, 1903, Salic. Jap.: 59 et tab. 13 fig. A-D; Schneider, 1916, in Sarg. Pl. Wilson. **3**: 169; Nakai, 1930, Fl. sylv. Kor. **18**: 112 (p. p. —cf. adnot. nostram); Kimura, 1934, in Miyabe, Kudo, Fl. Hokk. a. Saghal. **4**: 437; Makino, 1956, Fl. Jap.: 671; Ohwi, 1965, Fl. Jap.: 368; Skvortsov, 1966, Novosti sist. vyssh. rast.: 63. —*S. purpurea* var. *sericea* (non Wimmer) Seemen, 1903, op. cit.: 56; Koidzumi, 1913, Bot. Mag. Tokyo **27**: 92; Schneider, 1916, op. cit. **3**, 1: 167.

T y p u s: "Japonia, Yedo, 15.III, 23.IV, 8.VI 1874 leg. Hilgendorf" [KYO et olim (et nunc?) etiam B] N. v.

HABIT: A tall shrub.

HABITATS: Damp meadows, banks of streams.

DISTRIBUTION: Japan (Hokkaido, Honshu, Shikoku, and Kyushu); the Korea Peninsula. T. Nakai (1930: 212) also listed this species for southern Maritime Province, however, it is missing from there. He could mistakenly treat samples of *S. miyabeana* with fully developed styles as those of *S. gilgiana*. Japanese authors never listed this species for the Kurils. However, *S. gilgiana* was collected on Zelenyy Island by N. Popov and A. Chernyayeva in 1960 (the Herbarium of the Sakhalin Science Institute).

Subsect. *Tenuijules*

A. Skv. Novosti sist. vyssh. rast. a. 1968 describetur.

Tall shrubs or trees growing on alluvia in arid regions. Floriferous buds greatly different from vegetative ones. Stipules usually fully developed. Petioles relatively long (6–15 mm); leaf blades (linear-)lanceolate, broadest about middle. Catkins precocious or subprecocious. Nectary yellowish-olivaceous. Capsules short-stalked, lanceolate, acute, mature ones 5–7 mm long.

T y p u s: *Salix tenuijulis* Ledeb.

124. **S. tenuijulis** Ledeb. 1833, Fl. Alt. **4**: 262; id. 1834, Icon. **5**: 16 et tab. 453; Wolf, 1903, Trudy SPb. bot. sada **21**: 146; Krylov, 1930, Fl. Zap. Sib. **4**: 740; Pavlov, 1935, Fl. Ts. Kazakhst. **2**: 30; Nazarov, 1936, Fl. SSSR **5**: 158; Polyakov, 1960, Fl. Kazakhst. **3**: 21; Skvortsov, 1962, Bot. mat. Gerb. In-ta bot. AN UzbSSR **17**: 69. —*S. regelii* Anderss. 1868, in DC. Prodr. **16**, 2: 309. —*S. albertii* Rgl. 1880, Acta Horti Petropol. **6**: 462; Nazarov, 1936, op. cit. **5**: 172. —*S. serrulatifolia*, E. Wolf, 1903, op. cit. **21**: 163; Nazarov, 1936, op. cit. **5**: 165; Polyakov, 1960, op. cit.: 24. —*S. przewalskii* E. Wolf, 1907, Izv. Lesn. in-ta **15**: 179 et tabl.; Nazarov, 1936, op. cit. **5**: 169. —*S. verticilliflora* E. Wolf, 1909, Trudy SPb. bot. sada **28**: 400. —*S. spinidens* E. Wolf, 1909, op. cit. **28**: 403; Nazarov, 1936, op. cit. **5**: 161; Polyakov, 1960, op. cit. **3**: 22.

T y p u s: "In arenosis ad fl. Bekun et Kurtschum. —C. A. Meyer" (LE?). I did not have a chance to see that sample; probably, it is lost. If that is the case, then it is reasonable to consider an excellent image in C. Ledebour's work as the type. *231*

HABIT: A tall shrub (to 6 m) or wide-crowned tree (to 6–8 m).

HABITATS: *Tugai* along rivers, bottoms of *sai* at places where ground waters come to the surface or near underground streams. The species is associated with pebbly, sandy, and sometimes muddy-clayey substrate.

DISTRIBUTION: The southern Kazakh Uplands and northern coast of Lake Balkhash (occasionally). It becomes rather common south of Zaysan and Balkhash, along rivers from their mouths to elevations of 2,000–2,200 m (to 2,400 m at the Upper Chilik). It is particularly common in the basins of the Lepsa, Karatal, and Ili. The southwestern border of the species high occurrence area runs via Naryn, the Koke-Meren, Susamyr, and Upper Talas rivers and then across the Boroldaytau. It is sporadically encountered all across the Karatau and at the Lower Syr Darya downstream of Kzyl-Orda. It has never been found at the middle reaches of the Syr Darya, nor along the Arys. Within the Altai Mountains, it is

