SUBGENUS *CHAMAETIA*

(Dum.) Nasarov, 1936, Fl. SSSR **5**: 31.
T y p u s: *Salix reticulata* L.

Low or procumbent, very rarely medium-sized shrubs, their stems sometimes completely submerged in substrate. *Arctica*-type of bud size gradation along shoots. Petioles usually channeled above, eglandular. Leaves moderate-sized to small, relatively *116*
broad, often round. Veins originating mostly in lower half of leaf blades, highly curved, arching. Number of leaves on shoot per growing season usually limited. Catkins serotinous, terminating floriferous shoots, which are often nearly as large and foliated as vegetative ones. Bracts persistent. Nectaries rather large, not infrequently lobed, sometimes two or more. Stamens two, distinct.

Sect. 7. *Chamaetia*

Dum. 1825, Bijdr. Natuurk. Wetensch. **1**, 1: 156 (p. p.)
T y p u s: *Salix reticulata* L.

Low or procumbent shrubs. Floriferous and vegetative buds look similar: obtuse, broadly elliptic or obovoid. *Arctica*-type of bud size gradation along shoots. Leaves and buds on floriferous shoots absolutely alike those on vegetative shoots. Floriferous shoots normally growing thicker and becoming woody up to superior leaves, their catkins detach above uppermost leaf scar. Cataphylls lacking; inferior leaves usually of normal shape, different only in their size. Stipules rudimentary. Leaf blades broadly elliptic or round, entire or obscurely crenate, contrastingly bicolorous, their reticulation distinctly prominent beneath. Bracts not blackening. Nectaries two or more in male and female flowers. Capsules ovoid, small; styles obsolete, nearly none; stigmas short, two-lobed, laterally recurved.

This is a section of arctic-alpine distribution, consisting of only four species (three in the Old World and one, *S. nivalis* Hook., in North America).

Key to Species

1. Leaves small (5–15 mm long), flat above; dry foliage of previous seasons persistent on branches. Catkins few-flowered, their rachises and bracts puberulous or glabrous. Stamen filaments glabrous. Capsule stipes distinct, glabrous . . . . . 14. **S. erythrocarpa**
— Leaves large (mostly more than 20 mm long), distinctly rugose above due to impressed reticulation. Catkins dense, their rachises and bracts more or less densely puberulent. Stamen filaments pubescent. Capsules pubescent, sessile or subsessile 2
2. A shrub up to 30–70 cm tall, its branches upright. Annotinous and biennial shoots yellowish (not red). Petioles 5–12 times shorter than leaf blades. Mature leaves mostly long setulose-sericeous beneath. Catkin stalks (measured from the uppermost leaf scar) considerably shorter than catkins . . . . . 13. **S. vestita**

— Stems procumbent, rooting. Annotinous and biennial shoots, petioles, and catkin stalks mostly reddish. Petiole length = $^{1}/_{4}$–$^{2}/_{3}$ of leaf blade length. Mature leaves mostly glabrous. Catkin stalks approximately as long as catkins or even longer . . . . . 12. **S. reticulata**

12. **S. reticulata** L. 1753, Sp. pl.: 1018; Ledeb. 1850, Fl. Ross. **3**, 2: 623 (p. p.: excl. ß *villosa*); Wimmer, 1866, Salic. Eur.: 129; Krylov, 1930, Fl. Zap. Sib. **4**: 773 (p. p.: excl. var. *villosa*); Floderus, 1931, Salic. Fennoscand.: 19; Perfilyev, 1936, Fl. Sev. kr. **2–3**: 26; Nazarov, 1936, Fl. SSSR **5**: 32; Buser, 1940, Ber. Schweiz. bot. Ges. **50**: 782; Vicioso, 1951, Salic. Españ: 59; Shlyakov, 1956, Fl. Murm. **3**: 58; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 72; id. 1964, Fl. Eur. **1**: 46; Raup, 1959, Contrib. Gray Herb. **185**: 43. —*S. orbicularis* Anderss. 1868, in DC. Prodr. **16**, 2: 300; Rydberg, 1899, Bull. N. Y. Bot. Gard. **1**: 259; Nazarov, 1936, op. cit. **5**: 33.

117 T y p u s: "In alpibus Lapponiae, Helvetiae. Fl. Lapp. N 359 et tab. 8 fig. L, tab. 7 fig. 1–2; Fl. Suec. N 801; Hall. Helv. N 154".

HABIT: A procumbent dwarf shrub with rooting branches.

HABITATS: Rocks, stone-fields, scarps, and glacial deposits in the alpine and partially subalpine zones as well as tundras, particularly, stony and dry short-grass ones. In the forest-tundra belt, it occasionally grows in stony well-drained areas covered with open woods. Usually, it prefers conditions of moderate moisture, but also occurs near tundra and alpine streams. It avoids stagnant water as well as acidic and oligotrophic substrate, being restricted to basic bedrock.

DISTRIBUTION: The mountains of Scotland (600–1,100 m), Alps (across the entire mountain system at 1,800–3,200 m), Tatras (900–2,300 m), Romanian Carpathians (rare in the east and common in the south), mountains of Albania and Macedonia (sparsely scattered), Rila and Pirin in Bulgaria (higher than 2,500 m), and Pyrenees. The Spitsbergen and Bear Island, the mountains of Scandinavia, Kola Peninsula (the arctic coast and inland alpine tundras), northwestern Karelia and the adjacent part of Finland (the Myansielkia Ridge), gypsic rocks and limestones of the Soyana, Pinega, Sotka, and Pizhma rivers, the northern Kanin Peninsula, Kolguyev Island, Malozemelskaya and Bolshezemelskaya tundras, the Novaya Zemlya, Vaygach, the Polar and Prepolar Urals, Northern Urals (sporadically, down to Konzhakovskiy Kamen). It is rather sparse within the territory between the Urals and Kotuy River. Starting from the Olenek Basin, it becomes more common again and is widespread in the appropriate habitats across the Northeast from the Verkhoyanskiy Range to Wrangel and Ratmanov islands, Kamchatka, and the Commander (Komandorskiye) Islands. It is not infrequent in the Eastern Sayans (at 1,650–2,450 m), but rather sparse in the Western Sayans, Altai, Tuva (Tannu-Ola), and the Khangai. It is also sparsely distributed in the Barguzinskiy Range, on the Vitim-Olekma High Plateau, along the Upper Aldan, and around Ayan. (Fig. 15.)

NOTE. The report by A. Tolmachev (1956) that *S. reticulata* was distributed on the barren heights of the Eastern Sakhalin Range appears to be doubtful. I could not find any evidence of this species' presence in the Ukrainian Carpathians (Bradis 1965; Nazarov et al. 1952).

S. reticulata is rather common in American Arctic.

13. **S. vestita** Pursh, 1814, Fl. Amer. Sept. **2**: 610; Hook. 1840, Fl. Bor.-Amer. **2**: 152; Anderss. 1868, in DC. Prodr. **16**, 2: 300; Rydberg, 1899, Bull. N. Y. Bot. Gard. **1**:

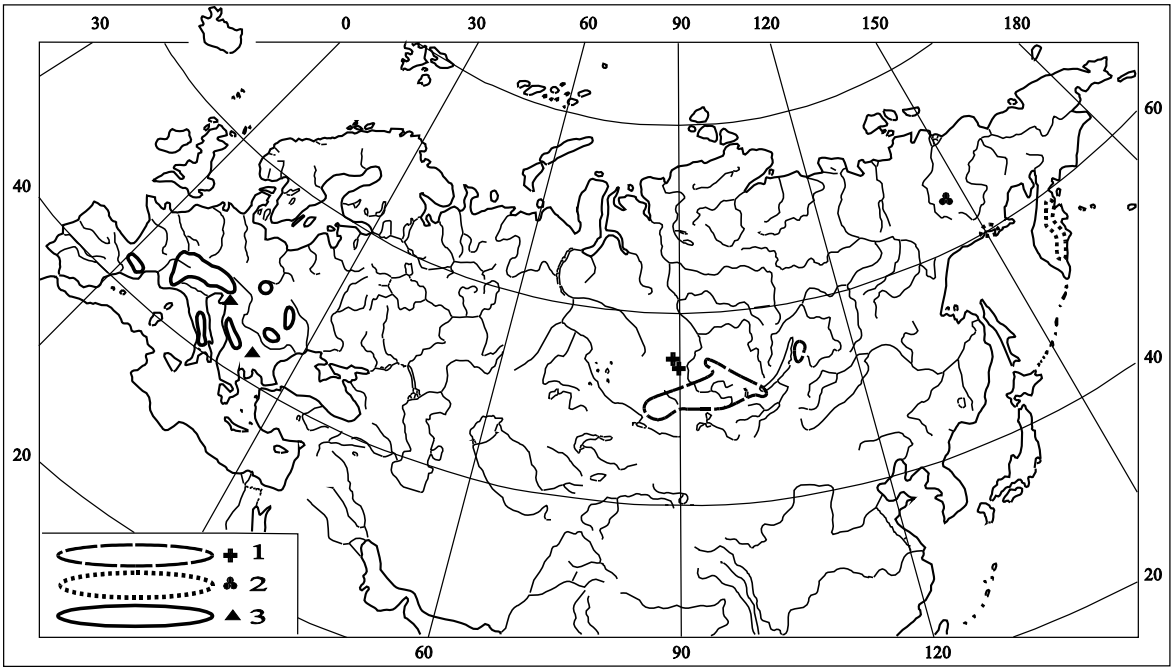

Fig. 19. Distributional areas of *Salix vestita* Pursh (*1*), *S. erythrocarpa* Kom. (*2*), and *S. retusa* L. (*3*)

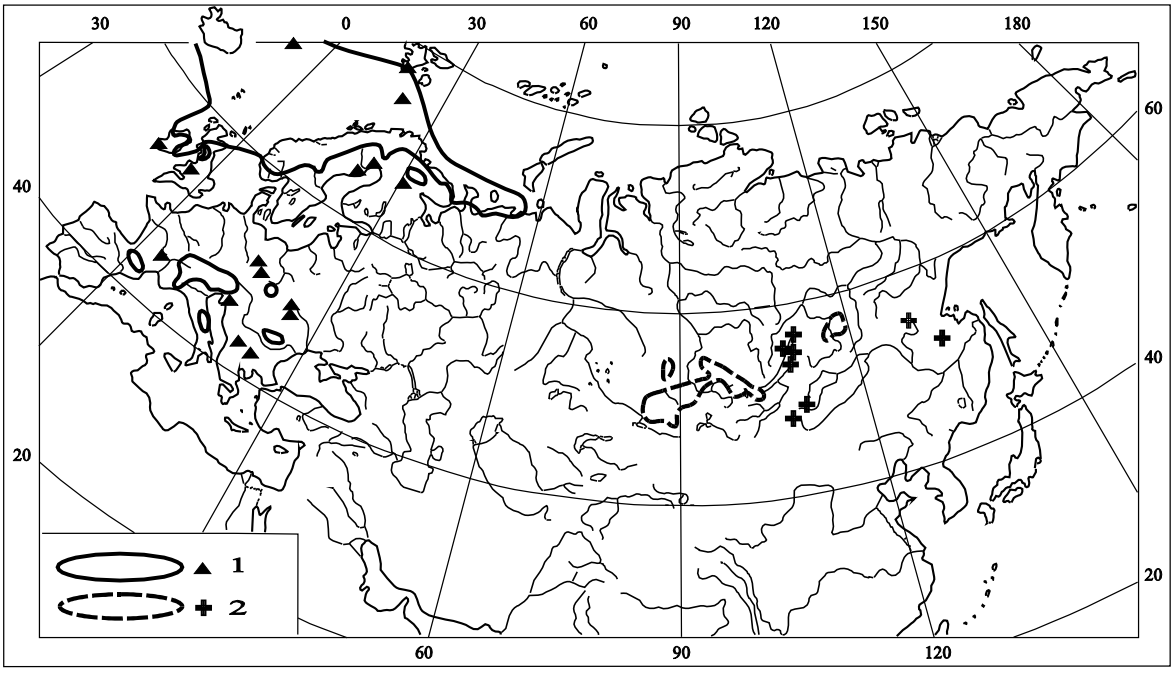

Fig. 20. Distributional areas of *Salix herbacea* L. (*1*) and *S. turczaninowii* Laksch. (*2*)

259; Schneider, 1919, Bot. Gaz. **67**: 45; Nazarov, 1936, Fl. SSSR **5**: 34; id. 1937, Fl. Zabayk. **3**: 220; Raup, 1959, Contrib. Gray Herb. **185**: 44; Cherepnin, 1961, Fl. yuzhn. ch. Krasnoyar. kr. **3**: 12; Sergiyevskaya, 1961, Fl. Zap. Sib. **12**: 3231; Malyshev, 1965, Fl. Vost. Sayana: 103. —*S. reticulata* ß *villosa* Trautv. 1833, in Ledeb. Fl. Alt. **4**: 291; Ledeb. 1850, Fl. Ross. **3**, 2: 623; Turcz. 1854, Fl. Baic.-Dah. **2**: 395; Krylov, 1930, Fl. Zap. Sib. **4**: 774; Popov, 1959, Fl. Sredn. Sib. **2**: 808.

T y p u s: "Labrador. Herb. Lambert et Banks" (n. v.).

HABIT: A low shrub with short, stout branches.

HABITATS: Rocks, taluses, runoff hollows, and cirques within the alpine and subalpine zones (occasionally descending to lower elevations when growing on rocks). The species needs fair moisture along with good drainage. It is likely to form continuous shrublands, either pure or in mixture with *S. hastata*, *S. recurvigemmis*, or *S. lanata*. The thickets, however, are not very extensive. *S. vestita* is confined to basic bedrock, particularly, limestone.

DISTRIBUTION: The Altai, Western and Eastern Sayans, Khamar-Daban, nearly all of the ranges in Tuva, the Haan Höhey, Kuznetskiy Alatau (Saraly Basin), Barguzinskiy Range and the adjacent part of the Vitim High Plateau. According to L. Malyshev (1965), its altitudinal range in the Eastern Sayans is 1,700–2,350 m. (Fig. 19.)

There are also two disjunct areas in North America: one, in the Rocky Mountains, another one, around Hudson Bay, on the Labrador Peninsula, and Newfoundland. No distinctions between American and Siberian plants have been detected.

118 14. **S. erythrocarpa** Kom. 1914, Feddes Repert. **13**: 165; Floderus, 1926, Ark. bot. **20A**, 6: 12; Hultén, 1928, Fl. Kamtch. **2**: 11; Komarov, 1929, Fl. Kamch. **2**: 29; Nazarov, 1936, Fl. SSSR **5**: 55. —*S. rubricapsula* Toepffer, 1916, Öst. bot. Z. **66**: 402.

T y p u s: "Kamtschatka: circa lacus Natschika et Kronotzkoje et ad font. fl. Kamtschatka aa. 1908–09 leg. Komarov" (LE!).

HABITATS: Rocky and stony outcrops within the alpine zone; mountain tundras. So far, it is hardly possible to present more data on this species' ecology, since both of its major collectors, V. Komarov and P. Novograblenov, used to omit habitat information on herbarium labels.

DISTRIBUTION: the Kamchatkan barren heights, vicinity of Magadan, and Ulakhan-Chastay Range (Moma Basin). V. Vasilyev (1957: 84) mistakenly considered it to be found on the Commander Islands. (Fig. 19.)[1]

Sect. 8. *Retusae*

Kerner, 1860, N.-Öst. Weid.: 195.

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

Small, prostrate, procumbent, cushion-like, or submerged in substrate dwarf shrubs. Floriferous and vegetative buds look similar, broadly elliptic or ovoid; *arctica*-type of bud size gradation along shoots. Stipules reduced. Leaves small, obtuse, round to oblanceolate,

[1] Due to scarcity of available material, the circumscription of *S. erythrocarpa* was admitted too broad in 1968 and included specimens that were later placed to other species: *S. khokhriakovii* A. Skv., *S. darpirensis* Jurtz. et Khokhr., and *S. magadanensis* Nedoluzhko. Thus *S. erythrocarpa* appears to be restricted to Kamchatka only (authors's note to the English edition).

with few veins. Floriferous shoots about as leafy as vegetative ones. Bracts pale to black. Stamen filaments glabrous. Capsules lanceolate or narrowly lanceolate, rather gradually attenuating into distinct styles. Stigmas two-lobed, not large, recurved.

This arctic-alpine, mostly Eurasiatic section consists of some 8–10 species. It might be heterogeneous. Its relations to other sections are not yet clear; the most probable connection is that with *Glaucae*, connection with *Myrtosalix* is less obvious.

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Key to Species

1. True stolons submerged in substrate (either moss or soil): pale, with small scales instead of leaves, gradually becoming woody and rooting on second or third growing season. Older stolons keep growing in substrate (unless they are exposed due to erosion). Epiterranean shoots uniformly short, poorly foliated, ones with elongated internodes lacking 2
— Plants not producing leafless stolons in substrate. Old stems and branches rooting only when reaching age of 5–10 years. Epiterranean vegetative shoots of two kinds found in normally developed, not too suppressed specimens: short, poorly foliated along with elongated, virgate, multifoliate ones 5
2. Leaves entire or with sparse denticles (2–5 per 1 cm of leaf margin length) mostly on lower half of leaf blade. Bracts black, black-purple, or blackish-brown 3
— Leaf margins with dense denticles (6–10 per 1 cm of leaf margin length) either regularly scattered along margins or more dense on upper half of leaf blade. Bracts yellowish to light brown. Ovaries glabrous 4
3. Leaves 12–40 mm long, 7–25 mm broad, dull, glaucous beneath. Catkins mostly cylindrical, 10–40 mm long when ripening. Dry anthers about 0.4 mm long. Styles 0.2–0.5 mm long . . . . . 18. **S. nasarovii**
— Leaves 7–20 mm long, 6–18 mm broad, rather concolorous, green, lustrous. Catkins mostly globular or ovate, 8–20 mm long when ripening. Dry anthers 0.5–0.6 mm long. Styles 0.3–0.6 mm long . . . . . 17. **S. polaris**
4. Petioles 2–15 mm long, leaves 10–50 mm long, 7–30 mm broad, mostly obovate, cuneate at base. Catkins cylindrical. Styles obsolete (0.1–0.2 mm) . . . . . 16. **S. turczaninowii**
— Petioles 2–7 mm long, leaves 7–20 mm long, 5–20 mm broad, round or broadly elliptic, abruptly narrowing or subcordate at base. Catkins globular or broadly elliptic. Styles 0.3–0.6 mm long . . . . . 15. **S. herbacea**
5. Leaves round or broadly elliptic, abruptly narrowing or cordate at base. Nectaries 2–4 times as long as capsule stipes. Capsule stipes very short. Anthers 0.3–0.4 mm long . . . . . 19. **S. nummularia**
— Leaves obovate or oblanceolate, gradually cuneate at base. Nectaries not larger than capsule stipes 6
6. Catkins of 3–6 flowers, hidden in foliage. Stamen filaments 1.5–2.5 mm long. Anthers 0.4–0.5 mm long, yellow. Capsules ovoid, short (2.5–3.5 mm long) . . . . . 21. **S. serpyllifolia**
— Catkins with more flowers, mostly broadly elliptic or cylindrical. Stamen filaments 3–5 mm long. Anthers 0.5–0.7 mm long, mostly purple before dehiscence. Capsules lanceolate-conical, 4–7 mm long . . . . . 20. **S. retusa**

15. **S. herbacea** L. 1753, Sp. pl.: 1018; Ledeb. 1850, Fl. Ross. **3**, 2: 624 (p. p. excl. pl. Sibir.); Wimmer, 1866, Salic. Eur.: 125; Seemen, 1908, in Aschers. et Graebn. Synopsis **4**: 64; Floderus, 1931, Salic. Fennosc.: 21; Nazarov, 1936, Fl. SSSR **5**: 36; Perfilyev, 1936, Fl. Sev. kr. **2–3**: 25; Buser, 1940, Ber. Schweiz. bot. Ges. **50**: 757;
120 Vicioso, 1951, Salic. Españ: 57; Nazarov et al. 1952, Fl. URSR **4**: 30; Shlyakov, 1956, Fl. Murm. **3**: 59; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 74; id. 1964, Fl. Eur. **1**: 46.

