

STUDIES IN MANCHURIAN SPECIES OF VALERIANA

A. I. BARANOV⁽¹⁾

INTRODUCTION

Within the last 60 years the genus *Valeriana* L. has been repeatedly studied by different authors in Manchuria. This work was closely associated with the survey of the group in the countries surrounding Manchuria: Ussuriland, Korea and the Amur Region, since the latter survey prepared the way to a knowledge of Manchurian valerianas. The species of *Valeriana* in the Asiatic part of Russia were examined by Ledebour, Smirnov, Kreyer, Sumnevich, Maximowicz, Komarov and Voroschilov. Manchurian members of the genus were studied by Komarov and those of Korea and Japan, for the most part, by Nakai. The results of this work were set down in several publications which are reviewed below. However, to date no systematical description of Manchurian valerianas as a whole has been published. Therefore, it is not known exactly which members of the genus are representative for this portion of China, although they are one of the most common plants in this region. In response to the need for such an account, this preliminary revisionary study of Manchurian valerianas is offered.

The preparation of this paper was started in 1957 in the Institute of Forestry of Academia Sinica. It is a summarized result of the study of all materials on the group found both in the herbarium and the library of the Institute, and in my own hands. Particularly, the illustrations are wholly based on the collections of the above mentioned organization, while the species descriptions are partly made from herbarium specimens and partly taken from different bibliographic sources. It is a matter of course that such a small note can not comprise a detailed taxonomic treatment of such a difficult group as the *Valeriana officinalis* complex. Therefore this revision is necessarily sketchy.

The history of botanical studies on the genus *Valeriana* in Manchuria.

The history of the study of species of *Valeriana* in Manchuria begins with the publication of Maximowicz's "Primitiae Florae Amurensis". In the treatment of Far Eastern valerianas he was oriented by Linnean works. Maximowicz reported only one species, *Valeriana officinalis* L. from Amurland and Ussuriland. He remarked that the plants referred to this species may be stoloniferous and non-stoloniferous, with pubescent or glabrous fruits, and with opposite or alternate leaves. Some specimens examined by Maximowicz had characters different from those of *V. officinalis*. He referred these, tentatively, to a different undetermined species.

In Komarov's "Flora Manshuriae" all members of the group were again credited to the collective species *Valeriana officinalis* L. Komarov cited 66 stations for this

(1) Research worker on the flora of Eastern Asia at the Arnold Arboretum.

plant, indicated that it is highly polymorphic, and that its varieties are very unsteady except for the following five: var. *alternifolia* Max., var. *dubia* (Bge.) Kom., var. *angustifolia* Rupr., var. *exaltata* (Mikan) Kom., and var. *incisa* Rupr. The latter of these he subdivided into three forms. At that particular time Komarov believed that var. *incisa* was the variety most typical of the Manchurian flora. He described it as a large-sized, robust, usually strongly pubescent plant, with very long-petioled radical leaves, very broad leaf segments, a dense inflorescence, and bright lilac corollas (Komarov, 1907 and 1950). This opinion was evidently based only on the study of valerianas in Ussuriland and East Manchuria. Komarov changed his mind later when he became familiar with the members of the genus from West Manchuria where they have an entirely different type of morphology.

In Komarov's next manual of Far Eastern plants (1925) the treatment of valerianas was in general similar to that in the "Flora Manchuriae", although somewhat simplified. Here, four varieties of *Valeriana officinalis* L. were distinguished by him, viz., var. *incisa* Rupr., var. *exaltata* (Mikan) Kom., var. *alternifolia* Maxim, and var. *lyrata* Kom. The latter variety was new. The classification of these varieties was based on the same characters, i. e. on leaf arrangement, shape of leaf segments, and the type of indumentum on the leaves and fruits.

In the "Key for the plants of the Far Eastern Region of USSR" (Komarov, 1932), the valerianas of the Region were still referred to *Valeriana officinalis* L., which is divided into eight elementary species, viz., *V. amurensis* P. Smirn., *V. chinensis* Kreyer, *V. Fauriei* Briq., *V. alternifolia* Ldb., *V. ajanensis* Rgl. et Til., *V. Stubendcrfii* Kreyer, *V. transjensseensis* Kreyer, and *V. sajanensis* Kreyer. Of these, five species, *V. amurensis*, *V. chinensis*, *V. Fauriei*, *V. alternifolia*, and *V. Stubendcrfii* are common both to the Russian Far East and Manchuria. Each of these species was subdivided into four contrasting varieties, var. *gymnocarpa* Kreyer (glabrous fruits), var. *dasyarpa* Kreyer (hairy fruits), var. *integrifolia* Kreyer (entire leaf segments), and var. *dentata* Kreyer (toothed leaf segments). This system is very formal and inconsistent since classification of infraspecific categories is based in it on two pairs of non-correlated characters.