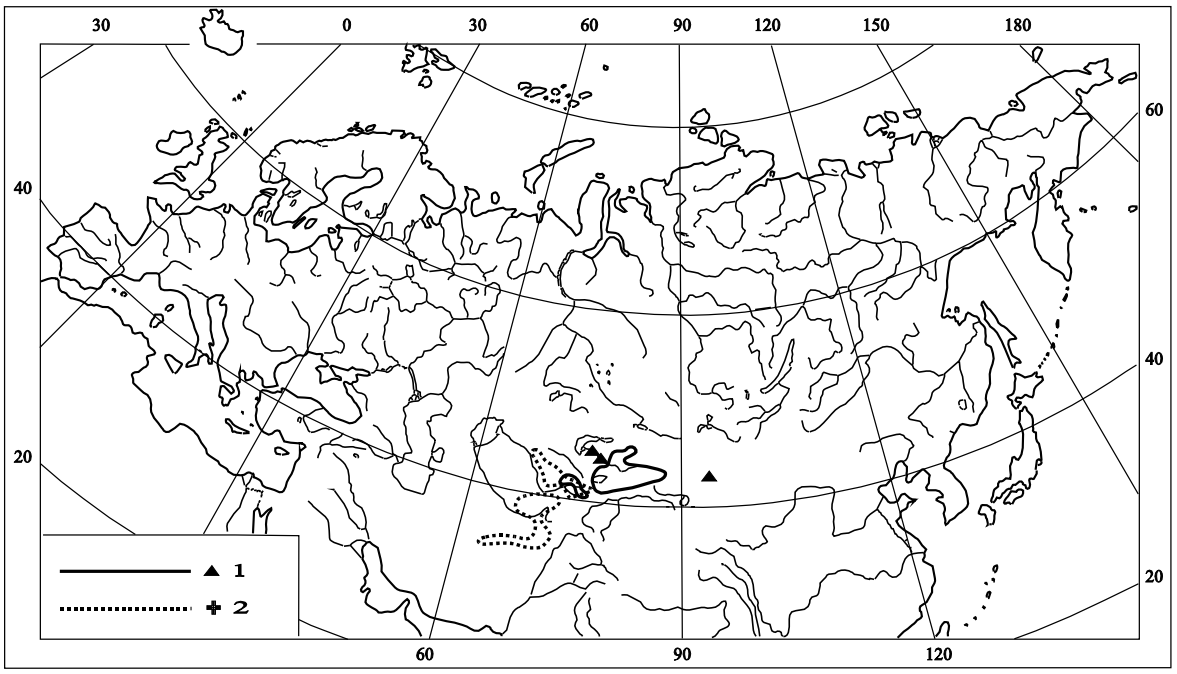

Fig. 65. Distributional areas of *Salix linearifolia* E. Wolf (*1*) and *S. kirilowiana* Stschegl. (*2*)

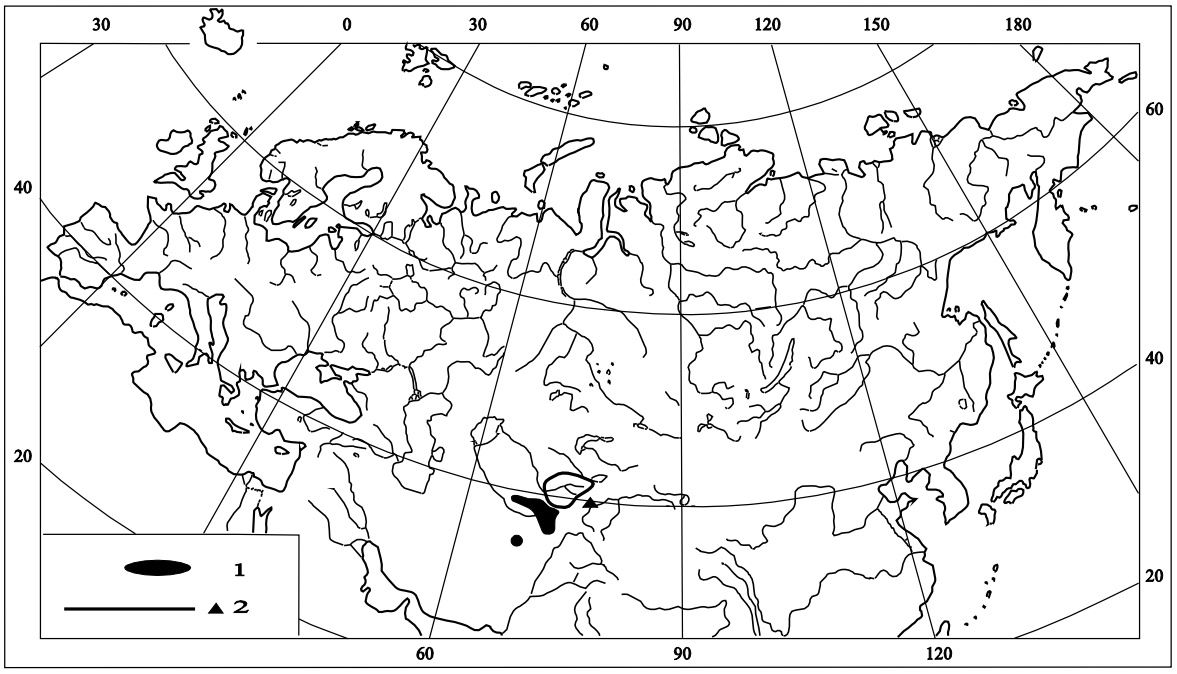

Fig. 66. Distributional areas of *Salix capusii* Franch. (*1*) and *S. niedzwieckii* Goerz (*2*)

listed only for the extreme southwestern part. The area includes western Sinkiang (primarily, the Ili Basin and the banks of the Black Irtysh); the Mongolian Altai (reaching Trans-Altai Gobi Desert in the southeast); the Khangai (near Zayin-geygen, solitary). (Fig. 64.)