T y p u s: "In alpibus Lapponiae, Helvetiae. Fl. Lapp. N 355. et tab. 8 fig. N, tab. 7 fig. 3, 4. Fl. Suec. N 800. Roy. Lugdbat.: 82; Hall. Helv.: 155".

HABITATS: Carpet-like alpine meadows, moss and short-grass tundra meadows, tussocky and hillocky tundras, rocks, stabilized moraines, taluses, clayey outcrops, banks of streams, and particularly places where the snow stays long during the summer. The species needs rather high moisture, especially air humidity, and good drainage. In the majority of locations, it is definitely restricted to siliceous (acidic) bedrock, however, occasionally it may as well grow on limestone.

DISTRIBUTION: Iceland (up to 1,000 m), the Faroe Islands, Jan Mayen Island, and Bear Island; the mountains of Ireland (250–900 m), Scotland (100–250 m), and Wales; the Pyrenees, French Massif Central (1,800 m), Apennines, Alps (up to 3,300 m), Sudetes, Tatras (1,500–2,600 m), Eastern and Southern Carpathians (1,700–2,500 m), Macedonia and western Bulgaria (2,300–2,600 m). It is widespread in the mountains of Scandinavia. The northern Kola Peninsula (close to the Barents Sea), the western Kola Peninsula (mountain tundras: Chuna-Tundra and Monche-Tundra), the Myansielkia Ridge; central and northern Kanin, Kolguyev, and Malozemelskaya Tundra. Multiple references for this species' locations in Bolshezemelskaya Tundra and the Polar Urals have turned out to be erroneous. The species is common in eastern American Arctic including Greenland. (Fig. 20.)

16. **S. turczaninowii** Lakschewitz, 1914, Spisok rast. Gerb. russk. fl. **8**, 50: N 2495; Krylov, Steinberg, 1918, Fl. Kansk. u.: 44; Krylov, 1930, Fl. Zap. Sib. **4**: 778; Nazarov, 1936, Fl. SSSR **5**: 37; id. 1937, Fl. Zabayk. **3**: 218; Grubov, 1955, Konsp. fl. Mong.: 102; Karavayev, 1958, Konsp. fl. Yak.: 80; Popov, 1959, Fl. Sredn. Sib. **2**: 808; Polyakov, 1960, Fl. Kazakhst. **3**: 37; Cherepnin, 1961, Fl. yuzhn. ch. Krasnoyar. kr. **3**: 12; Malyshev, 1965, Fl. Vost. Sayana: 104. —*S. liliputa* Nasarov, 1936, op. cit. **5**: 707, 37; id. 1937, op. cit. **3**: 218; Popov, 1959, op. cit. **2**: 809.

T y p u s: "Distr. Kansk, in alpinis ad fl. Kan super. 13. VII 1911. I. V. Kusnetzov. — Herb. Fl. Ross. N 2495" (LE!, MW! et alibi).

HABITATS: Rocks, taluses, moraines, moist slopes, moss-covered banks of small alpine streams, and cirques within the alpine and subalpine zones (1,300–2,600 m); also, mountain tundras, particularly, at places where the snow stays late during the summer. Presumably, it is associated with acidic bedrock.

DISTRIBUTION: The Altai, Kuznetskiy Alatau, Western and Eastern Sayans, Khamar-Daban, Barguzinskiy and Baykalskiy ranges, Vitim-Olekma High Plateau, Kentei, and Sokhondo; the Stanovoy and Dussye-Alin ranges and Upper Zeya Basin (isolated locations). (Fig. 20.)

17. **S. polaris** Whlnb. 1812, Fl. Lappon.: 261 et tab. 13, fig. 1; Ledeb. 1850, Fl. Ross. **3**, 2: 625; Wimmer, 1866, Salic. Eur.: 127; Krylov, 1930, Fl. Zap. Sib. **4**: 777; Floderus, 1931, Salic. Fennosc.: 30; Perfilyev, 1936, Fl. Sev. kr. **2–3**: 27; Nazarov, 1936, Fl. SSSR **5**: 40; id. 1937, Fl. Zabayk. **3**: 218; Shlyakov, 1956, Fl. Murm. **3**: 64; Raup, 1959, Contr. Gray Herb. **185**: 45; Rech. f. 1964, Fl. Eur. **1**: 46. — *S. pseudopolaris* Flod. 1926, Ark. bot. **20A**, 6: 8; Hultén, 1928, Fl. Kamtch. **2**: 18;

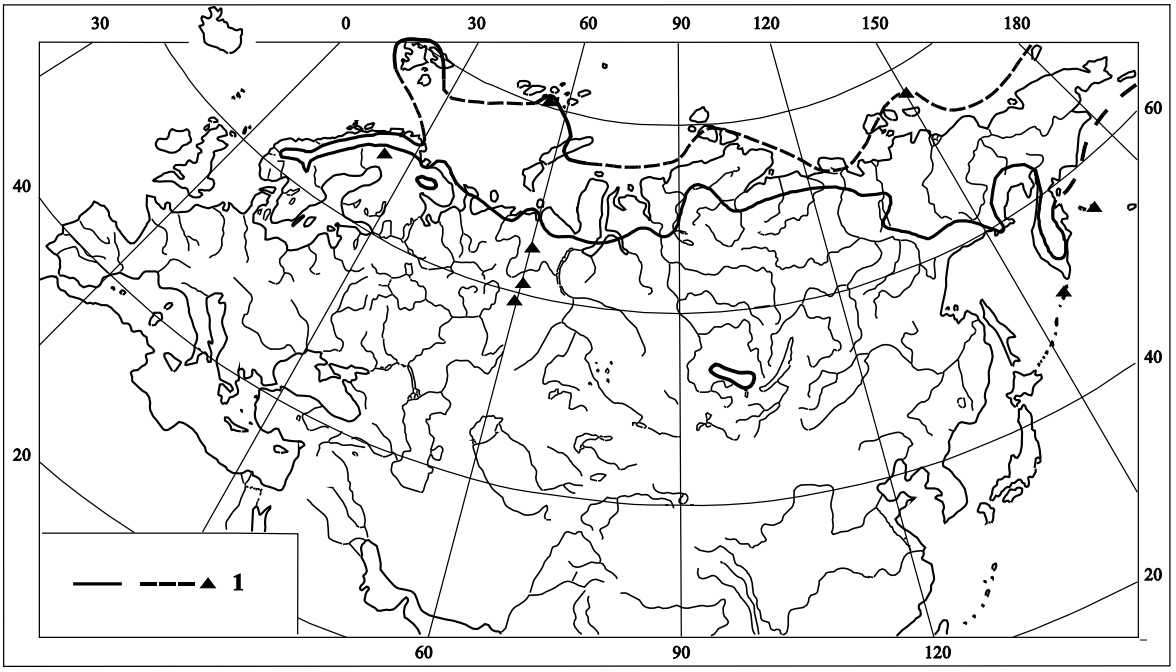

Fig. 21. Distributional area of *Salix polaris* Whlnb.

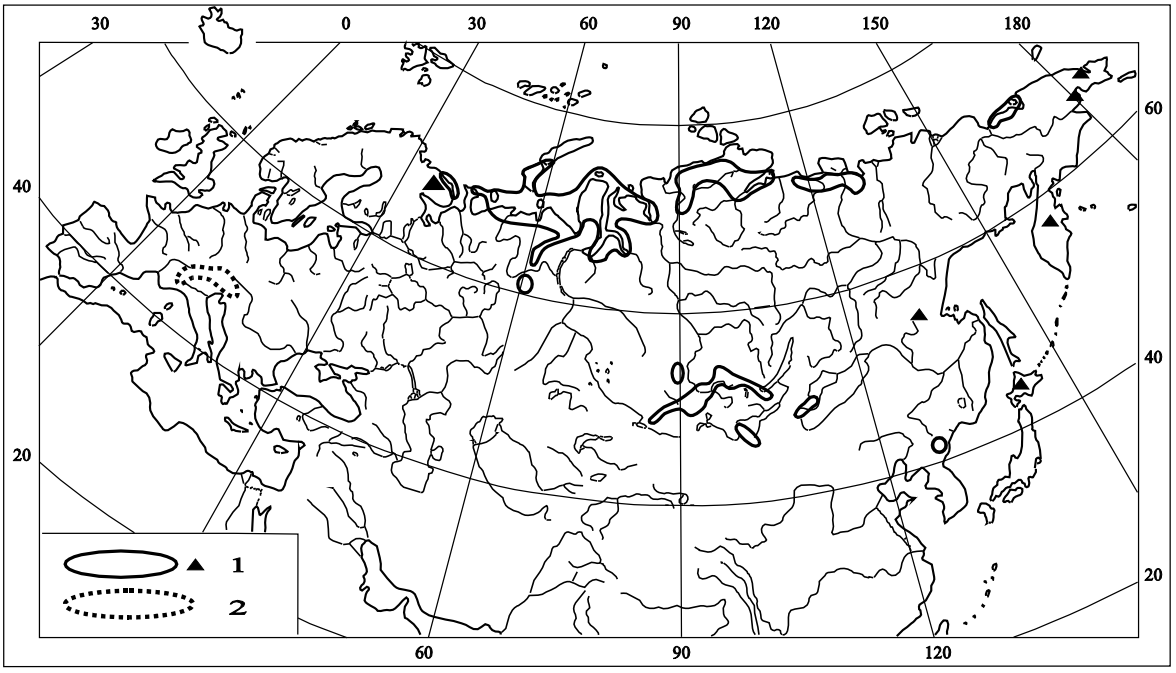

Fig. 22. Distributional areas of *Salix nummularia* Anderss. (*1*) and *S. serpyllifolia* Scop. (*2*)

Komarov, 1929, Fl. Kamch. **2**: 33; Porsild, 1951, Botany S.-E. Yukon: 139; id. 1955, Vasc. Pl. W. Canad. Arch.: 100; id. 1957, Ill. Fl. Canad. Arct. Arch.: 67; Hultén, 1960, Fl. Aleut. 2 ed.: 161; Wiggins, Thomas, 1962, Fl. Alask. Arct.: 148.

T y p u s: "Finmarkia orient. ad Rastakaisse; ad lacum Tornensem (Wahlenberg)" (n. v.).

122 HABITATS: Tundras with cryptogam vegetation; hillocky and spotty tundras; taluses, moraines, rocks, and outcrops; cirques and snowbanks. It tolerates much more dry climatic and habitat conditions as compared to *S. herbacea* showing its preference to basic bedrock and avoiding quartzite, especially in the western part of its range. It penetrates to extremely high latitudes in the Arctic, considerably farther than any other willow species.

DISTRIBUTION: The mountains of Scandinavia; inland mountains of the Kola Peninsula (the Khibins, Chuna-Tundra, and the tundras around Lovozero); the Spitsbergen; Franz Josef Land; northern Kanin; Kolguyev, the Novaya Zemlya, and Vaygach; Malozemelskaya and Bolshezemelskaya tundras, the Polar Urals; the entire territory of Siberian Arctic including the Severnaya Zemlya, Novosibirskiye, Bennett, and Wrangel islands; the barren heights of the Northeast and Kamchatka (including the southern Verkhoyanskiy Range, Magadan, and the islands Mednyy and Paramushir in the south). Sporadically, it also occurs in the Northern and Prepolar Urals and Eastern Sayans. It was listed for northeastern Karelia by M. Ramenskaya (1960); however, I never saw any material from there.

Altitudinal ranges: to 1,000 m in the Khibins and Polar Urals (the Shchuchya and Sob basins); to 860 m in the Verkhoyanskiy Range (at latitude 70° N); to 500–600 m near Korf Bay; 600–1,400 m on the Kamchatka Peninsula; 1,950–2,700 m in the Eastern Sayans. (Fig. 21.)

It is rather widespread in western American Arctic.

18. **S. nasarovii** A. Skv. 1956, Bull. MOIP **61**, 1: 76, cum fig.; Malyshev, 1965, Fl. Vost. Sayana: 105.

T y p u s: "Montes Sajanenses Orientales, jugum Tunkinski, prope pag. Arshan, in lapidosis reg. alpinae, 7.VIII 1936 leg. A. Korovkin" (MW).

HABITATS: Taluses, moraines, rocks, snowbank spots, etc. (similar to those of *S. turczaninowii*). However, it is associated with somewhat dryer conditions, more pronounced topography, and basic bedrock.

DISTRIBUTION: Tuva (Sangilen, rather sparsely), the Eastern Sayans (1,700–2,500 m), Barguzinskiy Range, and Stanovoye High Plateau. (Fig. 23.)

19. **S. nummularia** Anderss. 1868, in DC. Prodr. **16**, 2: 298; Krylov, 1930, Fl. Zap. Sib. **4**: 777; Nazarov, 1936, Fl. SSSR **5**: 38; id. 1937, Fl. Zabayk. **3**: 216; Floderus, 1941, Sv. bot. tidskr. **35**: 351; Popov, 1959, Fl. Sredn. Sib. **2**: 808; Sergiyevskaya, 1961, Fl. Zap. Sib. **12**: 3232. —*S. retusa* var. *rotundifolia* Trautv. 1847, in Middendorff, Reise Sibir. 1, **2**: 152; Ledeb. 1850, Fl. Ross. **3**, 2: 624. —*S. rotundifolia* auct. non Trautv. 1832: Trautv. 1871, Acta Horti Petropol. **1**, 1: 79; Schmidt, 1872, Fl. Jeniss.: 118; Lundström, 1877, Weiden Now. Sem.: 10; Tolmachev, 1930, Trudy Polyarn. kom. **2**: 19; Nakai, 1930, Fl. sylv. Kor. **18**: 146; Krylov, 1930, op. cit. **4**: 775; Perfilyev, 1936, Fl. Sev. kr. **2–3**: 25; Nazarov, 1936, op. cit. **5**: 39 (p. max. p.!); Rech. f. 1964, Fl. Eur. **1**: 47. —*S. herbacea* var. *flabellaris* Anderss. 1868, in DC. Prodr. **16**, 2: 298. —*S. vulcani* Nakai, 1916, Bot. Mag. Tokyo **30**: 140. —*S. pauciflora* Koidz. 1918, Bot. Mag. Tokyo **32**: 61; Kimura, 1934, in Miyabe, Kudo, Fl. Hokkaido a. Saghal. **4**: 411; Ohwi, 1965, Fl.

Jap.: 365. —*S. polyadenia* Hand.-Mazz. 1932, Öst. bot. Z. **81**: 306; Liou Tchen ngo, 1955, Ill. Fl. Tr. Shr. Northeast China: 145. —*S. tundricola* Schljakov, 1954, Bot. mat. Gerb. Bot. in-ta AN SSSR **16**: 67; id. 1956, Fl. Murm. **3**: 63. —*S. tschanbaischanica* Chou et Chang, 1955, in Liou Tchen ngo, op. cit.: 557.

T y p u s: "In Sibiria arctica ad fl. Boganida: Middendorff; in Sibiria altaica in alpibus ad fl. Tschuja: Bunge" (utra LE!).

HABITATS. Exposed, relatively dry or at least well-drained ones: stony, moss-lichen, and moss tundras; polygonal tundras; clayey, sandy, and stony outcrops; maritime and riverine sediments (habitats that are neither invaded by larger plants nor flooded); exposed *123*
dune sand. *S. nummularia*, as opposed to *S. herbacea*, *S. polaris*, and *S. turczaninowii*, is restricted to habitats, the snow is blown away from, rather than those where the snow stays longer. It is also associated with acidic bedrocks, such as silicate or granite.

DISTRIBUTION: The Kola Peninsula (the tundras around Lovozero, northeastern coast including Teriberka in the west); northern Kanin; Kolguyev; the Novaya Zemlya (up to the Matochkin Shar); Vaygach; Malozemelskaya and Bolshezemelskaya tundras; the Polar and Prepolar Urals; the barren heights of the Northern Urals (including mounts Isherim and Chuval in the south); the Yamal Peninsula (up to Belyy Island); the coast of the Ob Inlet and all the way east of the Ob across Arctic regions to the northern Verkhoyanskiy Range (reaching the Lower Nizhnyaya Taimyra as the northernmost location). It becomes less common and rather sparsely distributed farther east: east of the Kolyma Mouth, on Ayon Island and Cape Vankarem, and along the coast of the Gulf Kresta. It is also scattered (being not infrequent) across the barren heights of South Siberia and Mongolia: the Altai, Kuznetskiy Alatau, Western and Eastern Sayans, Khamar-Daban, Sokhondo, Kentei, Khangai, Haan Höhey, and Tannu-Ola. It is occasionally found solitary in the eastern Stanovoy Range, on the Kamchatka Peninsula (at the drainage divide between the Sedanka and Yelovka), Hokkaido (in the Daisetsu Mountains), and in the Pai T'ou Shan Mountains on the border of China and North Korea.

In the Sayans, its range is 1,700–2,700 m (Malyshev 1965); in Tuva, it ascends to 3,000 m; in the Polar Urals, to 200–700 m. (Fig. 22.)