125. **S. pycnostachya** Anderss. 1860, J. Linn. Soc. **4**: 44; id. 1868, in DC. Prodr. **16**, 2: 309; Hook. f. 1890, Fl. Brit. Ind. **5**: 636; Parker, 1924, Forest fl. Punjab: 510; Görz, 1934, Feddes Repert. **36**: 34; Nazarov, 1936, Fl. SSSR **5**: 163; Parsa, 1950, Fl. Iran. **4**: 1359; Skvortsov, 1960, Bot. mat. Gerb. Bot. in-ta AN SSSR **20**: 83; id. 1962, Bot. mat. Gerb. In-ta bot. AN UzbSSR **17**: 69; id. 1966, Spisok rast. Gerb. fl. SSSR **91**: N 4548; Ikonnikov, 1963, Opred. rast. Pamira: 90. —*S. sarawschanica* Rgl. 1882, Izv. Ob-va lyubit. yest. **34**, 2: 80; Nazarov, 1936, op. cit. **5**: 160. —*S. iranica*, 1920, Bornm. ex Toepffer, Salic. Exs.: N 471. —*S. margaritifera* E. Wolf, 1903, Trudy SPb. bot sada **21**:162; Nazarov, 1936, Fl. SSSR **5**: 173. —*S. macrostachya* E. Wolf, 1903, op. cit. **21**: 163; Nazarov, 1936, op. cit. **5**: 172. —*S. komarovii* E. Wolf, 1903, op. cit. **21**: 195; Nazarov, 1936, op. cit. **5**: 166. —*S. holargyrea* Goerz, 1936, Trudy Tadj. bazy **2**: 175. —*S. korshinskyi* Goerz, 1936, op. cit. **2**: 178; Nazarov, 1936, op. cit. **5**: 176. —*S. ferganensis* Nasarov, 1936, op. cit. **5**: 176, 713. —*S. rubrobrunnea* Drobov, 1941, *232* Bot. mat. Bot. in-ta, Tashkent **5**: 15. —*S. pamirica* Drobov, 1941, op. cit. **5**: 16.

T y p u s: "India, Zanskar, alt. 13000' —Thompson" (K!).

HABIT: A tall shrub or, if there is no damage, a tree, sometimes as tall as 10–12 m and to 40 cm in stem diameter.

HABITATS: Banks of rivers and streams.

DISTRIBUTION: The western ranges of the Tien Shan (the Ferganskiy, Chatkalskiy, Pskemskiy, Ugamskiy, and western Talasskiy ranges, at 1,200–2,500 m); the Pamir-Alay (all the ranges, reaching the Kashka Darya Basin in the west, at 1,400–4,300 m, being especially common in the Pamirs); the Kugitangtau; southern Kashgaria; Kashmir; Afghanistan (at high elevations); Iran (two small locations, one in Khorasan Province in the northeast, another one in the Kuhrud Mountains in the south.) (Fig. 64.)

NOTE. This is one of the most polymorphic willows. Such characters as the leaf breadth, intensiveness of pubescence on leaves and capsules, shoot color, and size of floriferous buds are greatly variable. Differences may be exhibited by individual plants as well as entire populations. Some characteristics appear to be contingent with certain ecological conditions, for example, a very dark color of shoots and rather narrow leaves with scanty pubescence dominate in high-altitude populations. Yet it is impossible to distinguish any particular races or subspecies.

The type of *S. holargyrea* Goerz (from Kulyab: Divnogorskaya) belongs to *S. pycnostachya*; as for other samples cited by R. Görz, they belong to *S. schugnanica*.

126. **S. olgae** Rgl. 1882, Izv. Ob-va lyubit. yest. **34**, 2: 79 (p. p.: quoad pl. 1.IV 1871 Lectas tantum); Wolf, 1903, Trudy SPb. bot. sada **21**: 152 (?); Nazarov, 1936, Fl. SSSR **5**: 170 (p. p.); Skvortsov, 1962, Bot. mat. Gerb. In-ta bot. AN UzbSSR **17**: 70; id. 1966, Spisok rast. Gerb. fl. SSSR **91**: N 4549. —*S. pseudalba* E. Wolf, 1903, op. cit. **21**: 167; Nazarov, 1936, op. cit. **5**: 171; Skvortsov, 1960, Bot. mat. Gerb. Bot. in-ta AN SSSR **20**: 84. —*S. angrenica* Drobov, 1941, Bot. mat. Bot. in-ta, Tashkent **3**: 22; id. 1953, Fl. Uzb. **2**: 36. —*S. coerulangrenica* Drobov, 1941, op. cit. **3**: 9; id. 1953, op. cit. **2**: 39. —*S. olgangrenica* Drobov, 1941, op. cit. **3**: 9; id. 1953, op. cit. **2**: 47.

T y p u s: "Ad fl. Salar prope Taschkent. 1.IV 1871. O. Fedtschenko" (LE!).

HABIT: A tall shrub or small tree.

HABITATS: River pebbles at low elevations in the mountains and on piedmont plains.

DISTRIBUTION is fairly discontinuous: The Chirchik Basin (along the Chirchik near Tashkent and Gazalkent, rather abundantly at the lower reaches of the Chimganka); the wide stony bottom of the Angren River Valley (extensive thickets); the *tugai* between Almalyk and Angren (the dominating species); the Zeravshan River and Zeravshan(-skiy) Range around Samarkand (sparsely); the vicinity of Kokand; the Karasu River in the Ferganskiy Range (?—only vegetative specimens); the vicinity of Beshir in Chardzhou Oblast. It has never been encountered higher than 1,500 m in the mountains; on the other hand, it is missing from sandy-muddy deposits of lowland rivers. Its scanty area is likely to be attributed to the cutting of *tugai* forests, which has been most intensive at piedmont and low mountain elevations. (Fig. 64.)

127. **S. linearifolia** E. Wolf, 1903, Trudy SPb. bot. sada **21**: 160, cum fig.; Nazarov, 1936, Fl. SSSR **5**: 169; Drobov, 1953, Fl. Uzb. **2**: 43; Skvortsov, 1962, Bot. mat. Gerb. In-ta bot. AN UzbSSR **17**: 71; id. 1966, Spisok rast. Gerb. fl. SSSR **91**: N 4550. —*S. blakii* Goerz, 1934, Feddes Repert. **36**: 31; Nazarov, 1936, op. cit. **5**: 162; Drobov,
233 1953, op. cit. **2**: 41; Polyakov, 1960, Fl. Kazakhst. **3**: 23. —*S. olga*e Rgl. 1882, Izv. Ob-va lyubit. yest. **34**, 2: 79 (p. p.); Drobov, 1941, Bot. mat. Bot. in-ta, Tashkent **5**: 11; id. 1953, op. cit. **2**: 44. —*S. blakolgae* Drobov, 1941, op. cit. **5**: 8. —? *S. tenuijuli*s auct. non Ledeb.: Drobov, 1953, op. cit. **2**: 37.

T y p u s: "Hissar montes Babatag prope Akmetschet, 1.V 1883. A. Regel" (LE!).

HABIT: A tall shrub or occasionally tree. (In the Zeravshanskiy Range, I have seen specimens to 10 m tall and 25–30 cm in stem diameter).

HABITATS: Banks of streams and rivers in the mountains and piedmont (on pebbly, sandy, and sandy-muddy drifts).

DISTRIBUTION. The northern limit is found in the northernmost Karatau; the eastern border runs via the Susamyr River, Naryn, Daraut-Kurgan, and Vanch; the westernmost localities are around Tashkent, Samarkand, and in the Kugitangtau. The species apparently is missing from lowlands: along the Chirchik, it is found only upstream of Tashkent; along the Arys, only upstream of Tamerlanovka; along the Kashka Darya, only upstream of Kitab, and so on. It is as well missing from the alpine zone (particularly, in the Pamirs), ascending not higher than 2,200 m (sometimes, 2,400 m). Within the territory of Afghanistan, it is distributed in the Paropamisus and western Hindu Kush. (Fig. 65.)

Subsect. *Kirilowianae*

A. Skv. Novosti sist. vyssh. rast. 1968 describetur.

Shrubs or small trees, their shoots slender, smooth, often covered with pruinose bloom. Floriferous buds slightly different from vegetative ones. Stipules usually lacking. Leaves small, dull on both sides, nearly concolorous, pale, bluish. Catkins serotinous, narrowly cylindrical, somewhat loosely flowered. Stamen filaments densely pubescent. Capsules stipitate, small (mature ones 4–6 mm long), mostly acute, conoidal.

T y p u s: *Salix kirilowiana* Stschegl.

128. **S. kirilowiana** Stschegl. 1854, Bull. Soc. Nat. Moscou **27**, 1: 148; Skvortsov,
234 1960, Bot. mat. Gerb. Bot. in-ta AN SSSR **20**: 80; id. 1962, Bot. mat. Gerb. In-ta bot. AN UzbSSR **17**: 72; id. 1966, Spisok rast. Gerb. fl. SSSR **91**: N 4544. —*S. alba-*

viminalis Rgl. 1880, Acta Horti Petropol. **6**: 460. —*S. issykiensis* Goerz ex Nasarov, 1936, Fl. SSSR **5**: 712. —*S. lipskyi* Nasarov, 1936, op. cit. **5**: 712; Polyakov, 1960, Fl. Kazakhst. **3**: 25. —*S. niedzwieckii* auct. non Goerz: Polyakov, 1960, op. cit. **3**: 23 (p. p.). —*S. coerulea* auct. non E. Wolf: Polyakov, 1960, op. cit. **3**: 22 (p. p.).

T y p u s: "In montosis Alatau ad fl. Lepsa et Sarchan, a. 1841 Karelin et Kirilow N 1967; a. 1842 et 1844 Karelin" (LE!).

HABIT: A tall shrub or small, short-stemmed tree with a wide round crown (to 6–8 m tall).

HABITATS: Banks of mountain streams and rivers, screes and taluses, deluvial cones, etc. (either on coarse pebbles or at places where ground waters reach the surface). Being characteristic of intermediate elevations, it may also descend to lowlands along large rivers. The upper limit is at 2,500 m.

DISTRIBUTION: The Saur Range; the entire Eastern Tien Shan including its Kazakh, Kirghiz, and Chinese parts as well as an isolated Karlyktag Massif near Hami. The western limit of the species continuous distribution matches that of the spruce forests. West of that boundary, it occurs rather sparsely, reaching the Talasskiy and Chatkalskiy ranges. There are some few localities at the lower reaches of the Ili. The species is not found on the territory of the Pamir-Alay System. (Fig. 65.)

129. **S. niedzwieckii** Goerz, 1931, Salic. Asiat. **1**: 18; id. 1933, Feddes Repert. **32**: 120; Nazarov, 1936, Fl. SSSR **5**: 161 (p. p.); Drobov, 1953, Fl. Uzb. **2**: 39; Protopopov, 1953, Fl. Kirg. **4**: 25; Polyakov, 1960, Fl. Kazakhst. **3**: 23 (p. p.); Skvortsov, 1962, Bot. mat. Gerb. In-ta bot. AN UzbSSR **17**: 72; id. 1966, Spisok rast. Gerb. fl. SSSR **91**: N 4545. — *S. olgae* Rgl. 1882, Izv. Ob-va lyubit. yest. **34**, 2: 79 (p. p.). — *S. coeruleiformis* Drobov, 1941, Bot. mat. Bot. in-ta, Tashkent **3**: 22; id. 1953, op. cit. **2**: 39 et tab. 1 fig. 1. —*S. coerulea* auct. non E. Wolf: Polyakov, 1960, op. cit. **3**: 22 (p. p.).