20. **S. retusa** L. 1763, Sp. pl. 2 ed.: 1445; Wimmer, 1866, Salic. Eur.: 121; Camus, 1904, Saul. Eur.: 117; Seemen, 1909, in Aschers. et Graebn. Synopsis **4**: 84; Buser, 1940, Ber. Schweiz. bot. Ges. **50**: 793; Pawłowski, 1946, O niekt. wierzb.: 17; id. 1956, Fl. Tatr **1**: 183; Vicioso, 1951, Salic. Españ: 54; Nazarov et al. 1952, Fl. URSR **4**: 26; Beldie, 1952, Fl. Rom. **1**: 293; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 76; id. 1964, Fl. Eur. **1**: 46. —*S. kitaibeliana* Willd. 1806, Sp. pl. **4**, 2: 683; Görz, 1926, Magyar Bot. Lap. **25**: 196; Nazarov et al. 1952, op. cit. **4**: 27; Pawłowski, 1956, op. cit. **1**: 184; Rech. f. 1964, op. cit. **1**: 46.

T y p u s: "In alpibus Helvetiae, Austriae, Italiae".

HABIT: A depressed, usually procumbent dwarf shrub.

HABITATS: Rocks, taluses, moraines, and sodded swales on a vast variety of bedrocks (sometimes, limestone) within the alpine and subalpine zones (occasionally at lower elevations).

DISTRIBUTION: The Pyrenees (to 2,700 m), Alps (1,200–3,000 m), Apennines, Tatras (1,300–2,400 m), Eastern Carpathians (both the Ukrainian and Romanian parts), Southern Carpathians, alpine zones in the mountains of Bosnia and Herzegovina, Montenegro (Crnagora), Albania, Macedonia, western Bulgaria (the Rila Mountains). Its altitudinal range in the Balkans is 1,200–2,600 m. (Fig. 19.)

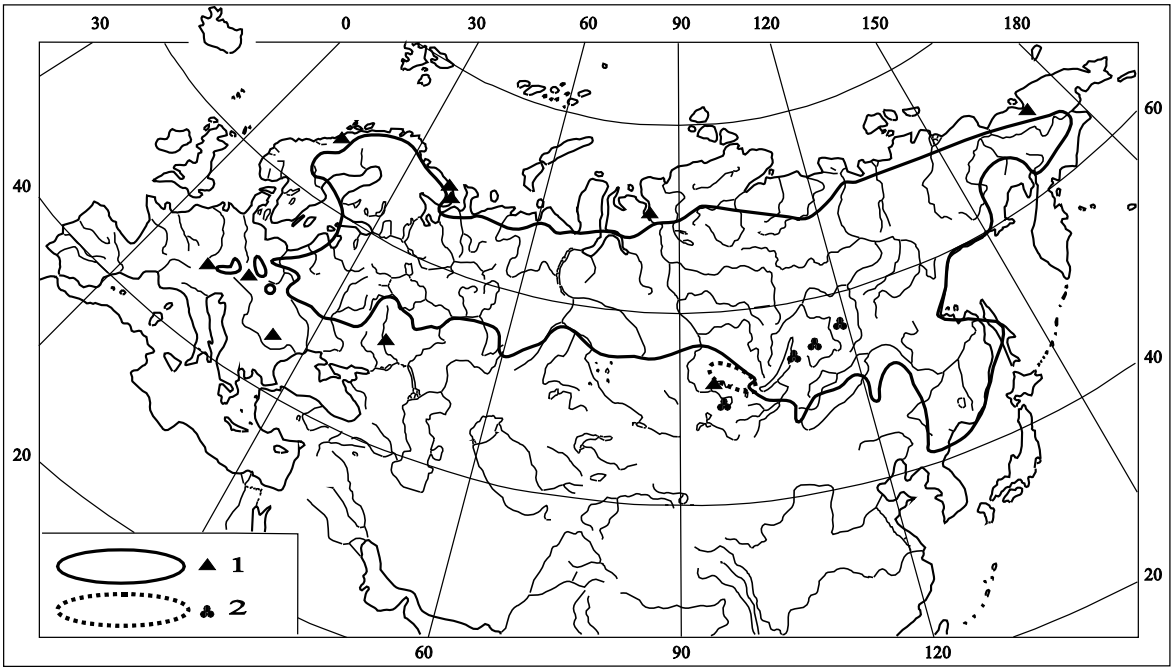

Fig. 23. Distributional areas of *Salix myrtilloides* L. *(1)* and *S. nasarovii* A. Skv. (*2*)

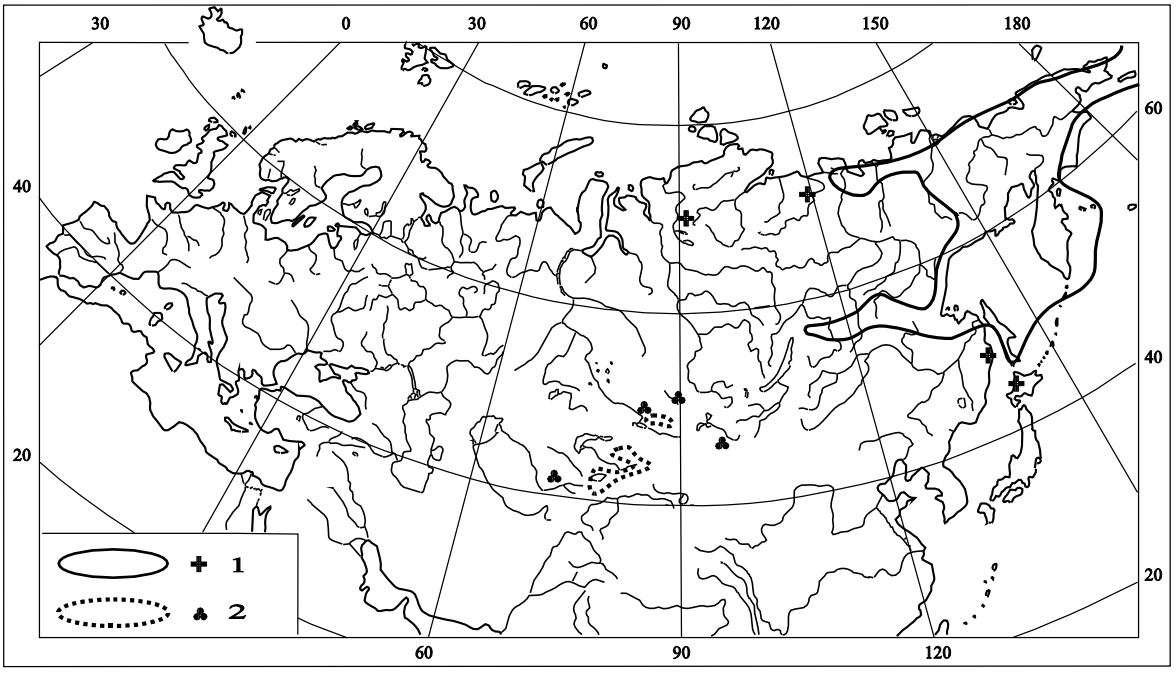

Fig. 24. Distributional areas of *Salix fuscescens* Anderss. (*1*) and *S. alatavica* Kar. ex Stschegl. (*2*)

NOTE. *S. kitaibeliana*, which is sometimes considered to be a distinct species (or subspecies), is only different in purely quantitative characteristics. These characters are also extremely obscure and inconstant, so that each author interprets them in his own way. While analyzing the material at my disposal, I could not justify the segregation of *S. kitaibeliana* either as a species or subspecies.

21. **S. serpyllifolia** Scop. 1772, Fl. Carn. **2**: 255 et **3**: tab. 61, fig. 1207; Jaccard, 1895, Catal. Valais.: 324; Buser, 1940, Ber. Schweiz. bot. Ges. **50**: 742; Becherer, 1956, Fl. Valais. Suppl.: 135; Janchen, 1956, Catal. fl. Austr. **1**: 102; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 78; id. 1964, Fl. Eur. **1**: 47. —*S. retusa* var. *serpyllifolia* Wahlenb. 1813, De veget. Helv.: 183; Wimmer, 1866, Salic. Eur.: 123; Camus, 1904, Saul. Eur. **1**: 122; Fiori, 1923, Nuova fl. Ital. **1**: 347; Seemen, 1909, in Aschers. et Graebn. Synopsis **4**: 87. —*S. retusa* ssp. *serpyllifolia* Rouy, 1910, Fl. Fr. **12**: 220; Toepffer, 1914, in Vollmann, Fl. Bayern: 193.

T y p u s: "In alpibus Vochinensibus" (n. v.).

HABIT: A tiny dwarf shrub appressed to substrate, resembling *S. retusa* very much, *124*
however, more miniaturized.

HABITATS: Rocks, moraines, taluses, and other habitats in the subalpine and alpine zones, much alike *S. retusa*. However, it is associated with more exposed, dry spots and calcareous substrates (although occurs on slatestone and serpentinite). Unlike *S. retusa*, it avoids acidic bedrock.

DISTRIBUTION: Nearly all across the Alps from France and Bavaria to Slovenia. However, it is absent in the Jura and, presumably, Apennines. Its altitudinal range is 1,600–3,200 m. (Fig. 22.)

NOTE. I treat *S. serpyllifolia* as a distinct species, primarily following R. Buser, who repeatedly observed this species along with *S. retusa* in nature and resolutely favored its distinctness. The material that I managed to study enabled me to distinguish *S. retusa* from *S. serpyllifolia* (unlike the case of *S. retusa* and *S. kitaibeliana*).

Sect. 9. *Myrtilloides*

Koehne, 1893, Dendr.: 89, 102.

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

Low shrubs with ascending, rooting stems. Floriferous buds similar to vegetative ones. Either *arctica*- or transitional to *alba*-type of bud size gradation along shoots. Leaves on short, channeled petioles, small, relatively broad, subentire. Catkins terminating foliated shoots; however, floriferous shoots less foliated and much shorter than vegetative ones. Bracts small, obtuse. In both sexes, nectaries mostly one in each flower. Stamen filaments short, glabrous. Capsules on long stipes, narrowly lanceolate. Styles very short, stigmas short, two-lobed.

This is a group of boreal and subarctic distribution consisting of 4 or 5 species (2 or 3 of them North American).

Key to Species

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1. Leaves mostly obovate, dark green, lustrous above, usually with few denticles on lower half of leaf blade margin. Bracts blackish . . . . . 23. **S. fuscescens**

— Leaves mostly broadly elliptic, completely entire, light green, dull above. Bracts pale . . . . . 22. **S. myrtilloides**

22. **S. myrtilloides** L. 1753, Sp. pl.: 1019; Ledeb. 1850, Fl. Ross. **3**, 2: 613; Wimmer, 1866, Salic. Eur.: 112; Anderss. 1867, Monogr. Salic.: 95; Wolf, 1930, Fl. Yu.-V. **4**: 58; Krylov, 1930, Fl . Zap. Sib. **4**: 759; Nakai, 1930, Fl. sylv. Kor. **18**: 154; Floderus, 1931, Salic. Fennosc.: 93; Perfilyev, 1936, Fl. Sev. kr. **2–3**: 36; Nazarov, 1936, Fl. SSSR **5**: 112; id. 1937, Fl. Zabayk. **3**: 197; Nazarov et al. 1952, Fl. URSR **4**: 51; Shlyakov, 1956, Fl. Murm. **3**: 99; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 104; id. 1964, Fl. Eur. **1**: 51; Popov, 1959, Fl. Sredn. Sib. **2**: 804. —*S. elegans* Besser, 1822, Enum. Volhyn.: 77. —*S. lenensis* Flod. 1936, Sv. bot. tidskr. **3**: 393.

T y p u s: "In Suecia septentrionali. Fl. Lapp. N 357 et tab. 8 fig. J, K; Fl. Suec. N 804".

HABIT: A low shrub (20–150 cm) with rooting stems.

HABITATS: Mesotrophic wetlands, graminoid and shrub-dominated transitional zones at edges of *Sphagnum* bogs with *Carex* and *Calamagrostis*, damp meadows, *yernik*' s, damp and paludal pine and larch forests. Occasionally, it invades *Sphagnum* bogs and alpine tundras.

DISTRIBUTION: Northern Scandinavia (except ocean-facing slopes) and the Kola Peninsula (excluding its northern maritime part). Extending east to the Lower Anadyr, the area primarily matches the belt of forest-tundra. Its easternmost parts include the Penzhina Basin, Sea of Okhotsk and Sea of Japan coasts, and northeasternmost Korea Peninsula. The species is missing from Kamchatka and Pacific islands, except central Sakhalin (where it is found in the Upper Poronay Basin). The southern border of the species area embraces forested regions of the northern Northeast China, Transbaykalia (except the vicinity of Borzya), and the Kentei Range. West of Lake Baykal, the southern border crosses the foothills of the Eastern Sayans and, leaving some isolated localities in Tuva, reaches Kansk, Tomsk, and Kurgan. Then it goes round the Urals abruptly ascending to the Kama River, again descending from Ulyanovsk to Tambov, once more ascending when going round the northern Central Russian Upland, and leaving an isolated location in the Don Valley, near the Donskoye Belogorye Highlands, far beyond the area limits. Then the border runs via Kursk, Priluki, and Kiev, and, matching a parallel, reaches Poland. The western border of the continuous species range crosses the southeastern and northeastern Poland and the Baltic States (in a distance from the sea coast). There are also some small disjunct area parts in the mountains of southern Bavaria, the Sudetes, Tatras, and southern Carpathians.

In the Tatras, the species ascends as high as 900 m; in the Northern Urals, to 800 m; in the Polar Urals (the Sob River Basin), to 300 m; on the Stanovoye High Plateau, to 1,100 m, in Liaoning Province of China, to 900 m. (Fig. 23.)

23. **S. fuscescens** Anderss. 1867, Monogr. Salic.: 97; id. 1868, in DC. Prodromus **16**, 2: 230; Coville, 1901, Proc. Wash. Acad. **3**: 329; Schneider, 1916, in Sarg. Pl. Wilson. **3**, 1: 153; id. 1921, J. Arn. Arb. **2**: 83 et 199; Floderus, 1926, Ark. bot. **20A**, 6: 44; Hultén, 1928, Fl. Kamtch. **2**: 11; Komarov, 1929, Fl. Kamch. **2**: 13; Nazarov, 1936, Fl. SSSR **5**: 113. —*S. rhamnifolia* (non Pall. 1788) Hook. et Arnott, 1841, Bot. Beechey voy.: 117 et tab. 26. —*S. paludicola* Koidz. 1919, Bot. Mag. Tokyo **33**: 219; Kimura, 1934, in Miyabe, Kudo, Fl. Hokk. a. Saghal. **4**: 425; Ohwi, 1965, Fl. Jap.: 366. —
127 *S. hebecarpa* Fern. 1924, Rhodora **26**: 123; Hultén, 1943, Fl. Al. **3**: 520. —*S. arbutifolia* auct. non Pall. 1788: Floderus, 1933, Ark. bot. **25A**, 10: 8; Kimura, 1934, op. cit. **4**:

423; Hultén, 1943, op. cit. **3**: 545; Kimura, 1952, Symb. Iteol. **19**: 196; Raup, 1959, Contrib. Gray Herb. **185**: 81. —? *S. poronaica* Kimura, 1934, op. cit. **4**: 426; Sugawara, 1936, Ill. Fl. Saghal. **2**: 677; Tolmachev, 1956, Der. i kustarn. Sakhal.: 68.

T y p u s: "Kamtschatka —captain Beechey". —K? —Cf. tab. 26 in Hooker and Arnott 1841.

Since the species name *S. fuscescens* Anderss. was proposed as nomen novum instead of *S. rhamnifolia* Hook. et Arnott, non Pall. and Beechey's sample was always first to be referred to by N. Andersson, apparently, it is to be considered as the holotype, and the rest of the cited samples (Alaska —Kastalski; the series from Udskoy District —Middendorff) are to be treated as paratypes.

HABIT: A low shrub (usually 8–30 cm tall, occasionally, on Sakhalin and at the Lower Amur, up to 80–100 cm) distinguished by obliquely ascending, rooting stems.

HABITATS: Wetlands, paludal meadows and tundras, occasionally (within maritime coastal zones) on dryer substrates, particularly, sand.

DISTRIBUTION. The species is very common on northern Sakhalin, the coast of the Sea of Okhotsk, Kamchatka, and in the Northeast from the Lower Lena and Indigirka to the Chukchi Peninsula, as well as on the islands and archipelagoes of Ratmanov, Commander, Shumshu, and Paramushir. The species is much more rare south and west of these regions, and its area becomes discontinuous there: some solitary locations are known in Maritime Province (the Botchi River) and on Hokkaido; it is scattered in the Stanovoy Range and on the Stanovoye High Plateau nearly reaching Lake Baykal. It was also found in the Putoran Mountains on the Taimyr Peninsula (the Chopko River). A sample was found among collections made by B. Gorodkov in Gydanskaya Tundra. However, the label was obscure. I. Koropachinskiy and A. Skvortsova (1966: 78) recorded the species in Tuva, which was apparently a mistake.

It is known to ascend to 1,600 m in the Stanovoy Range; to 2,100 m in the Kodar Range (the Stanovoye High Plateau); to 550 m in the Verkhoyanskiy Range at latitude 69° N. (Fig. 24.) It is also distributed in American continental Arctic, at least as far east as Hudson Bay.

NOTE. Hybrids with *S. udensis* are common on the Kamchatka and particularly Sakhalin. One of them was named *S. kudoi* Kimura 1934, in Miyabe, Kudo, Fl. Hokk. a. Saghal. **4**: 441 (see also Sugawara 1939: 687 et tab. 323). According to E. Hultén (1928: 12), *S. macilenta* Anderss. 1867, Monogr. Salic.: 141 is nothing but a hybrid of the same kind. Yet E. Hultén's opinion hardly seems to be true if one considers the illustration in N. Andersson's monograph. Although *S. macilenta* Anderss. was mentioned by M. Nazarov in the "Flora of the USSR" (1936: 83), the species remains obscure and puzzling. I had no chance to see its type ("Redovski Land"—Chamisso), which was preserved in the Berlin-Dahlem Herbarium.