T y p u s: "Ad fl. Tschimganka 1.V 1921 leg. P. Gomolitzky (Goerz Sal. Asiat. N 19 et 20) (LE! TAK! et alibi).

HABIT: A small tree to 6–8 m tall.

HABITATS: River banks (mostly on coarse pebbles). It is encountered more often at intermediate mountain elevations (1,000–2,500 m); however, it may descend to piedmont plains along rivers.

DISTRIBUTION: The Western Tien Shan including Angren, Tashkent, Lenger, Dzhambul, and Gulyayevka on the Chu (rather frequently); the Central Tien Shan (less frequently, reaching the southwestern shore of Issyk-Kul, the Town of Naryn and apparently missing from the Susamyr and Upper Talas); the eastern and southern Ferganskaya Valley, Ferganskiy and Alayskiy ranges (again becoming more common). The westernmost part of the area includes the Karavshin and Isfara basins; the southern limit is near Daraut-Kurgan and on the northern slopes of the Zaalayskiy Range (Altynmazar) and the Range of Peter I (Sarykosh). Within Kashgaria, it is found in the Kyzylsu Basin upstream of Kashgar. (Fig. 66.)

130. **S. capusii** Franch. 1884, Ann. Sci. Natur. 6, **18**: 251; Skvortsov, 1962, Bot. mat. Gerb. In-ta bot. AN UzbSSR **17**: 73; id. 1966, Spisok rast. Gerb. fl. SSSR **91**: N 4546. —*S. coerulea* E. Wolf, 1903, Trudy SPb. bot. sada **21**: 157, cum fig. (non Smith 1812); Nazarov, 1936, Fl. SSSR **5**: 159; Drobov, 1953, Fl. Uzb. **2**: 38. — Non *S. coerulea* auct.: Polyakov, 1960, Fl. Kazakhst. **3**: 22. —*S. egberti-wolfii* Toepffer, 1916, Öst. bot. Z. **66**: 402.

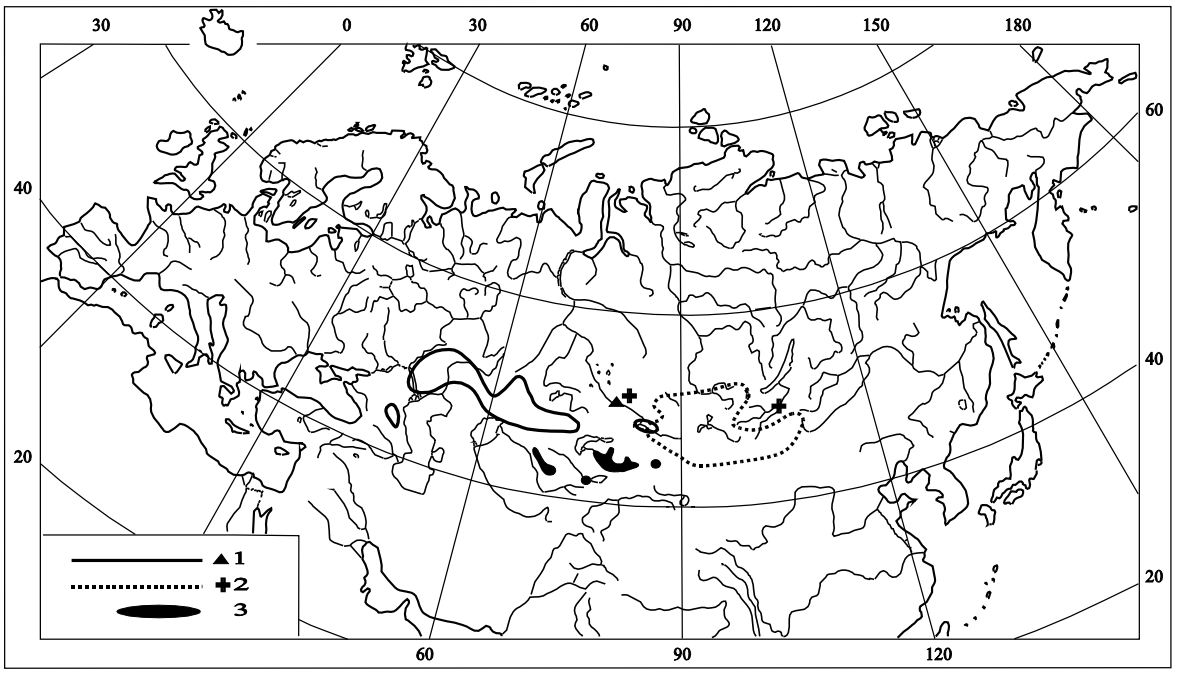

Fig. 67. Distributional areas of *Salix caspica* Pall. (*1*), *S. ledebourana* Trautv. (*2*), and *S. michelsonii* Goerz ex Nas. (*3*)

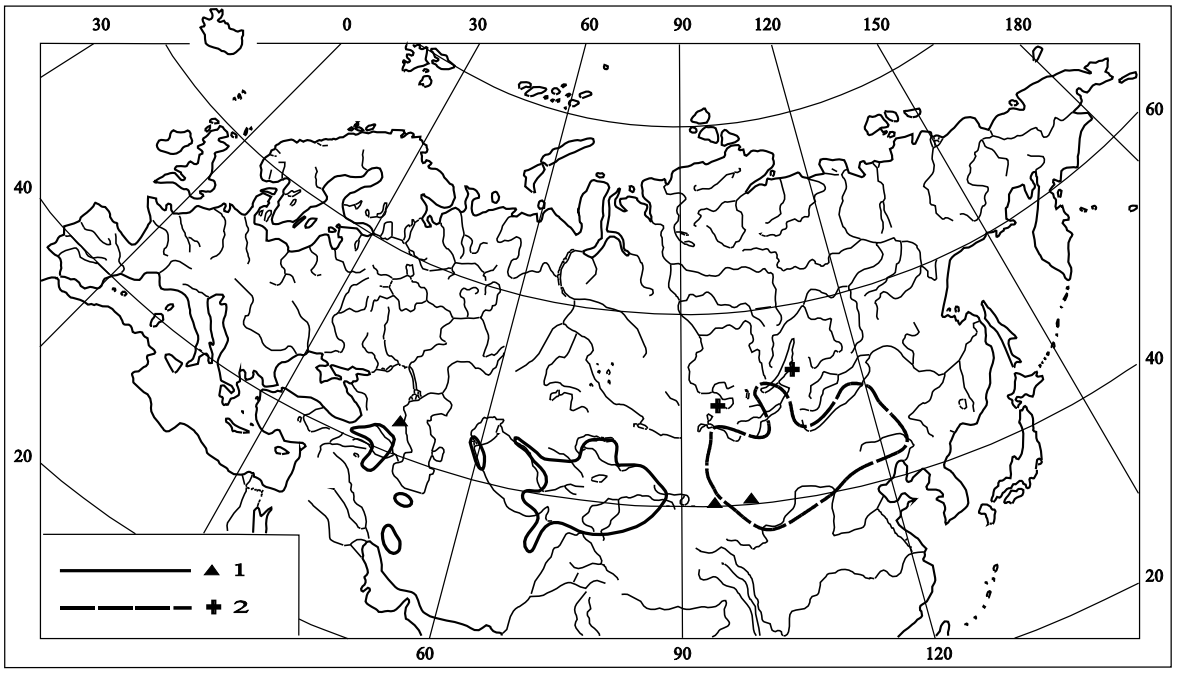

Fig. 68. Distributional areas of *Salix wilhelmsiana* M. B. (*1*) and *S. microstachya* Turcz. ex Trautv. (*2*)

T y p u s: "Bords du Zerafchane près de Dardar, 17.VI 1881 Capus N 1200; Iskander-koul 7.VII id N 1201" (P!; N 1201 etiam LE!).

HABIT: A small tree with a wide crown to 6–8 m tall or a wide, spreading, dense shrub.

HABITATS: Banks of rivers and streams; *sai* and irrigation ditches. The elevation range is from nearly the lowland to 3,400 m.

DISTRIBUTION: The Zeravshan Basin (along the Zeravshan from Matcha to Samarkand); the Gissar(-skiy) Range (seldom, reaching the border with Uzbekistan in the west); the Vaksh(-skiy) Range; the Darvaz(-skiy) Range (reaching Kulyab in the west); the Western Pamirs (in the east reaching Lake Sarezskoye, the Gunt River at the confluence with the Tokuzbulak, and the Upper Pyandzh). In the Hindu Kush, it is found on the territory of Afghanistan as well as northwestern Pakistan. (Fig. 66.) *236*

131. **S. michelsonii** Goerz ex Nasarov, 1936, Fl. SSSR **5**: 711; Skvortsov, 1962, Bot. mat. Gerb. In-ta bot. AN UzbSSR **17**: 71; id. 1966, Spisok rast. Gerb. fl. SSSR **91**: N 4543. —*S. caspica* var. *michelsonii* Poljakov, 1963, Fl. Kazakhst. **3**: 21.

T y p u s: "Dsharkent (nunc Panfilov), limen Dshijdelik 2.VIII 1910 A. Michelson, N 2494" (LE!).

HABIT: A tall shrub, its branches spreading in different directions.

HABITATS: *Tugai* along rivers (mostly on the sand and fine pebbles) on the plain or at low elevations in the mountains (not higher than 1,400–1,500 m).

DISTRIBUTION: The Karatau from Turkestan District to Dzhambul (sparsely); Buam(-skoye) Gorge (the Chu River); the Ili Basin, particularly, the Ili River upstream of Bakanas and its tributaries, such as the Kunges, Charyn, and Chilik (much more frequently). North and east of that territory, along the Aksu and Borotala rivers at the northern and southern foothills of the Dzungarskiy Alatau, the species is distributed more sparsely. In Chinese Dzungaria, it has been found near Manas. (Fig. 67.)

132. **S. caspica** Pall. 1788, Fl. Ross. **1**, 2: 74; Trautv. 1876, Salicetum: 27; Ledeb. 1850, Fl. Ross. **3**, 2: 604; Wolf, 1909, Trudy SPb. bot. sada **28**, 3: 405; id. 1930, Fl. Yu.-V. **4**: 61; Nazarov, 1936, Fl. SSSR **5**: 157 (p. p.: excl. syn. *S. ledebourana* Trautv.); Grossheim, 1945, Fl. Kavk. **3**: 23 (p. p.: excl. pl. e reg. Colch. et Iran); Ivanov, 1949, Opred. der. i kustarn. Zap. Kazakhst.: 31; Polyakov, 1960, Fl. Kazakhst. **3**: 20 (p. p.: excl. var. *michelsonii*); Sergiyevskaya, 1961, Fl. Zap. Sib. **12**: 3221; Rech. f. 1964, Fl. Eur. **1**: 53.

T y p u s: "In arenis inter australem Volgam et Rhymnum… itamque ad Sarpa et Kuma". In St. Petersburg, there is a sample labeled "Ryn-peski. Pallas" ("The Ryn Sands. Pallas") (!), and obviously there is a good reason to consider it as the holotype.

HABIT: A shrub or small tree (to 4–5 m tall) in favorable conditions.

HABITATS: Hillocky sand in steppes and semi-deserts.