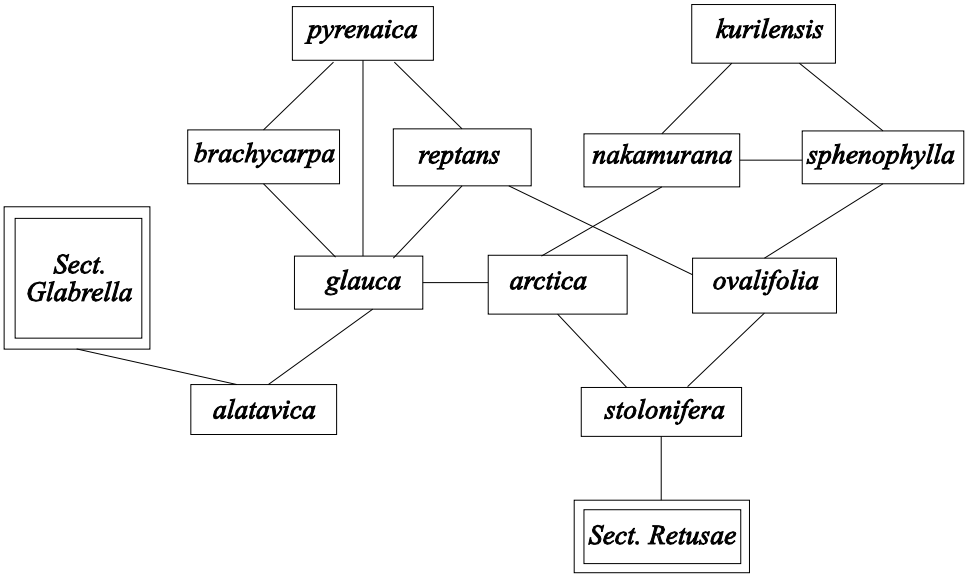
On the northern coast of the Sea of Okhotsk, Sakhalin, and at the Lower Amur there occur unusually huge specimens with large leaves. These were the plants named *S. poronaica* by A. Kimura, according to his own description (Kimura 1934: 426) as well as the illustration in S. Sugawara's "Flora of Saghalin" (1936: pl. 315). Under this name, A. Kimura could also partially imply hybrids of *S. fuscescens* × *S. udensis* mentioned here above. These hybrids are considerably larger than *S. fuscescens* and quite common around Poronaysk. In any case, the available material does not provide enough grounds to recognize one more distinct species related to *S. fuscescens* existing on Sakhalin.

Sect. 10. *Glaucae*

Pax, 1889, in Engl. et Prantl, Natü rl. Pflanzenfam. **3**, 1: 37 (p. p.).
T y p u s: *Salix glauca* L.

Low or depressed (occasionally moderate-sized) shrubs. Floriferous and vegetative buds look alike, ovoid or broadly elliptic. *Arctica*-type of bud size gradation along shoots. Leaves of variable shape, but mostly rather broad, entire or obscurely dentate, exstipulate or with lanceolate subequilateral stipules, their petioles channeled. Catkins borne on foliated stalks, rather large. Bracts pale to black. Nectaries one or two (sometimes more) in male flowers, mostly one in female ones. Adaxial nectary usually large, (1 mm long or more), frequently lobed. Capsules on short stipes, mostly large; styles distinct, often cleft; stigmas two-lobed or linear, two-parted.

At the first glance, the section, the way it is presented here, might appear rather heterogeneous. In fact, it is very difficult to admit close filiation of, say, *S. glauca* and *S. kurilensis*, as these species are very different both in their vegetative and floriferous parts. However, if one considers the section on the whole, then connections between all of its members become so obvious that it is even difficult to delimit subsections. The relations of the taxa within the section *Glaucae* might be approximately outlined as follows.



Probable evolutionary relations within and around the section *Glaucae*

The most natural approach to the division of the section could be the segregation of the species with pubescent capsules and cleft styles (*S. alatavica, S. glauca, S. reptans, S. arctica,* plus the West European *S. pyrenaica*) versus the species with mostly glabrous (or only partially pubescent) capsules and elongated, usually not cleft styles (these are *S. kurilensis, S. sphenophylla, S. nakamurana, S. ovalifolia*). These groups could be treated as subsections. One must say, this division is not absolute, since both *S. ovalifolia* and *S. nakamurana* greatly resemble *S. arctica* in their vegetative organs; *S. ovalifolia* is also close to *S. reptans* in the structure of its nectaries.

Some features of *S. alatavica* resemble those of *Glabrella* members: leaf and bud morphology, bract and capsule characters (bracts are large, scarious, truncate; capsules large, acute). It is quite possible that the sections *Glaucae* and *Glabrella* are of close filiation. On the other hand, one can trace connection with the section *Retusae* via *S. arctica*, *S. ovalifolia*, and particularly the Alaskan species *S. stolonifera* Coville. *129*

Key to Species

1. Shrubs distributed mostly in subalpine and subarctic regions. Branches upright (except most unfavorable conditions). Stamen filaments pubescent 2
— Shrubs of woodless tundras, rocks, and the alpine zone, their stems procumbent or ascending. Stamen filaments glabrous 3
2. Leaves dentate, lustrous above when alive. Bracts blackish-brown . . . . . 24. **S. alatavica**
— Leaves entire or with solitary glands along margins, dull or glittering when alive. Bracts pale or light brown (although there are some exceptions, such as the populations on Wrangel Island) . . . . . 25. **S. glauca**
3. Stems procumbent, but almost never rooting. Leaves not large (10–30 mm), round to broadly elliptic, mostly cordate at base, exstipulate, their petioles 3–7 mm long, reticulation slightly prominent beneath. Catkins mostly short, globular or broadly elliptic. Capsules glabrous or with scattered pubescence . . . . . 29. **S. ovalifolia**
— Stems promptly rooting when procumbent. Leaves not as above. Catkins cylindrical 4
4. Branches ascending and rooting. Leaves (ob)ovate or (ob)lanceolate, mostly acutish or pointleted, light green or grayish-green, more or less pubescent, their petioles 2–5 mm long. Capsules pubescent. Styles cleft at least up to half of their length 5
— Leaves mostly obtuse or rounded, mature ones mostly glabrous, their petioles longer than 5 mm. Styles not cleft or cleft on less than half of their length 6
5. Leaves mostly stipulate. Bracts black. Adaxial nectary usually deeply lobed. Mature capsules 7–9 mm long . . . . . 26. **S. reptans**
— Leaves exstipulate. Bracts pale. Adaxial nectary entire or shallowly lobed. Mature capsules 4–6 mm long . . . . . 27. **S. pyrenaica**
6. Bracts mostly purple-brown. Ovaries acute, glabrous or pubescent in their upper parts. Styles mostly not cleft 7
— Bracts black. Ovaries obtusish, entirely pubescent. Styles usually cleft . . . . . 28. **S. arctica**
7. Petioles 10–40 mm long. Leaves broadly elliptic to reniform, mostly cordate at base; veins considerably curved; reticulation distinctly prominent beneath. Floriferous shoots short: their length (measured to catkin base) equal or less than leaf breadth on same plant . . . . . 31. **S. kurilensis**
— Petioles mostly not longer than 15 mm. Leaves cuneate at base. Floriferous shoots (measured to catkin base) longer than leaf breadth 8
8. Leaves light-colored, yellowish-green, dull above; reticulation distinctly prominent beneath mature ones. Bracts mostly equal or slightly longer than capsule stipes. Styles 0.3–1.0 mm long. Stigmas 0.2-0.3 mm long, with two short lobes *130*

. . . . . 30. **S. sphenophylla**

— Leaves dark green above, more or less lustrous. Reticulation not distinctly prominent beneath (leaves resemble those of *S. arctica*). Bracts much longer than capsule stipes. Styles 1–2 mm long. Stigmas 0.4–0.5 mm long, two-parted, their parts linear . . . . . 32. **S. nakamurana**

24. **S. alatavica** Kar. ex Stschegl. 1854, Bull. Soc. Natur. Moscou **21**, 1: 197; Nazarov, 1936, Fl. SSSR **5**: 60; Skvortsov, 1962, Bot. mat. Gerb. in-ta bot. AN UzbSSR **17**: 63; Polyakov, 1960, Fl. Kazakhst. **3**: 35. —*S. spissa* Anderss. 1868, in DC. Prodr. **16**, 2: 283. —*S. karelinii* Wimm. ex Seemen, 1895, Bot. Jahrb. Beibl. **52**: 10. —Non *S. karelinii* Turcz. 1854. —*S. seemenii* B. Fedtsch. 1915, Rastit. Turkest.: 298.

T y p u s: "In lapidosis alpinum Alatau, Karelin et Kirilow a. 1842" (MW!, LE! et alibi).

HABIT: A low or medium-sized shrub (0.4–1.5 m tall) with short, stout branches.

HABITATS: Taluses, moraines, and moist slopes within the subalpine and partially alpine zones.

DISTRIBUTION: The Western Sayans (however, reliable data is available only from the Shapshalskiy Range, where it grows at 2,300–2,600 m), the western and southwestern Altai, western Mongolia (there is an isolated location in the Tayshir Ola Range within the larch forest zone). It is more common in the Tien Shan at 2,500–3,500 m (the Dzungarskiy Alatau, Borokhoro, Iren-Khabyrga, Zailiyskiy, and Ketmen ranges as well as those south of the Lake Issyk-Kul including the Atbashi Range in the west). There is an isolated location in the Talasskiy Alatau near Karabura Pass. (Fig. 24.)

25. **S. glauca** L. 1753, Sp. pl.: 1019; Ledeb. 1850, Fl. Ross. **3**, 2: 618; Wimmer, 1866, Salic. Eur.: 91; Krylov, 1930, Fl. Zap. Sib. **4**: 768; Floderus, 1931, Salic. Fennosc.: 37; Perfilyev, 1936, Fl. Sev. kr. **2–3**: 41; Nazarov, 1936, Fl. SSSR **5**: 58; Buser, 1940, Ber. Schweiz. bot. Ges. **50**: 735; Raup, 1943, Sargentia **4**: 102; id. 1959, Contrib. Gray Herb. **185**: 54; Shlyakov, 1956, Fl. Murm. **3**: 75; Popov, 1959, Fl. Sredn. Sib. **2**: 805; Polyakov, 1960, Fl. Kazakhst. **3**: 35; Rech. f. 1964, Fl. Eur. **1**: 47; Argus, 1965, Contrib. Gray Herb. **196**: 1 et seq. —*S. pseudolapponum* Seemen, 1900, Bot. Jahrb. Beibl. **65**: 28. —*S. seemannii* Rydb. 1901, Bull. N. Y. Bot. Garden **2**: 164; Floderus, 1933, Ark. bot. **25A**, 10: 5; Nazarov, 1936, op. cit. **5**: 59. —*S. sericeo-cinerea* Nakai, 1919, Bot. Mag. Tokyo **33**: 43; id. 1930, Fl. sylv. Kor. **18**: 136; Liou Tchen ngo, 1955, Ill. Fl. Tr. Shr. Northeast China: 153. —*S. stipulifera* Flod. 1930, Bot. not.: 328; id. 1931, op. cit.: 35; Perfilyev, 1936, op. cit. **2–3**: 41; Nazarov, 1936, op. cit. **5**: 59; Shlyakov, 1956, op. cit. **3**: 72; Rech. f. 1964, op. cit. **1**: 47. —*S. glaucosericea* Flod. 1943, Sv. bot. tidskr. **37**: 169; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 83; id. 1964, op. cit. **1**: 47.

T y p u s: "In alpibus lapponicis. Fl. Lapp. N 363 et tab. 7 fig. 5, tab. 8, fig. P; Fl. Suec. N 802".

HABIT: A quite tall (up to 2–2.5 m) to nearly procumbent shrub, depending upon environmental conditions.

HABITATS are greatly variable: depressions, lowlands, river valleys, wetlands, bog edges; tundras of various types from paludal to rather dry; stone-fields, rocks, various outcrops, glacial moraines; banks of mountain and tundra streams, bypasses and channels with sluggish water flow. Usually, it avoids freshly deposited alluvia of large rivers. Although this species can survive on a vast variety of different bedrocks, it is mostly associated with acidic substrate staying away from carbonate. Usually, it forms extensive shrublands.

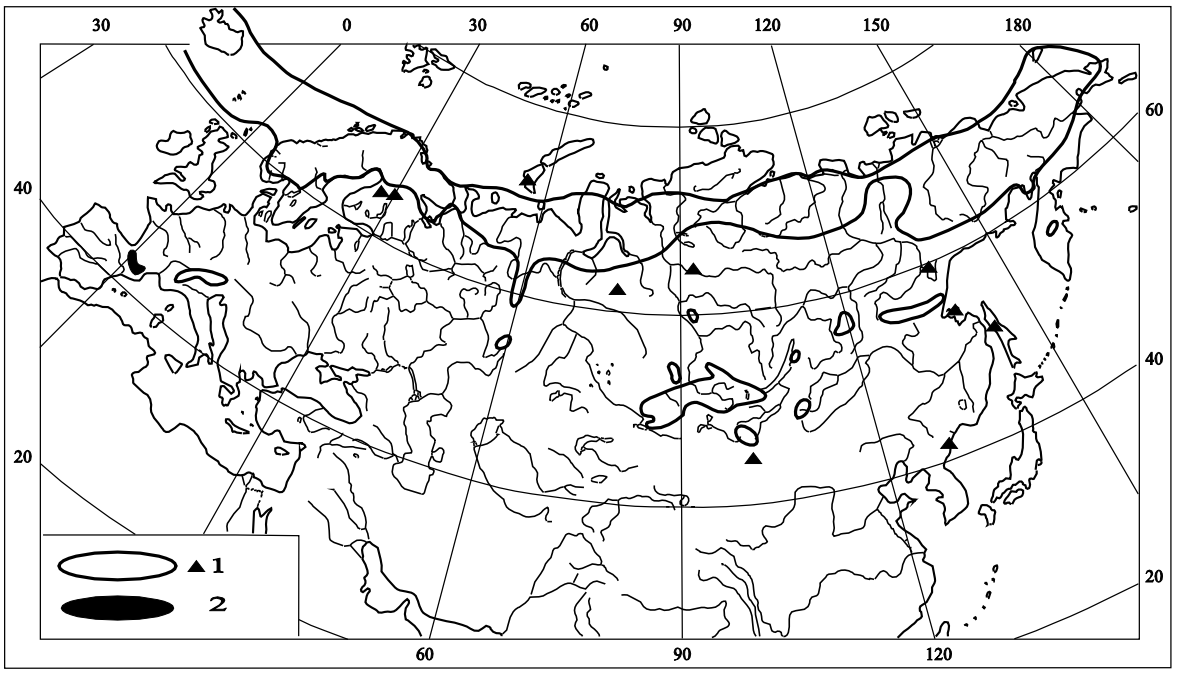


Fig. 25. Distributional areas of *Salix glauca* L. (*1*) and *S. pyrenaica* Gouan (*2*)

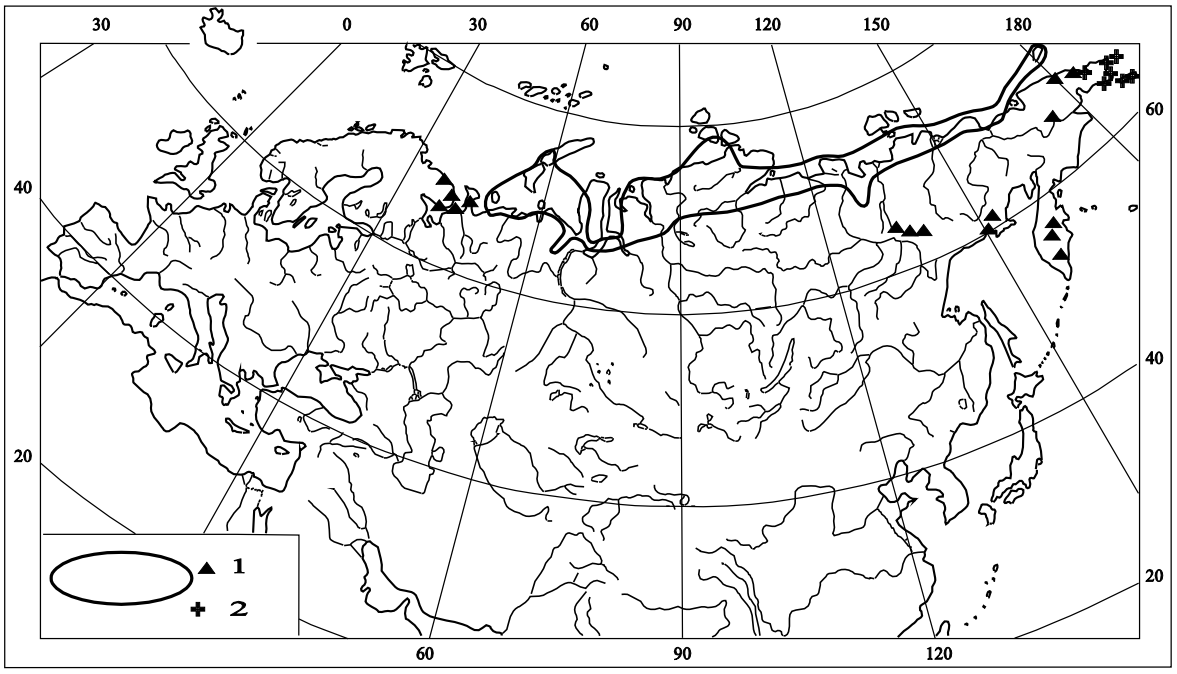


Fig. 26. Distributional areas of *Salix reptans* Rupr. (*1*) and *S. ovalifolia* Trautv. (*2*)

DISTRIBUTION: Iceland; major part of the Scandinavian Peninsula; northern Finland, the Kola Peninsula, and northern Karelia; the northernmost part of the forest belt, forest-
131 tundra and southernmost tundra in European as well as Asiatic Russia. In the north, it reaches Southern Island of the Novaya Zemlya (occasionally, it is found there on the southwestern coast). It is encountered at latitude 62–63° N on the Yamal Peninsula and around the Yenisei Bay; on the Taimyr Peninsula in the Pyasina Basin, it reaches Tarea; east of the Khatanga River, it gets to the ocean coast almost everywhere, growing also on Ayon and Wrangel islands. It is scattered across the entire territory of the Northeast starting from the Verkhoyanskiy Range (except the coast of the Sea of Okhotsk). South of the area described above, it is encountered only in the mountains: the Alps, Urals (where it reaches Kytlym as the southernmost point and also occurs on many peaks in the Southern Urals), the Yeniseiskiy Kryazh, Kuznetskiy Alatau, Altai, Western and Eastern Sayans, Khangai, Kentei, Sokhondo, other barren heights of Transbaykalia, the Barguzinskiy Range, and Stanovoye High Plateau. There are some scattered locations in North Korea, on Sakhalin (Mount Lopatina), on the coast of the Sea of Okhotsk (Bolshoy Shantar Island and the vicinity of Ayan), and on the Kamchatka Peninsula (the Kamchatka River Basin).

Its elevation range in the Alps is 1,800–2,400 m; in the Southern Urals, 900–1,500 m; in the Northern Urals, 700–1,300 m, in the Altai and Eastern Sayans, 1,600–2,200 m; in Tuva, it ascends to 2,500 m and, according to I. Koropachinskiy and A. Skvortsova (1966), even to 3,000 m. (Fig. 25.)

NOTE. This is a rather polymorphic, manifold species. In every part of its area, one can easily find a vast diversity of forms. It was that high variability which caused many attempts to describe superfluous new species. However, the variability also made it impossible to distinguish those "species". Within the flora of this country, it is reasonable to distinguish the only one race growing on the barren heights of South Siberia from the Altai to Stanovoye High Plateau. These plants are generally characterized by relatively short, less pubescent leaves and short catkins borne on short stalks. Probably, it would make sense to treat those South Siberian populations as a subspecies. The plants from the Alps are not divergent that much, so that it does not appear reasonable to segregate them as a distinct species, as some of the European authors did. Particularly in North America many "species" were segregated within *S. glauca*. However, a thorough monographic study (Argus 1965) clearly demonstrated that there were not enough reasons for such division.

26. **S. reptans** Rupr. 1845, Fl. samojed. cisur.: 54; Ledeb. 1850, Fl. Ross. **3**, 2: 619; Lundström, 1877, Weiden Now. Sem.: 39; Lakschewitz, 1914, Spisok rast. Gerb. russk. fl. **8**, 50: N 2492; Floderus, 1926, Ark. bot. **20A**, 6: 31; Krylov, 1930, Fl. Zap. Sib. **4**: 775; Perfilyev, 1936, Fl. Sev. kr. **2–3**: 36; Nazarov, 1936, Fl. SSSR **5**: 60; Shlyakov, 1956, Fl. Murm. **3**: 71. —*S. eriocaulos* Lundström, 1888, K. sv. vet. handl. **22**, 10: 204; Grapengiesser, 1942, Sv. bot. tidskr. **36**: 161.

T y p u s: "In parte orientale ins. Kolgujew non longe ab ost. fl. Pestschanka, 8. VIII 1841, F. Ruprecht " (LE!).

HABIT: A low (10–40 cm), petite shrub with ascending, rooting, slender stems.

HABITATS: Damp and paludal tundras, particularly, those located on coastal plains and at lower reaches of rivers as well as maritime coastal meadows, maritime and riverine sand and pebbles (as long as they are not occupied by larger willows); occasionally, *layda*'s; graminoid and graminoid-moss tundras with *Carex* spp.; tussocky, hillocky, and spotty tundras. In the mountains, it is much more rare, found only in some few regions.

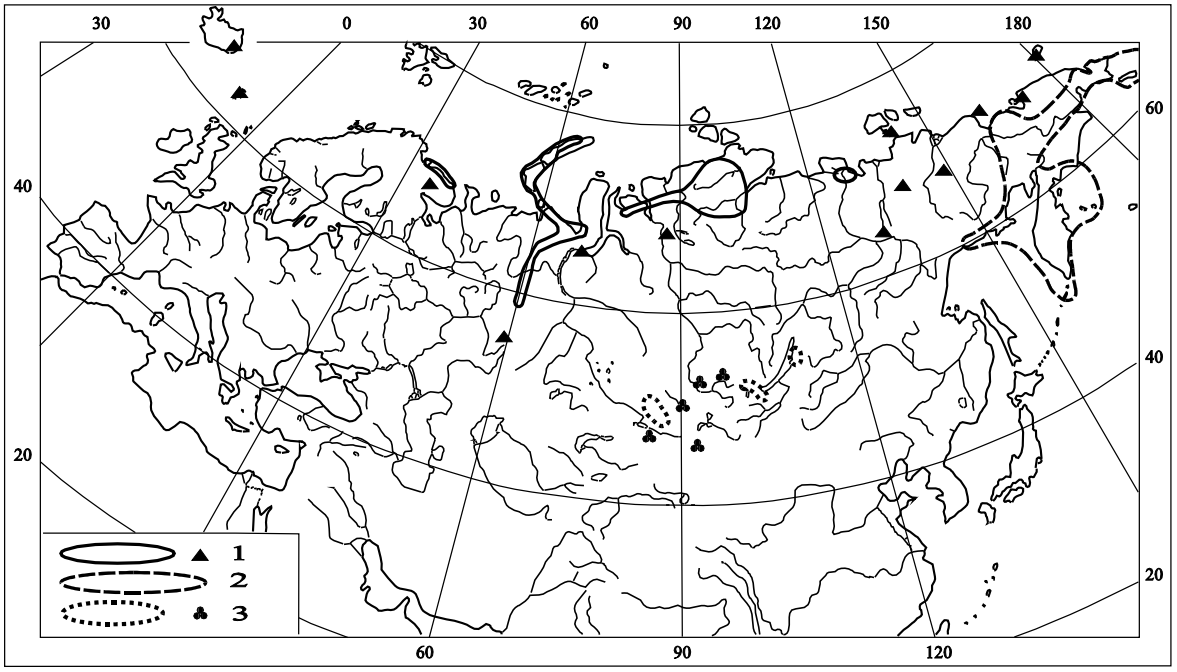


Fig. 27. Distributional areas of *Salix arctica* Pall. ssp. *arctica* (*1*), ssp. *crassijulis* (Trautv.) A. Skv. (*2*), and ssp. *torulosa* (Trautv.) A. Skv. (*3*)

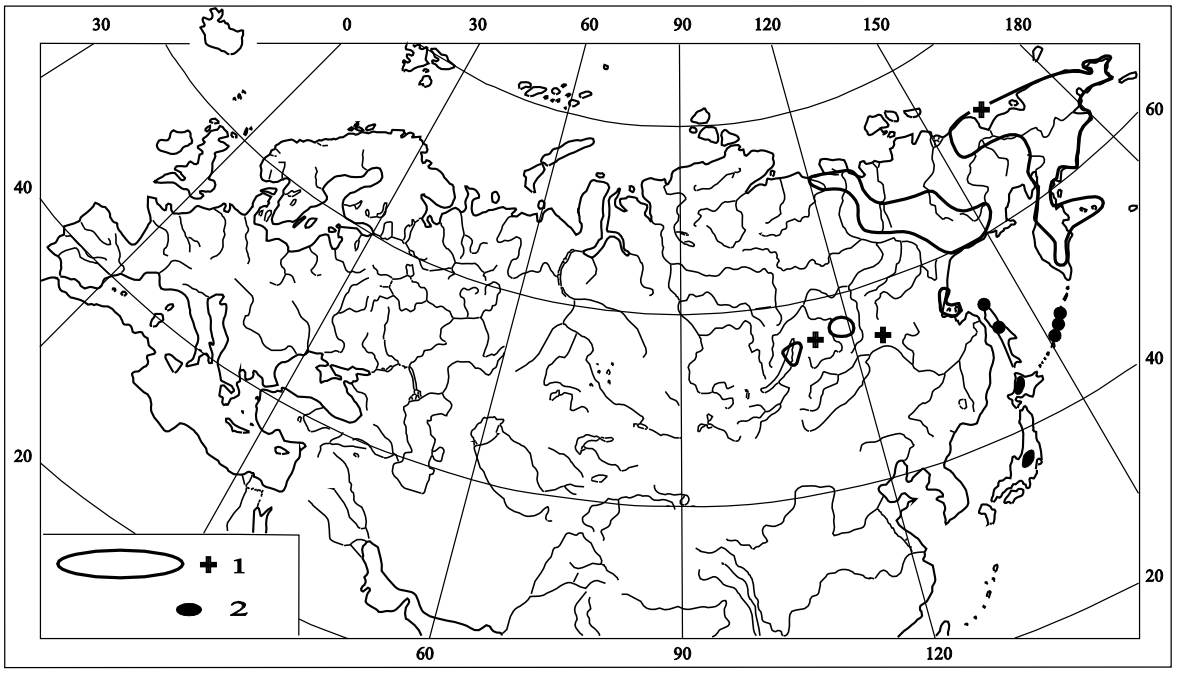


Fig. **28.** Distributional areas of *Salix sphenophylla* A. Skv. (*1*) and *S. nakamurana* Koidz. (*2*)

DISTRIBUTION: The maritime zone on the Kola Peninsula (near Rynda, Ponoi, Tetrino, and on Kharlov Island, very rarely); the maritime zone between the Beloye (White) Sea Mouth (the Mayda River Mouth) and the Kara Inlet (rather sparsely); the islands Kolguyev, Vaygach, and Novaya Zemlya Archipelago including the southern part of its Northern Island (much more often); the Polar Urals, Yamal Peninsula, coast of the Ob and Taz Inlet, and Gydanskaya Tundra; the Lower Yenisei (very commonly); the Taimyr Peninsula and Severnaya Zemlya Archipelago (Bolshevik and October Revolution islands); the territory between the Khatanga River and Kolyma River Mouth including Bolshoy Lyakhovskiy Island in the north. East of that territory, it becomes sparse,
133 however, it is known as far as Cape Vankarem, fairly common on Wrangel Island, found in many locations across the Verkhoyanskiy Range (Sakkyryrskiy District in the north, the Tompo and Bryangada basins in the south). There are also some isolated locations in the Northeast: around Magadan and Ust-Belaya on the Anadyr River and on the Kamchatkan *sopka*'s (Shiveluch, Klyuchevskaya, and Avachinskaya volcanoes).

In the Polar Urals, it ascends as high as 600–700 m; on Klyuchevskaya Sopka, it is found at the elevation of 1,000 m; on Shiveluch, presumably, even at 2,600–2,700 m (according to a herbarium label by K. Stepanova, a collector). (Fig. 26.)

27. **S. pyrenaica** Gouan, 1773, Illustr.: 77; Wimmer, 1866, Salic. Eur.: 94; Bubani, 1897, Fl. Pyren. **1**: 61; Camus, 1904, Saul. Eur. **1**: 135; Rouy, 1910, Fl. Fr. **12**: 217; Görz, 1929, Saul. Catal.: 24; Cadevall, Font, 1933, Fl. Catal. **5**: 179; Vicioso, 1951, Salic. Españ: 62.

T y p u s: "In Pyrenaeis ad juga montis Laurenti atque vallis Eynes, locis nivalibus" (n. v.).

HABIT: A depressed dwarf shrub with procumbent or ascending branches.

HABITATS: Moist and peaty meadows and pastures within the subalpine and alpine zones, at elevations (1,200–)1,400–2,500 m.

DISTRIBUTION: The Spanish part of the Pyrenees (Huesca, Lérida, and Gerona provinces), the French Pyrenees (nearly everywhere); the Corbières Range. The species is fairly common within its distributional area. (Fig. 25.)

NOTE. This is a Pyrenean endemic, quite distinct in its morphology. The closest to *S. pyrenaica* is Eurasian *S. reptans*; the closest American species is *S. brachycarpa* Nutt.

28. **S. arctica** Pall. 1788, Fl. Ross. **1**, 2: 86; Ledeb. 1834, Icon. **5**: 18 et tab. 460; id. 1850, Fl. Ross. **3**, 2: 619 (partim); Komarov, 1920, Fl. Kamch. **2**: 24; Krylov, 1930, Fl. Zap. Sib. **4**: 770 (p. p.: excl. var. *taimyrensis*); Nazarov, 1936, Fl. SSSR **5**: 44; Hultén, 1943, Fl. Al. **3**: 513; Raup, 1943, Sargentia **4**: 98; id. 1959, Contrib. Gray Herb. **185**: 47; Shlyakov, 1956, Fl. Murm. **3**: 67. —*S. diplodictya* Trautv. 1832, Salic. Frigid.: 307. —*S. crassijulis* Trautv. 1832, op. cit.: 308; Hultén, 1943, op. cit. **3**: 515. —*S. torulosa* Trautv. 1832, op. cit.: 309; Polyakov, 1960, Fl. Kazakhst. **3**: 36; Cherepnin, 1961, Fl. yuzhn. ch. Krasnoyar. kr. **3**: 13. —*S. pallasii* Anderss. 1868, in DC. Prodr. **16**, 2: 285; Nazarov, 1936, op. cit. **5**: 45. —*S. altaica* Lundström, 1877, Weiden Now. Sem.: 36; Nazarov, 1937, Fl. Zabayk. **2**: 212; Popov, 1959, Fl. Sredn. Sib. **2**: 807. —*S. brownei* Lundström, 1877, op. cit.: 37. —*S. ehlei* Flod. 1936, Sv. bot. tidskr. **30**: 386 et fig. 1. —*S. arctica* R. Br. 1823, Chloris Melvilleana: 24; id. 1823, ex Richardson, Franklin J.: 752; Trautv. 1832, op. cit.: 293. —*S. anglorum* Cham. 1831, Linnaea **6**: 541 (nom. nov. pro *S. arctica* R. Br. non Pall.). —*S. brownii* Bebb 1889, Bot. Gaz. **14**: 115.

T y p u s: "In plaga arctica secundum sinum Obensem et versus glacialem Oceanum legit Sujef" (n. v.). There are no samples of *S. arctica* from P. Pallas' collection in the

St. Petersburg Herbarium. Presumably, they are preserved in the British Museum or Berlin-Dahlem.

Ssp. **crassijulis** (Trautv.) A. Skv. comb. nova. —*S. crassijulis* Trautv. 1832, Salic. Frigid.: 308. —*S. pallasii* Anderss. 1868, in DC. Prodr. **16**, 2: 285. —*S. arctica* "sensu stricto" Rydb. 1899, Bull. N. Y. Bot. Gard. **1**: 265. —*S. arctica* × *glauca* et *S. arctica* × *cuneata* × *glauca* Flod. 1926, Ark. bot. **20A**, 6: 23, 26.

T y p u s: "Ad sinum St. Laurentii. Chamisso et Eschscholtz" (LE!).

Different from ssp. *arctica* in its vigorous growing habit, mostly ascending (not procumbent) branches, large leaves with distinct reticulation beneath, and densely pubescent catkins. Its young leaves are usually clothed with long sericeous trichomes.

Ssp. **torulosa** (Trautv.) A. Skv. comb. nova. —*S. torulosa* Trautv. 1832, Salic. Frigid.: 309. —*S. altaica* Lundström, 1877, Weiden Now. Sem.: 36. *134*

T y p u s: "Altai. Ledebour" (LE!).

Different from ssp. *arctica* in its mostly elongated, light-colored (yellowish-green) leaves and often in its reddish pigmentation of petioles and catkin stalks.

HABITATS: Well-drained graminoid or herb-dominated meadowy tundras; sometimes also moss and stony polygonal tundras; sodding clayey, sandy, and stony outcrops and deposits. On Kamchatka, it also descends to the forest zone, where it occurs in cold depressions and at wetland edges.

In the Southern Urals, it grows at about 1,500 m; in the Northern Urals, within 900–1,500 m; in the Polar Urals, it ascends only to 700–800 m; in the Sayans and Tuva, it is found at 1,800–2,600 m; in the Saur, at 2,150–2,400 m; on Kamchatka, from nearly the sea level to 1,700 m; in the Lower Lena Basin (the Kharaulakh Range), to 600–700 m.

DISTRIBUTION: Iceland (Mjoifjördhur, very rare), the Faroe Islands (Kunø Island, very rare), the Kola Peninsula (the Khibins and northern coast, scattered), Yugorskiy Peninsula, Vaygach, and the Novaya Zemlya (to the Russian Harbor, common); the Polar Urals (very common), Prepolar Urals (rather infrequent), Northern Urals, (sporadically distributed), Southern Urals (only on Mount Iremel). East of the Urals, it is scattered across tundras. On the Taimyr Peninsula, it again becomes common, going north to the mouth of the Nizhnyaya Taimyra. So far it has not been found between the Khatanga and Lena; however, it is occasionally encountered at the Lower Lena and around Tiksi. It is found on Bolshoy Lyakhovskiy Island. East of the line connecting Okhotsk and the Kolyma Mouth, it again becomes considerably more common, particularly, on the Kamchatka Peninsula. The location on Wrangel Island is doubtful.

Ssp. *crassijulis*: Paramushir, the Commander Islands, Kamchatka, the Chukchi Peninsula, and Anadyr River Basin.

Ssp. *torulosa*: The barren heights of South Siberia (the Barguzinskiy Range, Eastern and Western Sayans, Altai, Tarbagatay). (Fig. 27.)

The species is widespread in North American Arctic: ssp. *crassijulis*, in Alaska and western Canada; plants from eastern Canadian Arctic and Greenland, presumably, are to be segregated in yet another subspecies.

NOTE. The species has an enormous range of individual variability, much alike *S. glauca*. N. Andersson (1868) brought about much confusion in the understanding of the species, since he included a whole series of completely alien components into *S. arctica*. These were actually some races from the *glauca*-cycle (*S. cordifolia* Pursh, *S. callicarpaea* Trautv.) and even some species from remote sections, like *S. saxatilis* Turcz., *S. divaricata* Pall., and *S. taimyrensis* Trautv. Some remnants of this confusion can be still found in the

literature. For example, in the "Flora of the USSR" and "Flora Europaea", *S. taimyrensis* = *S. pulchra* is still considered to be closely related to *S. arctica*. Still more complications emerged due to the fact that the species was described twice under the same name, however, absolutely independently: from Siberia by P. Pallas and from North America by R. Brown. The relation of these two "*S. arctica*" remained obscure for a long time. On our list, all the synonyms ascending to R. Brown's specimens are segregated at the end for the sake of the reader's better orientation.

It is a curious fact that the name *S. brownii* was also proposed two times, independently.

29. **S. ovalifolia** Trautv. 1832, Salic. Frigid.: 306 et tab. 13; Ledeb. 1850, Fl. Ross. **3**, 2: 620; Rydberg, 1899, Bull. N. Y. Bot. Gard. **1**: 275; Coville, 1901, Proc. Wash. Acad. **3**: 331; Schneider, 1918, Bot. Gaz. **66**: 138; Nazarov, 1936, Fl. SSSR **5**: 51 (p. min. p.: quoad pl. peninsulae Tschukot. tantum!!); Hultén, 1943, Fl. Al. **3**: 521; Raup, 1949, Contrib. Gray Herb. **185**: 51; Skvortsov, Derviz-Sokolova, 1966, Spisok rast. Gerb. fl. SSSR **91**: N 4522. —Non *S. ovalifolia* auct.: Rgl. et Tiling, 1858, Fl. Ajan.: 117; Lundström, 1877, Weiden Now. Sem.: 15; Nazarov, 1936, op. cit. **5**: 51 (p. max. p.); id. 1937, Fl. Zabayk. **3**: 216; Karavayev, 1958, Konsp. fl. Yak.: 81 et al. —*S. glacialis*
135 Anderss. 1858, Öfver. K. vet. förhandl. **15**: 131; id. 1868, in DC. Prodr. **16**, 2: 300. —*S. cyclophylla* Rydb. 1899, op. cit. **1**: 274.