DISTRIBUTION: The eastern part of the Northern Caucasus; the Volga-Ural Sands; the middle reaches of the Ural (occasionally), Yeruslan River, and Buzulukskiy Bor; sandy territories of Northern Kazakhstan. It appears to be distributed across all of sand areas that are large enough, however, according to the data available so far, rather sparsely and discontinuously. The southern area limit is found on the northern coast of the Aral Sea, in northern Betpak-dala, and near Lake Balkhash; the northernmost point is near Kushmurun; the easternmost one is at Zaysan(-skaya) Depression. (Fig. 67.)

NOTE. The species has been frequently confused with S. *vinogradovii* ("*S. purpurea*" auct.), both in the literature and herbaria. Particularly, N. Pavlov (1935: 29) and P. Polyakov (1960: 20) assigned a considerable number of *S. vinogradovii* samples to *S. caspica*. V. Ivanov (1949) succeeded much more in the delimitation of these species. He articulated very well the major ecological difference between the species, that is, the confinement of *S. vinogradovii* to river banks and *S. caspica* to hillocky sand areas. However, another statement made by V. Ivanov as well as preceding authors about "an extraordinary ability" of *S. caspica* to tolerate high soil salinity appears to be doubtful. As far as one can judge relying on the range of known habitats, the one exhibiting more salinization tolerance is *S. vinogradovii* rather than *S. caspica*. *S. vinogradovii* has been frequently found amidst subsaline meadows on soils of considerable salinity.

133. **S. ledebourana** Trautv. 1836, Salicetum: 25 (nom. nov. pro *S. pallida* Ledeb. non Salisb. 1796 nec H. B. K.); Ledeb. 1850, Fl. Ross. **3**, 2: 603; Turcz. 1854, Fl. Baic.-Dah. **2**, 2: 337; Wolf, 1903, Trudy SPb. bot. sada **21**: 150; Krylov, 1930, Fl. Zap. Sib.
237 **4**: 739 (p. p.?); Sergiyevskaya, 1961, Fl. Zap. Sib. **12**: 3221; Koropachinskiy, Skvortsova, 1966, Der. i kustarn. Tuvy: 86. —*S. pallida* Ledeb. 1833, Fl. Alt. **4**: 261; id. 1834, Icon. **5**: 16 et tab. 454 (non *S. pallida* Salisb. 1796, Prodr. Allert.: 394). —*S. caspica* auct. (quoad pl. altaicas, sajanens. et mongolicas) non Pall.: Nazarov, 1936, Fl. SSSR **5**: 157; Sobolevskaya, 1953, Konsp. fl. Tuvy: 65; Grubov, 1955, Konsp. fl. Mong.: 99.

T y p u s: "In insulis fl. Tschuja —Bunge" (LE!).

HABIT: A medium-sized or tall shrub (to 4–5 m), its branches spreading.

HABITATS: River banks, valley meadows, sometimes considerably subsaline.

DISTRIBUTION: The Saur Piedmont; valley steppes in the Altai (particularly common in Chuyskaya Steppe), southern and central Tuva, and the major part of Mongolia (reaching the Upper Kerulen in the east). The only places within the Russian territory east of Tuva where the species is found are the Oka River in the Eastern Sayans and the vicinity of Kyakhta. M. Nazarov listed this species in his "Flora of Transbaykalia" (3: 222) for the basins of the Barguzin and Uda in Buryatia and the Nercha Basin in Dahuria, yet this is not supported by any collected material.

The species ascends to 1,700 m in the Altai; to 2,200 m, in southern Tuva; in Mongolia, it has been encountered even higher than that. (Fig. 67.)

Sect. 26. *Cheilophilae*

Hao, 1936, Syn. Chin. *Salix*: 102, emend. A. Skv.

T y p u s: *Salix cheilophila* Schneid. (sec. Hao, l. c.).

Medium-sized or rather tall shrubs, occasionally small trees. Shoots slender, multifoliate, young ones mostly covered with silky, appressed trichomes. Leaves on very short petioles (1–3 mm), small (10–60 × 3–8 mm), dirty green, more or less covered with silky, appressed pubescence. Catkins serotinous, short (15–50 mm long), cylindrical, their rachises densely white pubescent, bracts obtuse, pale, persistent. Nectary solitary, trapeziform or narrowly triangular, mostly colored. Stamen filaments entirely connate, glabrous. Capsules small, sessile, styles and stigmas short.

This is a small Asiatic group. Besides the two species described here, there are two Chinese ones: *S. cheilophila* Schneid. distributed in the central, arid regions of China and *S. variegata* Franch. from South China.

Key to Species

1. Shrub, its branches vigorously spreading in different directions at nearly right angles, shoots arching. Leaves 3–4 (–5) mm broad. Ovaries clothed with dense, compact, silky pubescence . . . . . 134. **S. wilhelmsiana**
— Shrub not exhibiting any unusual branching habit or small tree. Leaves 4–6 mm broad. Ovaries glabrous . . . . . 135. **S. microstachya**

134. **S. wilhelmsiana** Marschall a. Bieberstein, 1819, Fl. Taur.-Cauc. **3**: 627; Trautv. 1836, Salicetum: 21 et tab. 3; Wolf, 1903, Trudy SPb. bot. sada **21**: 153; Görz, 1934, Feddes Repert. **36**: 28, 29; Nazarov, 1936, Fl. SSSR **5**: 164; Grossheim, 1945, Fl. Kavk. **3**: 23; Drobov, 1953, Fl. Uzb. **2**: 43; Polyakov, 1960, Fl. Kazakhst. **3**: 23; Skvortsov, 1962, Bot. mat. Gerb. Bot. in-ta AN UzbSSR **17**: 73; id. 1966, Trudy Bot. in-ta AN ArmSSR **15**: 135; id. 1966, Spisok rast. Gerb. fl. SSSR **91**: N 4547. —*S. angustifolia* Willd. 1806, Sp. pl. **4**, 2: 699; M. B. 1808, Fl. Taur.-Cauc. **2**: 414; Ledeb. 1850, Fl. Ross. **3**, 2: 604 (p. p.); Boiss. 1879, Fl. Or. **4**: 1184. —Non *S. angustifolia* Wulfen, 1789, in Jacquin, Collect. bot. **3**: 48. —*S. dracunculifolia* Boiss. 1846, Diagn. **7**: 99. —*S. trautvetteriana* Rgl. 1880, Acta Horti Petropol. **6**, 2: 465. *238*

T y p u s: "Iberia —Wilhelms" (LE!).

HABIT: A shrub with vigorously spreading branches, to 4–5 m tall, greatly resembling the sea buckthorn (*Hippophaë rhamnoides*) and often growing together with it.

HABITATS: Sandy or clayey-loamy-sandy river deposits, from lowland to alpine elevations.

DISTRIBUTION. The species area consists of two isolated parts: Caucasian-Iranian and Middle Asian. The Caucasian-Iranian part includes the eastern arid regions of the Caucasus (where the species is rather sparse): the Kura Valley from the Lower Aragva to Lower Iori and Gäncä (formerly Kirovabad); Nahichevan Republic and Armenia: the Debed River and Mount Bogutli (some solitary findings); eastern Turkey: Olti, Bayburt on the Coroch, the Zab River in Hakkâ ri Province (rarely); the arid northwestern part of Iranian Azerbaijan; the western Elburz and Zagros (occasionally). The species is missing from the eastern half of Iran and all of Turkmenia. It is common in northeastern Afghanistan (the Hindu Kush). Not infrequently, it is found in Kashgaria, in the mountains as well as lowland (along the Tarim River); some solitary findings have been reported from the Karakorum (Baltistan). Within the territory of the Middle Asia, it is very common at the lower reaches and estuary of the Amu Darya and in the Sultanuizdag Mountains; it is also encountered along the Syr Darya from Yany-Kurgan to Dzhusaly and occasionally in the Karatau. East of the Kafirnigan River, Shakhrisyabz, Samarkand, Tashkent, and Chimkent, the distributional area becomes nearly continuous, reaching the Lepsa River in the east and the Lower Talas and Lake Balkhash in the north. Along the Ili and Kunges rivers, the species extends its area to Chinese Dzungaria.

In the Caucasus, it does not ascend higher than 1,500 m; in the Tien Shan, it goes up to 2,200 m; in the Pamirs, to 3,500 m; in the Karakorum, even to 3,600 m. (Fig. 68.)

NOTE. In Kashgaria, within the Upper Ili Basin including its Kazakh part, there occur some specimens resembling *S. microstachya* either in their glabrous capsules or tree-like habit. Such specimens, for example, have been found in Sarytogoy on the Charyn (see the note to *S. microstachya* description).

239 135. **S**. **microstachya** Turcz. ex Trautv. 1836, Salicetum: 22 et tab. 4; Turcz. 1854, Fl. Baic.-Dah. **2**, 2: 377; Wolf, 1903, Trudy SPb. bot. sada **21**: 156; Nazarov, 1936, Fl. SSSR **5**: 136; id. 1937, Fl. Zabayk. **3**: 223; Hao, 1936, Syn. Chin. *Salix*: 103; Liou Tchen ngo, 1955, Ill. Fl. Tr. Shr. Northeast China: 178; Grubov, 1955, Konsp. fl. Mong.: 101; Popov, 1959, Fl. Sredn. Sib. **2**: 797; Koropachinskiy, Skvortsova, 1966, Der. i kustarn. Tuvy: 87. — *S. angustifolia* ß *leiocarpa* Ledeb. 1850, Fl. Ross. **3**, 2: 604. — *S. stenophylla* Sukacz. 1931, Trudy issled. po lesn. op. delu **10**: 13, 20 cum fig. — *S. bordensis* Nakai, 1936, Rep. First Sci. Exped. Manch. 4 sect. **4**: 74.

T y p u s: "In sabulosis ad fl. Irkut. —Turczaninow" (LE!).

HABIT: A shrub or small tree.

HABITATS: Sandy river banks; occasionally, sandy areas apart from any rivers or streams.

DISTRIBUTION: Within the Russian territory, only southern Tuva, Prebaykalia (around Irkutsk, in Tunkinskaya Valley, along the Barguzin, in the Selenga Basin upstream of Ulan Ude), and southern Dahuria. The area includes Mongolia; the eastern and southeastern part of Northeast China; Jehol; Ordos; Gansu Province; ?Kashgaria (see the note).

In Russia, the species hardly ever occurs in the mountains (it is known to ascend to 800 m); in Gansu Province, to 2,500 m. (Fig. 68.)

NOTE. Delimitation of *S. wilhelmsiana* and *S. microstachya* has constituted a problem since the time of M. Nazarov (1936). Indeed, one can find specimens very much resembling *S. microstachya* even within the area of *S. wilhelmsiana* continuous distribution (on the Charyn River). Material from Sinkiang is even more challenging. *S. wilhelmsiana* appears to reach the Nan Shan; on the other hand, *S. microstachya* appears to be distributed all the way to Kashgar. A number of samples cannot be attributed to either of the two species with confidence. Hence, it is quite possible that we will have to consider *S. microstachya* in the rank of subspecies. However, to make a reasonable decision, we need more Chinese material. Within the territory treated in this book, the areas of the two species are far from each other, so that their delimitation is not a real problem.