T y p u s: "Cap Espenberg. Eschscholtz" (LE!).

HABIT: A sprawling procumbent shrub with numerous branches spreading radially from a powerful caudex, almost never rooting.

DISTRIBUTION AND HABITATS. Within the Russian territory, it is known exclusively from the coast of the Chukchi Peninsula, where it grows on somewhat sodded sandy-pebbly deposits. So far, there are very few known localities: Uelen, Kolyuchin and Ratmanov islands, the Gulf of Lavrentiya, Provideniya (Providence) Bay, Senyavin Strait, and Arakamchechen Island. (Fig. 26.)

It is more widespread in North America: along the northern and western coasts of Alaska and on the Aleutian and Pribilof islands. According to E. Hultén (1943), it also occurs in the mountains of Alaska.

30. **S. sphenophylla** A. Skv. 1966, Spisok rast. Gerb. fl. SSSR **91**: N 4524 (nom. nov. pro *S. cuneata* Turcz. 1850 non Nutt. 1842); id. 1966, Arkt. fl. SSSR **5**: 62. —*S. cuneata* Turcz. ex Ledeb. 1850, Fl. Ross. **3**, 2: 623; Turcz. 1854, Fl. Baic.-Dah. **2**, 2: 395; Komarov, 1929, Fl. Kamch. **2**: 27; Nazarov, 1936, Fl. SSSR **5**: 50; id. 1937, Fl. Zabayk. **3**: 212; Popov, 1959, Fl. Sredn. Sib. **2**: 807. —Non *S. cuneata* Nuttal, 1842, N. Am. Sylva **1**: 66. —*S. arctica* γ *leiocarpa* Ledeb. 1850, op. cit. **3**, 2: 619. —*S. arctica* α *nervosa* Anderss. 1868, in DC. Prodr. **16**, 2: 286. —*S. arctica* × *cuneata* Flod. in Porsild, 1939, Rhodora **41**: 216. —*S. torulosa* (non Trautv.) Hultén, 1943, Fl. Al. **3**: 519.

T y p u s: "Inter Jakutsk et Ochotsk. —Turcz. pl. exs. a. 1835" (LE!).

Ssp. **pseudotorulosa** A. Skv. 1966, Spisok rast. Gerb. fl. SSSR **91**: N 4524; id. 1965, Arkt. fl. SSSR **5**: 63. A ssp. *sphenophylla* differt ramis saepe elongatis subascendentibus, foliis latioribus, capsulis plus minusve pubescentibus.

T y p u s: "Peninsula Tschukotka, prope pag. Uë len, tundra lapidosa, 8 VIII. 1959. leg. T. Derviz-Sokolova" (Herb. Fl. URSS, N 4524).

HABIT: A powerful, sometimes fist-sized woody caudex producing slender, short-
136 living shoots. The development of this special habit is attributed to the impact of frost and wind erosion.

HABITATS: Stony, gravelly, or gritty substrates on barren heights, particularly, taluses, rocky outcrops, and dry stony tundras; places where the snow is blown away from during the wintertime; occasionally, sandy and moss tundras.

DISTRIBUTION: The Siberian Northeast from the Lower Olenek, Lena, and Verkhoyanskiy Range to Uelen; Chetyrekhstolbovoy and Ayon islands (yet missing from Wrangel Island); Kamchatka (common, to 1,000 m); Paramushir (according to A. Kimura; no samples in Russian collections); Commander and Shantar islands, Ayan, the Tukuringra and Baykal ranges, Stanovoye High Plateau (reaching the Barguzinskiy Range).

Ssp. *pseudotorulosa* is distributed east and northeast of the Kolyma Mouth and Lower Anadyr and scattered on the barren heights of western Alaska. M. Nazarov (1937: 212) mentioned that this species occurred in the Sayans, however, there is no evidence in herbaria. (Fig. 28.)

31. **S. kurilensis** Koidz. 1918, Bot. Mag. Tokyo **32**: 62; Hultén, 1928, Fl. Kamtch. **2**: 21; Kimura, 1934, in Miyabe, Kudo, Fl. Hokk. a. Saghal. **4**: 406; Nazarov, 1936, Fl. SSSR **5**: 34. —*S. longepetiolata* Flod. 1926, Ark. bot. **20A**, 6: 14; Hultén, 1928, op. cit. **2**: 15; Komarov, 1929, Fl. Kamch. **2**: 28. —*S. hidaka-montana* Hara, 1933, J. Jap. Bot. **9**: 512; Kimura, 1934, op. cit. **4**: 408; Ohwi, 1965, Fl. Jap.: 365. —*S. subreniformis* Kimura, 1934, op. cit. **4**: 409; id. 1937, Symb. Iteol. **4**: 312. —*S. phanerodictya* Kimura, 1934, op. cit. **4**: 449.

T y p u s: "Insula Shumshu, 29.VII 1903 K. Yendo" (TI?, n. v.).

HABIT: A procumbent small shrub with stout branches resembling *S. sphenophylla*, occasionally developing a strong caudex as large as in *S. sphenophylla*.

HABITATS: Rocks, scarps, damp meadows, and heaths.

DISTRIBUTION: Nearly all of the Kuril Islands from Shikotan to Shumshu (not found on Kunashir), southernmost Kamchatka, Bering Island, and the mountains of Hokkaido. On the central and northern Kurils, it descends almost to the sea level; on the southern Kurils and Hokkaido, it occurs only in the mountains. (Fig. 29.)

NOTE. A. Kimura considered *S. longepetiolata* Flod. to be a synonym of *S. kurilensis* (Kimura 1934: 407). It remains unclear if A. Kimura had compared the appropriate authentic specimens. In spite of numerous requests, I never had a chance to examine the type specimen of *S. kurilensis*, and the species description does not match our plants well enough. Consequently, the name of our plants is not yet decided, and it is quite possible that *S. longepetiolata* might become an accepted name. I have studied the authentic specimens of *S. hidaka-montana* from Hokkaido and found them absolutely identical with the plants from the Kurils.

32. **S. nakamurana** Koidz. 1913, Bot. Mag. Tokyo **27**: 96; Schneider, 1916, in Sarg. Pl. Wilson. **3**, 1: 135; Kimura, 1928, Bot. Mag. Tokyo **42**: 574; id. 1931, Sci. Rep. Tohoku Univ. 4 ser. **6**, 2: 189; Makino, 1956, Fl. Jap.: 675; Ohwi, 1965, Fl. Jap.: 365. —*S. cyclophylla* (non Rydb. 1899) Seemen, 1902, Bot. Jahrb. Beibl. **67**: 41; id. 1903, Salic. Jap.: 69; Koidzumi, 1916, Bot. Mag. Tokyo **30**: 81. —*S. yezoalpina* Koidz. 1916, op. cit. **30**: 332; Kimura, 1934, in Miyabe, Kudo, Fl. Hokk. a. Saghal. **4**: 407; Ohwi, 1965, op. cit.: 365. —*S. neoreticulata* Nakai, 1930, Rep. Veget. Daisetsusan Mts.: 62; Kimura, 1934, op. cit. **4**: 408. —*S. ketoiensis* Kimura, 1934, op. cit. **4**: 410. —*S. rashuwensis* Kimura, 1934, op. cit. **4**: 450. —*S. aquilonia* Kimura 1934, op. cit. **4**: 405 (p. p.?).

T y p u s: "Prov. Sinano, Dailengezan, VIII 1912. Masao Nakamura" (TI n. v. Vidi specimina e loco classico e Hb. U. Tokyo missae).

HABIT: A compact procumbent shrub greatly resembling *S. arctica*.

HABITATS: Rocks and mountain tundras.

DISTRIBUTION: Sakhalin (the Schmidt Peninsula and Zatymovskiy Range); the Kurils
138 (Shiashkhotan, Rasshua, Shimushir, and, according to A. Kimura, 1934, Ketoi); Japan (the mountains of Hokkaido and central Hondo). (Fig. 28.)

Sect. 11. *Myrtosalix*

Kerner, 1860, N.-Öst. Weid.: 203.

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

Small or dwarf shrubs. In majority of species, floriferous buds considerably different from vegetative ones; bud size gradation of type 3 (*caprea*) or transitional from 2 (*arctica*) to 3. Leaves mostly stipulate; stipules subequilateral, lanceolate or ovate. Petioles channeled. Leaves firm, stiff, lustrous above (and often as well beneath). In many species, dead leaves persistent on branches during wintertime. Catkins terminate more or less foliated shoots, bracts black or purple-brown. Nectaries two or one in male flowers. Ovaries glabrous or pubescent (in nearly all species, pubescence of ovaries is facultative). Pubescence consists of either flexuous or rumpled, ribbon-like trichomes highly refracting light. Styles distinct, stigmas vary in their length (0.2–1.0 mm).

This is a very solid and natural group of 13 or 14 species distributed across boreal Eurasia and North America, in tundras and alpine zones. There are just two species, *S. phlebophylla* and *S. rotundifolia,* that are somewhat different from the rest of the section members and resemble the species from *Retusae* because of considerable reduction of their organs. However, there is no doubt that these two also belong to *Myrtosalix,* as far as their foliage and pubescence are concerned. It is quite possible that *Myrtosalix* and *Retusae* are of close filiation (indeed, *S. retusa,* too, somewhat resembles the species from *Myrtosalix* in particular characters); still we are not confident about this relation. There also exists a possibility of close connection with *Hastatae,* which is revealed through the morphology of the leaves, stipules, buds, and partially gynoecium.

Key to Species

1. Leaves green beneath. Dry leaves of previous seasons persistent on branches 2
— Leaves deciduous 6
2. Plants form small, compact, cushion-like clumps. Annual accretion of epiterranean shoots insignificant. Elongated leafless stolons obliquely ascending inside substrate. Stipules lacking or obsolete, rudimentary. Leaves entire or obscurely dentate 3
— Plants cushion-like or fruticose. Underground stolons lacking; all of annual accretion allocated to epiterranean shoots. Leaves stipulate, at least on vigorous shoots, distinctly dentate 4
3. Old specimens form powerful caudices, up to 1–2 cm thick. Leaves cuneately attenuating at base, 5-20 mm long. Old leaves disintegrating into fibers (reticulation) before total decay. Catkins of 6–10 flowers or more, mostly cylindrical, sticking out above foliage after flowering, at least female ones. Bracts mostly entirely pubescent; trichomes straight . . . . . 41. **S. phlebophylla**

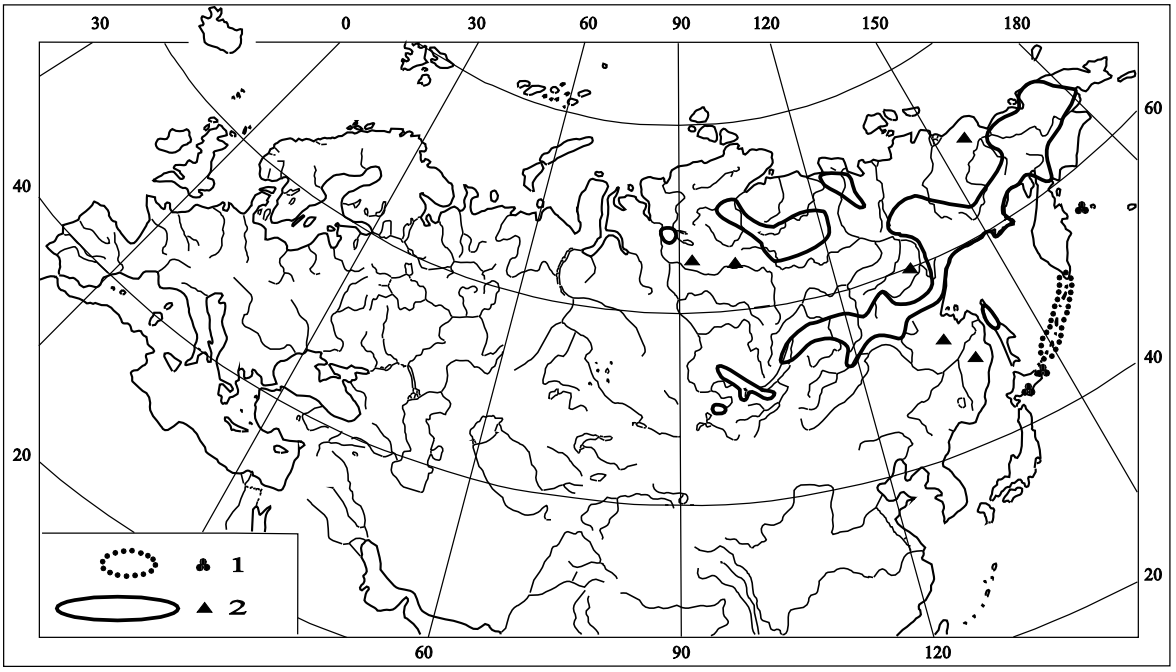


Fig. 29. Distributional areas of *Salix kurilensis* Koidz. (*1*) and *S. saxatilis* Turcz. ex Ledeb. (*2*)

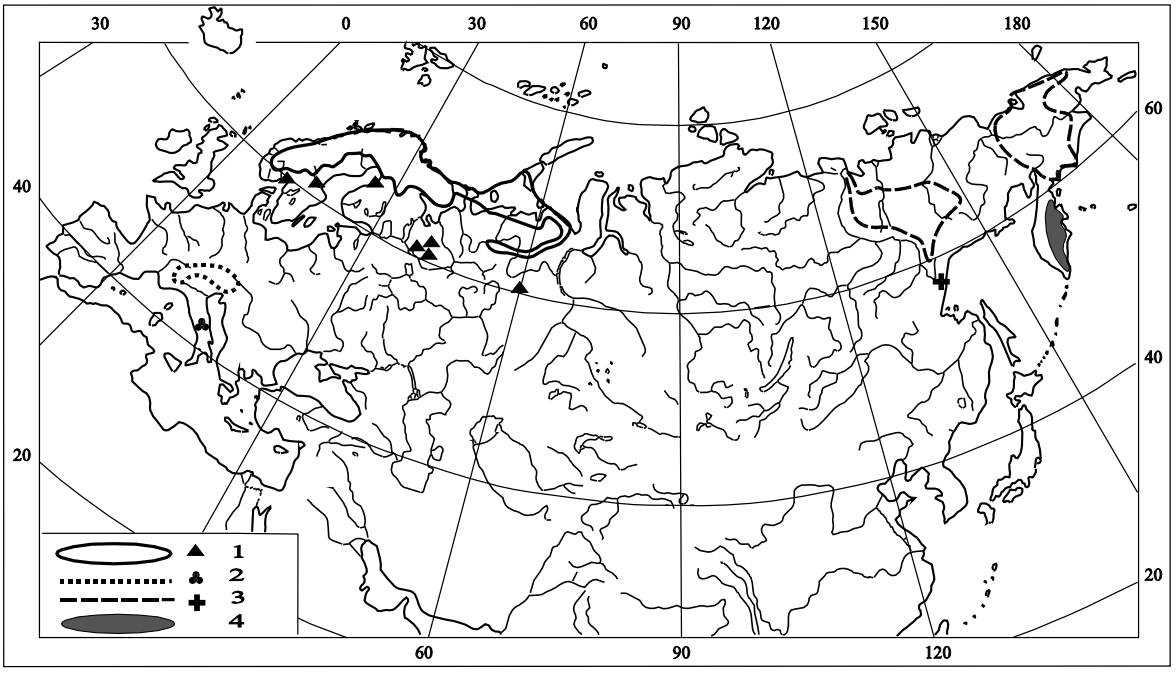


Fig. 30. Distributional areas of *Salix myrsinites* L. (*1*), *S. breviserrata* Flod. (*2*), *S. tschuktschorum* A. Skv. (*3*), and *S. berberifolia* ssp. *kamtschatica* A. Skv. (*4*)

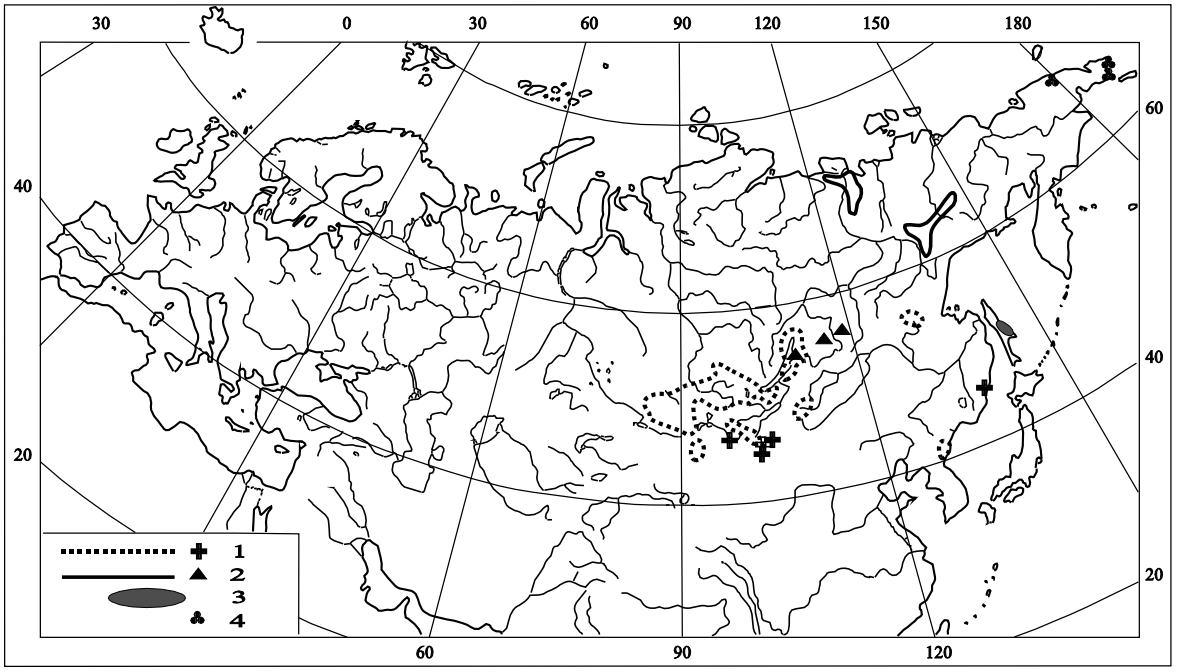


Fig. 31. Distributional areas of *Salix berberifolia* Pall. ssp. *brayi* et *berberifolia* (*1*), ssp. *fimbriata* A. Skv. (*2*), ssp. *kimurana* (Miyabe et Tatewaki) A. Skv. *(3)*, and *S. rotundifolia* Trautv. (*4*)

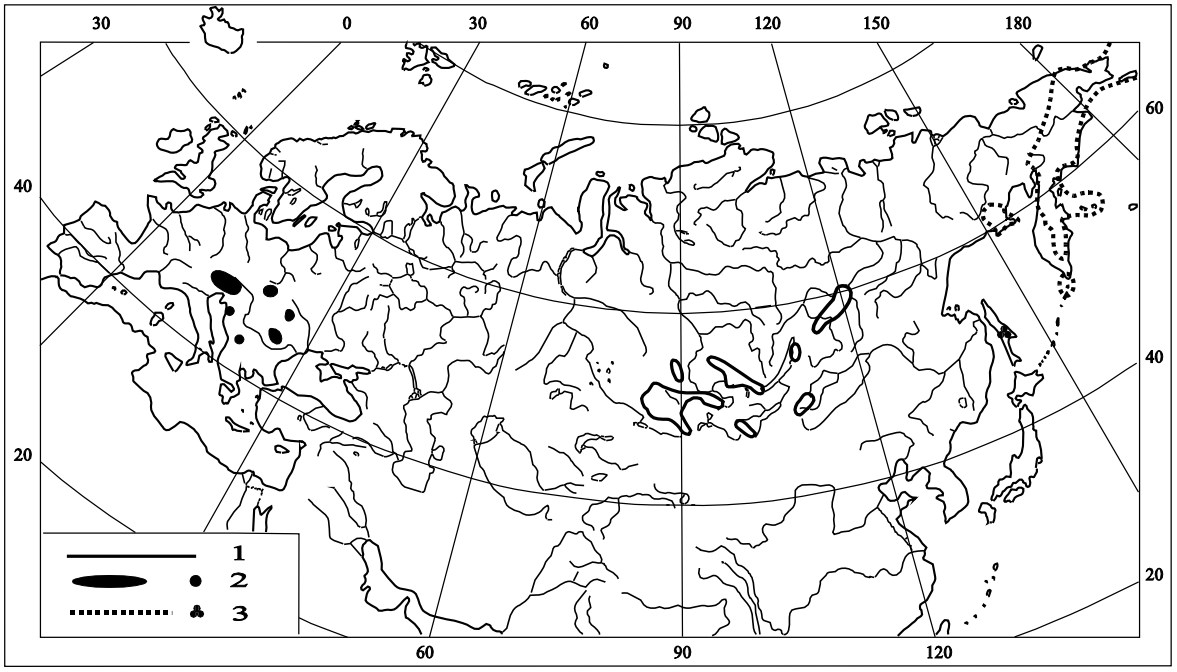


Fig. 32. Distributional areas of *Salix rectijulis* Ledeb. et Trautv. (*1*), *S. alpina* Scop. (*2*), and *S. chamissonis* Anderss. (*3*)

— Caudices never formed, even in oldest specimens. Leaves round to roundish, 2–5 mm long, abruptly cuneate at base. Old leaves persistent many years and decay totally, without previously disintegrating into fibers. Catkins of 2–6 flowers, not protruding out of foliage. Bracts crispy pubescent to puberulous at margins . . . . . 42. **S. rotundifolia** *139*

4. Plants procumbent, cushion-like. Leaves mostly obovate, cuneate at base. Anthers 0.4–0.5 mm long. Stigmas 0.2–0.3 mm long, short-two-lobed . . . . . 34. **S. berberifolia**

— Plants fruticose. Leaves mostly broadly elliptic, abruptly cuneate or rounded, occasionally subcordate at base. Anthers 0.5–0.7 mm long. Stigmas 0.3–0.7 mm long, either deeply two-lobed or two-parted, linear 5

5. Leaves spiny-toothed (denticles to 0.5–1.5 mm long). Female catkins long-stalked, usually significantly protruding from foliage, rather loosely flowered, particularly at their lower parts. Ovaries glabrous, occasionally puberulent . . . . . 35. **S. tschuktschorum**

— Leaf denticles not spiny, shorter than 0.3 mm. Catkins densely flowered, short-stalked, insignificantly protruding from foliage. Ovaries mostly densely pubescent (mature capsules sometimes glabrous) . . . . . 33. **S. myrsinites**

6. Leaves glaucous dull beneath, at least superior ones. Bracts mostly lanceolate or ovate, acutish. Styles mostly considerably longer than stigmas 7

— All leaves green, lustrous beneath. Bracts usually broadly elliptic or ligular, either obtuse or rounded at apex. Styles mostly not longer than stigmas 8

7. Branches procumbent. Buds obtuse, accumbent to shoots; floriferous buds inconspicuously different from vegetative ones. Petioles 5–15 mm long. Leaves always denticulate . . . . . 39. **S. chamissonis**

— Branches either upright or ascending. Floriferous buds significantly different from vegetative ones (*caprea*-type of bud gradation), ovoid, acute, growing at acute angle to shoot or at least recurved at their apices. Petioles 2–5 mm long; not infrequently, leaves subentire . . . . . 40. **S. saxatilis**

8. Creeping habit. Leaves entire (rarely with sparsely scattered denticles). Catkin stalks slender (less than 1 mm thick) . . . . . 38. **S. alpina**

— Leaves denticulate, at least ordinary ones. Catkin stalks mostly thicker than 1 mm 9

9. Leaves 5–15 mm broad, inferior ones (as well as cataphylls) always very densely denticulate; superior ones often partially entire. Female catkin stalks nearly as long as catkins or shorter (but not more than twice shorter), with 5–8 leaflets . . . . . 36. **S. breviserrata**

— Leaves usually broader, inferior ones (as well as cataphylls) often subentire, ordinary ones with more distinct denticles. Female catkin stalks a few times shorter than their catkins, with 2–5 leaflets . . . . . 37. **S. rectijulis**

33. **S. myrsinites** L. 1753, Sp. pl.: 1018; Ledeb. 1850, Fl. Ross. **3**, 2: 620 (p. p.: quoad pl. europaeas); Wimmer, 1866, Salic. Eur.: 97 (p. p.: excl. pl. centrali-europ.); Floderus, 1931, Salic. Fennosc.: 32; id. 1939, Ark. bot. **29A**, 18: 37; Perfilyev, 1936, Fl.

Sev. kr. **2–3**: 28; Nazarov, Fl. SSSR **5**: 49 (p. p.: excl. pl. Sibir. austr.); Shlyakov, 1956, Fl. Murm. **3**: 68; Rech. f. 1964, Fl. Eur. **1**: 47.

T y p u s: "In alpibus Lapponiae. Fl. Lapp. N 353 et tab. 8 fig. F, tab. 7, fig. 6; Fl. Suec. N 799".

140 HABIT. The species usually forms dense thickets that are, however, neither extensive nor tall.

HABITATS: Banks of streams, well-moisturized slopes and depressions, damp rocks, and mesotrophic edges of wetlands. Presumably, it is associated with basic bedrock, particularly, limestone.

DISTRIBUTION: The mountains of Scotland (100–800 m) and Scandinavia (to 1,000 m in northern Norway); the entire Kola Peninsula (to 600 m in the Khibins); the northern Kanin Peninsula, Kolguyev Island, and Malozemelskaya Tundra; the western coast of Southern Island in the Novaya Zemlya. East of these territories, that is, in Bolshezemelskaya Tundra, on Vaygach Island, the Yugorskiy Peninsula, in Kara Tundra, as well as in the Polar and Prepolar Urals the species becomes much more rare and occurs only sporadically and almost exclusively on limestone. There are also some scattered locations restricted to limestone in drainage wetlands within the northern forest belt: in the Vaga Basin, near Lake Vozhe, in the Pizhma, Izhma, and Kozhva basins, and near Denezhkin Kamen in the Urals. (Fig. 30.)

34. **S. berberifolia** Pall. 1776, Reise **3**: 444, 759; id. 1788, Fl. Ross. **1**, 2: 84; Ledeb. 1850, Fl. Ross. **3**, 2: 621; Nakai, 1930, Fl. sylv. Kor. **18**: 149; Nazarov, 1936, Fl. SSSR **5**: 55 (p. p.); id. 1937, Fl. Zabayk. **3**: 216; Popov, 1959, Fl. Sredn. Sib. **2**: 808; Polyakov, 1960, Fl. Kazakhst. **3**: 36; Skvortsov, 1961, Bot. mat. Gerb. Bot. in-ta AN SSSR **21**: 86. —*S. brayi* Ledeb. 1833, Fl. Alt. **4**: 289; id. 1834, Icones **5**: 15 et tab. 449; id. 1850, Fl. Ross. **3**, 2: 621; Krylov, 1930, Fl. Zap. Sib. **4**: 772. —*S. kimurana* Miyabe et Tatewaki, 1936, Trans. Sapporo Nat. Hist. Soc. **14**: 255; Kimura, 1937, Symb. Iteol. **3**: 103 et **4**: 318; Skvortsov, 1961, op. cit. **21**: 91. —*S. montis-lopatinii* A. Tolmatschev, 1956, Der. i kustarn. Sakhal.: 67.

T y p u s: "In summis alpium Sochondo leg. Sokolof" (LE!).

Key to Subspecies

1. Dead leaves of preceding season of bright brown or chestnut color, smooth, firm, spiny-toothed . . . . . ssp. **kamtschatica**
— Dead leaves of preceding season dull, rather rumpled 2

141 2. Leaves cleft to nearly half of distance from margin to midrib, with 3–8 denticles on each side. Styles 0.1–0.3 mm long . . . . . ssp. **fimbriata**
— More leaf denticles of smaller size on each side. Styles not shorter than 0.3 mm 3

3. Shoots stout, often more or less ascending. Leaves large (15–30 × 8–15 mm), without stomata on upper surface . . . . . ssp. **kimurana**
— Shoots slender, procumbent. Leaves smaller, mostly with stomata on upper surface 4

4. Leaves narrow (3–7 mm broad), with minute, sometimes obscure denticles. Bracts very shortly puberulent . . . . . ssp. **brayi**
— Leaves broader (5–10 mm), with acute, distinct denticles. Bracts mostly clothed with longer, straight trichomes . . . . . ssp. **berberifolia**

Ssp. **brayi** (Ledeb.) A. Skv. 1961, Bot. mat. Gerb. Bot. in-ta AN SSSR **21**: 88. —*S. brayi* Ledeb. 1833.

T y p u s: "Altai, in alpibus Terektensibus —Bunge" (LE!).

Ssp. **fimbriata** A. Skv. 1961, op. cit. **21**: 86 et fig. 3a.

T y p u s: "In valle fl. Lenae infer. ca 1800 km a Jakutsk, Adshergai pr. Atlach-Kaja, 6.VI 1914. V. A. Kaschkarov" (LE).

Ssp. **kamtschatica** A. Skv. ssp. nova. Foliis acute spinoso-serrulatis, emarcidis anni praecedentis rigidis castaneis sublucidis distinguitur.

T y p u s: "Kamtschatka, in alpibus Montis Krascheninnikovii, 21.VIII 1909. V. L. Komarov N 3265" (LE, MW).

Ssp. **kimurana** (Miyabe et Tatewaki) A. Skv. comb. nova. —*S. berberifolia* var. *kimurana* Miyabe et Tatewaki, 1935, Trans. Sapporo Nat. Hist. Soc. **14**: 84; Sugawara, 1939, Ill. Fl. Saghal. **2**: 695. —*S. kimurana* Miyabe et Tatewaki, 1936, l. c. —*Salix* an sp. n.? A. Tolmatschev, 1950, Bot. zhurn. **35**, 4: 347. —*S. montis-lopatinii* id. 1956, Der. i kustarn. Sakhal.: 67.

T y p u s: "Sachalin austr., Mons Sekaisan [Mons Sokolov] 2.VIII 1935. M. Kawashima" (Hb. Univ. Hokkaido, n. v.).

HABITATS: Well-drained dwarf-shrub, graminoid, or moss-dominated tundras (mostly on stony substrate), gravelly stone-fields, outcrops, and rocks (mostly on basic bedrock, particularly, limestone) within the barren heights zone in East Siberia at elevations 1,400–2,300 m in the Sayans and Altai, to 2,800–2,900 m in Tuva and Mongolia, to 2,300 m in the Stanovoy Range, and to 1,000 m on the Kamchatka Peninsula.

DISTRIBUTION: The barren heights of the Altai (including most of the Mongolian Altai), Western and Eastern Sayans, Khangai, Kentei, and southern Transbaykalia (common). The Baykal Range and the ranges of the Stanovoye High Plateau (more sporadically). The Stanovoy Range, Sikhote-Alin, and the mountains of North Korea (some solitary findings).

The plants from the Altai and part of the Western Sayan plants belong to ssp. *brayi*, the rest of the species area is occupied mostly by ssp. *berberifolia*. Ssp. *kimurana* is known only from three summits on Sakhalin (mounts Lopatina, Sokolov, and Orel). Ssp. *fimbriata* is distributed in the Verkhoyanskiy and Cherskogo ranges (however, some specimens also occur on the Stanovoye High Plateau). Ssp. *kamtschatica* is restricted to the Kamchatkan barren heights. (Fig. 31.)

NOTE. The systematics of *S. berberifolia* still needs more investigation. For instance, it is necessary to find out if the ssp. *fimbriata* is a distinct species, particularly, in the Stanovoye High Plateau. There is also a need for more material concerning the ssp. *kimurana*, since it is not improbable that this is yet another distinct species. The ssp. *kamtschatica* resembles the next species treated here below, *S. tschuktschorum*, in its firm *142*
dead leaves and stomata of large size. Hence, it is not unlikely that future studies may place the ssp. *kamtschatica* in *S. tschuktschorum*[1].

35. **S. tschuktschorum** A. Skv. 1961, Bot. mat. Gerb. Bot. in-ta AN SSSR **21**: 83, 90; id. 1961, Feddes Repert. **64**: 75. —*S. berberifolia* auct. fl. Ross. non Pall.: Trautv. 1879, Acta Horti Petropol. **6**, 1: 35; Nazarov, 1936, Fl. SSSR **5**: 55 (p. p.); Karavayev, 1958, Konsp. fl. Yak.: 81 (p. p.).

[1] As it was proposed in 1977 (Skvortsov 1977: footnote on p. 74), this subspecies might be rather related to *S. tschuktschorum* (authors's note to the English edition).

T y p u s: "Anadyr, montes Gorelovy dicti, ad rivulum, 26.VI 1933. M. Vassiljeva" (LE).

HABIT: A dwarf shrub to 50 cm tall, different from the previous species in its rather upright habit; however, its branches are spreading, often nearly cushion-like. It resembles *S. myrsinites*, a European species.

HABITATS: Wet moss-dominated and stony tundras near streams; dwarf-shrub and cryptogam tundras that get enough water during the summer and snow during the winter; exposed dry slopes (much more rarely). Its ecological characteristics, like habitual ones, are divergent from those of *S. berberifolia* and close to *S. myrsinites*.

In the Moma Range, it ascends to 1,400 m; on Tarbaganakh Barren Height (the southern Verkhoyanskiy Range), to 2,100 m, appearing to be rather indifferent to bedrock acidity (or probably preferring acidic bedrock).

DISTRIBUTION: The barren heights of the Northeast from the Verkhoyanskiy Range to Koryak High Plateau and Anadyr Range. However, there are no collections from the coast of the Sea of Okhotsk and southern Kolymskiy Range. (Fig. 30.)

36. **S. breviserrata** Flod. 1939, Ark. bot. **29A**, 18: 44; Janchen, 1956, Catal. fl. Austr. **1**: 103; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 81; id. 1964, Fl. Eur. **1**: 47. —*S. myrsinites* auct.: L. 1753, Sp. pl.: 1018 (p. p.); Wimmer, 1866, Salic. Eur.: 97 (p. p.); Camus, 1904, Saul. Fr. **1**: 111 (p. p.); Rouy, 1910, Fl. Fr. **12**: 215; Buser, 1940, Ber. Schweiz. bot. Ges. **50**: 754; Vicioso, 1951, Salic. Españ: 98. —*S. myrsinites* var. *serrata* Neilreich, 1859, Fl. Nied.-Öst.: 266; Seemen, 1909, in Aschers. et Graebn. Synopsis **4**: 162. —*S. arbutifolia* auct. (non Pall. 1788): Willd. 1806, Sp. pl. **4**, 2: 682; Samuelsson, 1922, Vierteljahresschr. naturf. Ges. Zü rich **67**: 249.

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T y p u s: "In alpibus Sabaudiae… Sub nomine *S. arbutifoliae* (♀) communicavit Flü gge" (Hb. Willdenow —B, n. v.).

HABIT: A low (but usually not procumbent) shrub 10–50 cm tall.

HABITATS: Peaty meadows, moist depressions, banks of streams, and stony spots in the crooked forest and alpine zones (the elevation range 1,600–2,500 m). Presumably, this species is associated with acidic, siliceous substrates. However, it also occurs on limestone, according to some authors (Buser 1940, Neumann 1960).

DISTRIBUTION: The central Pyrenees (presumably, just their French side), Alps (from the Maritime Alps to Carinthia), Abruzzi Apennines, and probably Picenum Apennines as well. (Fig. 30.)

NOTE. There are some complications with the type of *S. breviserrata*. B. Floderus did not designate the type of the species. Instead, when publishing the species name, he referred to pre-Linnaean descriptions of *S. breviserrata* made by J. Scheuchzer and A. von Haller and also to *S. arbutifolia* Willd. Obviously, the appeals to J. Scheuchzer and A. von Haller were relied on citations in C. Linnaeus' and C. Willdenow's works. However, neither C. Linnaeus, C. Willdenow, nor B. Floderus ever saw the original plants of J. Scheuchzer and A. von Haller. Therefore, it would be more appropriate not to treat those plants as type specimens. We would rather use the type of *S. arbutifolia* Willd., which is quite distinct and appears to belong to the species under consideration.

37. **S. rectijulis** Ledeb. ex Trautv. 1832, Salic. Frigid.: 313 (p. p. excl. pl. ex Ins. Sti Laurentii); Skvortsov, 1957, Spisok rast. Gerb. fl. SSSR **81**: N 4013; id. 1966, op. cit. **91**: N 4525; Sergiyevskaya, 1961, Fl. Zap. Sib. **12**: 3230; Malyshev, 1965, Fl. Vost. Sayana: 105. —*S. submyrsinites* Flod. 1936, Sv. bot. tidskr. **30**: 388 et fig. 2; id. 1939, Ark. bot. **29A**, 18: 47. —*S. myrsinites* auct. non L.: Trautv. 1833, in Ledeb. Fl. Alt. **4**: 284;

Ledeb. 1834, Icones **5**: 16 et tab. 455; id. 1850, Fl. Ross. **3**, 2: 620 (ex p.: quoad pl. altaicas); Nazarov, 1936, Fl. SSSR **5**: 49 (ex p.: quoad pl. Sibir. austr.); id. 1937, Fl. Zabayk. **3**: 214; Grubov, 1955, Konsp. fl. Mong.: 101; Popov, 1959, Fl. Sredn. Sib. **2**: 806; Polyakov, 1960, Fl. Kazakhst. **3**: 36; Cherepnin, 1961, Fl. yuzhn. ch. Krasnoyar. kr. **3**: 13.

T y p u s: "Prope Riddersk in Monte Crucis, in alpibus Sentelek et in summis alpibus Terektensibus" (Ledeb. 1834: 17) (LE!).

HABITATS: Rocks and stone-fields; stony, meadowy, and moss-dominated mountain tundras; banks of streams; spots near icefields and snowbanks (calcareous substrates preferred).

Elevation ranges: 1,700–2,500 m in the Eastern Sayans, to 2,900 m in the Tannu-Ola. Due to climatic inversions in the Barguzinskiy Range, the species descends to the coast of Lake Baykal at the mouth of the Sosnovka River and some other places.

DISTRIBUTION: On and around the barren heights of the Altai (including its Mongolian part), Sayans, Kuznetskiy Alatau, Tannu-Ola, Khangai, Kentei, Sokhondo, and Barguzinskiy Range. On the Stanovoye High Plateau, the species is quite rare: it was found in the Muya River Basin and also between Urteni and the Olekma River, according to P. Polyakov. (Fig. 32.)

38. **S. alpina** Scop. 1772, Fl. Carniol. 2 ed. **2**: 255 et tab. 61, fig. 1208 (p. p.?); Floderus, 1939, Ark. bot. **29A**, 18: 49; Pawłowski, 1956, Fl. Tatr **1**: 185; Rech. f. 1957, in Hegi, Ill. Fl. Mitteleur. **3**, 1: 80; id. 1964, Fl. Eur. **1**: 47. —*S. fusca* (non L.) Jacq. 1778, Fl. Austr. **5**: 4. —*S. jacquinii* Host, 1797, Synops. Austr.: 529; Szafer, 1921, Fl. Polska **2**: 43; Pawłowski, 1946, O niekt. wierzb.: 13; Nazarov et al. 1952, Fl. URSR **4**: 28; Beldie, 1952, Fl. Rom. **1**: 312. —*S. jacquiniana* Willd. 1806, Sp. pl. **4**, 2: 692; Schur, 1866, Enumer. Transsilv.: 662; Zapałowicz, 1908, Consp. Galic. **2**: 78. —*S. myrsinites* auct. p. p. non L.: Wimmer, 1866, Salic. Eur.: 99; Seemen, 1909, in Aschers. et Graebn. Synopsis **4**: 162; Dostá l, 1950, Květ. ČSR: 895 et al.

T y p u s: "In alpibus Carnioliae".

HABITATS: Moist rocks, taluses, meadowy slopes, and banks of streams in the alpine and subalpine zones (almost exclusively on limestone). *144*

DISTRIBUTION: The Eastern Alps (Austria, Italy, Slovenia, and a part of Bavaria); Tatras, Eastern and Southern Carpathians (the only location within the Ukrainian territory is on Mount Bliznitse, at 1,800 m); Croatia and Macedonia.

The elevations are 1,700–2,500 m in the Alps, 1,100–2,150 m in the Tatra Mountains, 2,300–2,500 m in Macedonia. (Fig. 32.)

39. **S. chamissonis** Anderss. 1868, in DC. Prodr. **16**, 2: 290; Trautv. 1879, Acta Horti Petropol. **6**, 1: 35; Coville, 1901, Proc. Wash. Acad. **3**: 325; Floderus, 1926, Ark. bot. **20A**, 6: 29; Komarov, 1929, Fl. Kamch. **2**: 23; Nazarov, 1936, Fl. SSSR **5**: 49; Floderus, 1939, Ark. bot. **29A**, 18: 42; Hultén, 1943, Fl. Al. **3**: 509; Raup, 1959, Contrib. Gray Herb. **185**: 72; Skvortsov, Derviz-Sokolova, 1966, Spisok rast. Gerb. fl. SSSR **91**: N 4527. —*S. myrsinites* (non L.) Chamisso, 1831, Linnaea **6**: 540; Ledeb. 1850, Fl. Ross. **3**, 2: 620 (p. p. quoad pl. e Kamtschatka et Tschukotka). —*S. rectijulis* Trautv. 1832, Salic. Frigid.: 313 (p. p. quoad pl. ex ins. Sti Laurentii). —*S. pulchroides* Kimura, 1934, in Miyabe, Kudo, Fl. Hokk. a. Saghal. **4**: 446; id. 1940, Symb. Iteol. **8**: 414. —*S. kingoi* Kimura, 1940, op. cit. **8**: 405, fig. 3 et tab. 12.

T y p u s: "In sinu Sti Laurentii —Chamisso" (LE!).

HABIT: A prostrate shrub.

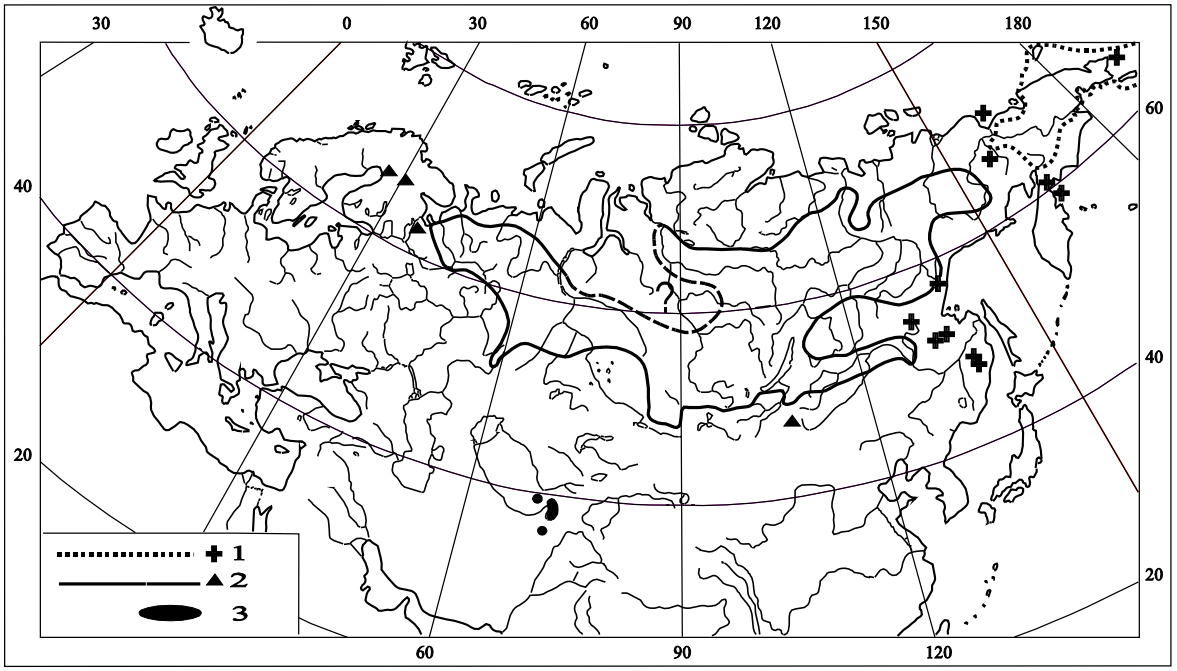

Fig. 33. Distributional areas of *Salix phlebophylla* Anderss. (*1*), *S. pyrolifolia* Ledeb. (*2*), and *S. fedtschenkoi* Goerz (*3*)

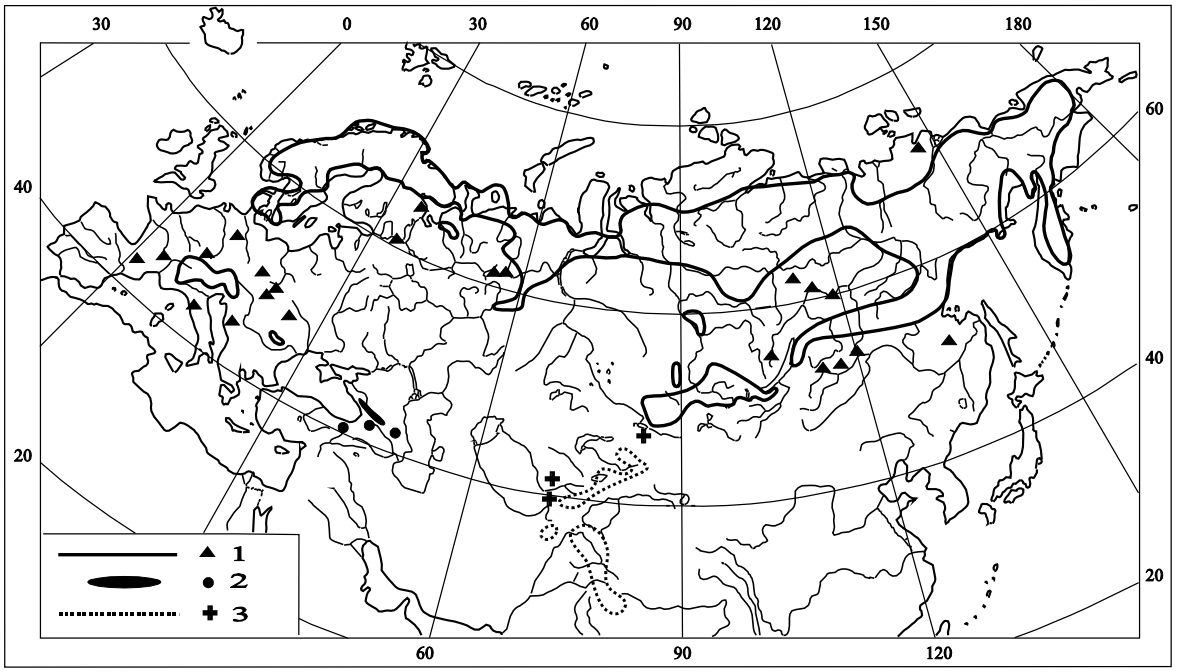

Fig. 34. Distributional areas of *Salix hastata* L. (*1*), *S. apoda* Trautv. (*2*), and *S. karelinii* Turcz. ex Stschegl. (*3*)

HABITATS: Moss-dominated and graminoid tundras in conditions where water supply is sufficient, but not stagnant; occasionally, somewhat paludal habitats (only on large tussocks). It appears to be a maritime species rather than inland one.

DISTRIBUTION: The Northeast (from Magadan and Cape Schmidt to Uelen and the Island of Ratmanov); the Kamchatka Peninsula (on and around the barren heights, to 1,200 m); the Commander Islands; Kurils (Shumshu and Paramushir); southern Sakhalin, (barren heights). (Fig. 32.) It also grows in Alaska.

40. **S. saxatilis** Turcz. ex Ledeb. 1850, Fl. Ross. **3**, 2: 621; Turcz. 1854, Fl. Baic.-Dah. **2**, 2: 391; Nazarov, 1936, Fl. SSSR **5**: 52; id. 1937, Fl. Zabayk. **3**: 214. —*S. fumosa* Turcz. 1854, op. cit. **2**, 2: 384; Nazarov, 1936, op. cit. **5**: 51; id. 1937, op. cit. **3**: 214; Popov, 1959, Fl. Sredn. Sib. **2**: 803. —*S. arnellii* Lundström, 1888, K. sv. vet. handl. **22**, 10: 202. —*S. nyiwensis* Kimura, 1934, in Miyabe, Kudo, Fl. Hokk. a. Saghal. **4**: 442; Tolmachev, 1956, Der. i kustarn. Sakhal.: 68. —*S. stoloniferoides* Kimura, 1934, *145*
op. cit. **4**: 448; Tolmachev, 1956, op. cit.: 69.

T y p u s: "In Sibiriae baicalensis rupibus ad torrentem Kudun—a. 1829 Turczaninow" (LE!).

HABIT: A low shrub (40–50 cm tall, specimens taller than that are rare), occasionally appressed to rocks.

HABITATS. It absolutely needs a good drainage and is restricted to stony or gravelly substrates. It grows under the canopy of open pine and larch stands or independently along mountain streams, on spring fens, near icefields, and in *yernik*'s, as long as there is a good supply of flowing water. On the other hand, it also occurs on fairly dry stony slopes, particularly, on calcareous rocks. It is mostly found around barren heights and in the forest-tundra; however, it may descend to the forest zone as well as partially ascend to barren heights and reach typical tundras.

DISTRIBUTION: The Eastern Sayans (to 2,400 m), Tannu-Ola and Sangilen (1,900–2,100 m), barren heights of southern Transbaykalia, Baykal Range, Stanovoye High Plateau (to 1,800–1,900 m), Stanovoy and Tukuringra ranges. There are solitary findings in the Bureyinskiy Range, northern Sikhote-Alin (Mount Tardoki-Yani, 1,700 m), and on northern Sakhalin (Mount Lopatina, to 1,200 m). It is common in the mountainous regions of the Northeast from the Verkhoyanskiy and Dzhugdzur ranges to the Gulf Kresta including the coast of the Sea of Okhotsk and reaching the Chaunskaya Inlet as the northernmost point. It is not found on Kamchatka. It is common in the forest-tundra and scattered in the northern forest belt of East Siberia from the Lena to Yenisei. (Fig. 29.)

NOTE. Across most of the species distributional area, its variability range remains fairly stable and rather narrow as compared to other species. However, there are two specific local forms standing out against that monotonous background.

1. In Amur Oblast and southern Yakutia, on pebbles of large rivers (particularly, the Zeya), there occur unusually tall (to 1–1.2 m) plants with abnormally elongated oblanceolate leaves. Unfortunately, all of a few (four or five) samples at my disposal were collected without catkins, so that one can hardly make any reliable assessments. Presumably, these are hybrids with one of riparian species (maybe, *S. udensis*).

2. On open sand dunes of northern Sakhalin, there occur plants with completely prostrate stems. These were described under the name of *S. stoloniferoides* Kimura. However, they do not exhibit any other specific characteristics except their prostrate habit and hence might be rather considered as a local ecotype adapted to certain conditions. Since

one can also find non-prostrate plants on Sakhalin, it is doubtful that "*S. stoloniferoides*" may be assigned of a taxonomic rank. More observations of this peculiar form are required.

Also, in the Dzhugdzur Range, there are many plants with strongly pubescent leaves, a feature that is extremely rare in the rest of the species distributional area.

41. **S. phlebophylla** Anderss. 1858, Öfver. K. vet. förhandl. **15**: 131; id. emend. 1868, in DC. Prodr. **16**, 2: 290 (nom. nov. pro *S. retusa* Hook. 1840, non L.); Coville, 1901, Proc. Wash. Acad. **3**: 336; Komarov, 1929, Fl. Kamch. **2**: 31; Nazarov, 1936, Fl. SSSR **5**: 56; Raup, 1959, Contrib. Gray Herb. **185**: 47; Skvortsov, Derviz-Sokolova, 1966, Spisok rast. Gerb. fl. SSSR **91**: N 4520. —*S. buxifolia* Trautv. 1832, Salic. Frigid.: 301, non *S. buxifolia* Schleicher ex Seringe, 1815, Saul. Suisse: 54. —*S. anglorum* Cham. 1831, Linnaea **6**: 541 (quoad plantas citatas, nec ad synonyma). —*S. retusa* Hook. 1840, Fl. Bor.-Amer. **2**: 153. —*S. arctica* ß *minor* Ledeb. 1850, Fl. Ross. **3**, 2: 619. —*S. palaeoneura* Rydb. 1899, Bull. N. Y. Bot. Gard. **1**: 267.

T y p u s: "Cap Mulgrave, captain Beechey" (K?, n. v.).

146 HABITATS: Stony mountain slopes poorly covered with snow. Although it is mostly associated with granite, it is often found on limestone, as well.

DISTRIBUTION: The extreme Northeast from the mouths of the Indigirka and Penzhina to Cape Dezhnev (common, except the Koryak High Plateau, where it is not found); the islands Chetyrekhstolbovoy, Wrangel (to 500 m on Berry Peak), and Karaginskiy. After a large gap, the species again appears at a number of isolated locations on barren heights of the ranges Dzhugdzur, Stanovoy (the Upper Zeya, at 2,000 m), Dussye-Alin, and northern Sikhote-Alin (mounts Ko and Tardoki-Yani, at 1,800–2,000 m). (Fig. 33.)

The species is also distributed in Alaska and Yukon, reaching the Lower Mackenzie.

42. **S. rotundifolia** Trautv. 1832, Salic. Frigid.: 304 et tab. 2; Anderss. 1868, in DC. Prodr. **16**, 2: 299; Rydberg, 1899, Bull. N. Y. Bot. Gard. **1**: 276; Schneider, 1919, Bot. Gaz. **67**: 52; Kimura, 1934, J. Fac. Agric. Hokkaido Univ. **36**, 1: 32; Nazarov, 1936, Fl. SSSR **5**: 39 (p. min. p.!); Floderus, 1941, Sv. bot. tidskr. **35**: 351; Raup, 1959, Contrib. Gray Herb. **185**: 46; Hultén, 1960, Fl. Aleut. 2 ed.: 163. —Non *S. rotundifolia* auct. mult.: Trautv. 1871 et 1877; Schmidt, 1872; Lundström, 1877; Tolmachev, 1930; Krylov, 1930; Perfilyev, 1936; Rechinger, 1964; et al. (cf. supra sub *S. nummularia*). —*S. polaris* var. *leiocarpa* Chamisso, 1831, Linnaea **6**: 542. —*S. leiocarpa* Coville, 1901, Proc. Wash. Acad. **3**: 338.

T y p u s: "In sinu Sti Laurentii. Chamisso" (LE!).

HABIT: A tiny plant, the smallest of the willows in this country.

HABITATS: Rocky outcrops and moist, but well-drained mountain tundras on gravelly or clayey slopes. The species is apparently restricted to limestone.

DISTRIBUTION: Within the territory under consideration, it occurs only on Wrangel Island (where it is common), the Chukchi High Plateau, and occasionally in the maritime zone on the eastern coast of the Chukchi Peninsula, that is, along the Gulf of Lavrentiya, Senyavin Strait, on Arakamchechen Island, and around the Provideniya Bay. (Fig. 31.). It also grows in arctic and alpine tundras of Alaska.