In the period of time between 1932 and the 1950's not much progress was made in the study of Far Eastern valerianas. Although Nakai in 1932 published the name *Valeriana japonica*, based on *Valeriana officinalis* L. var. *latifolia* Miq., and in 1936 another name *Valeriana nipponica* based on *Valeriana officinalis* (non L.) auct. Fl. Mansh. p. p., but both names were *nomina nuda* and superfluous besides. Nevertheless, Kitagawa (1939) in his catalogue of the Manchurian flora reported *V. nipponica* Nakai along with *Valeriana alternifolia* Bge. Under the former of these binomials he placed the different forms of *Valeriana Fauriei* and *V. alternifolia*. Later Kitagawa (1941) described one of the populations of *V. Fauriei* as a distinct species under the name of *Valeriana leiocarpa*. Today, it is known that this name is also superfluous.

In the 1950's a new series of four papers bearing on the subject was published. These papers may be divided into two groups according to the method of classification employed in them. The papers of the first category are the local revision of valerianas of the USSR by Grubov (1958) and the resurvey of the members of the same group in North Eastern Asia by Hara (1956). The authors of these works returned to the early Komarovian method of classification of valerianas. For example, in Grubov's revision almost all elementary species of *Valeriana officinalis* complex were classed under one binomial, *V. officinalis*. Within this species five forms were distinguished, viz., f. *stolonifera* (stoloniferous plants), f. *alternifolia* (alternate leaves), f. *verticillata* (leaves 3-4 in whorls), f. *integrifolia* Ldb. (leaves completely or almost entire), and f. *angustifolia* (leaf segments narrow linear). So far as Manchurian species were concerned, Grubov treated as synonyms of *V. officinalis* the following taxa: *Valeriana alternifolia* Ldb., *V. Fauriei* Briq., and *V. Stubendorffii* Kreyer. However, *Valeriana amurensis* P. Smirn. he segregated as a distinct species. Such an approach to the problem appears to be inconsistent, since all these races of *Valeriana* seem to represent distinct taxa with approximately same taxonomic status. Furthermore, *V. amurensis* P. Smirn. can not be grouped together with *V. officinalis* under series *Officinales*, as is done by Grubov, because the former species belongs to a different series (Voroshilov, 1959). Grubov's work is inadequate in several more respects. By joining together all European and Asiatic races of *Valeriana* under the name of *V. officinalis* L. he incorrectly interpreted this Linnean species. This name, in the narrow sense, may be applied only to one local Scandinavian race of *Valeriana*, and, in the broad sense, to two other European members of the complex. Grubov also failed to take into account that there exist differences in both the cytogenetics and the phytochemistry (composition of essential oils) between *V. Fauriei* and *V. officinalis* (Hara, 1956). Therefore, at least on the basis of these characters, these two races should be maintained as separate taxa. The infrageneric and infraspecific taxa established by Grubov were not given Latin descriptions and their types were not designated; consequently, these taxa are not valid. All except one of the forms of *V. officinalis* listed by Grubov do not have authorities. Hence, it is not clear whether they were newly described or were based on the previously described taxa. It is also worth mentioning that two forms reported by Grubov, f.f. *alternifolia* and *verticillata* are based on abnormal traits. The normal leaf arrangement in *Valeriana* is opposite and plants with alternate and whorled leaves are met only occasionally as monstrosities.

Hara (op. cit.) similarly refers all Far Eastern races of *Valeriana* to one species, *V. sambucifolia* Mikan, within which he distinguishes six infraspecific taxa of different rank. All of these are based on previously described species or varieties as is demonstrated by their names, viz., *V. sambucifolia* Mikan var. *Fauriei* (Briq.) Hara and f. *dageletiana* (Nakai) Hara; var. *dasycarpa* (Hara) Hara; var. *sachalinensis*

(Hara) Hara; subsp. *amurensis* (P. Smirn.) Hara and f. *leiocarpa* (Hara) Hara. Two points in this system seem to be open to discussion: 1) is *V. Fauriei* Briq. really a variety of *V. sambucifolia* Mikan? and 2) what are the taxonomic relationships of the former species with the other Far Eastern members of *V. officinalis* complex?

Valeriana sambucifolia Mikan, or *V. excelsa* Poir.*), was always known as a typically Western and Central European species. There are clear indications in many local European floras that the eastern limit of its distribution lies in the Western Ukraine (in the Carpathians) (Coste, Hegi, Katina, Rouy). Therefore its occurrence in the Far East seems to be doubtful. It is apparently true that morphologically it is very similar to *V. Fauriei***). Nevertheless, the two are not conspecific but are vicarious species, *V. Fauriei* being the eastern geographical counterpart of *V. sambucifolia* (Voroshilov, 1959). Morphological and phytogeographical characterizations of typical forms of these species, after Voroshilov, are *viz.*,

<i>V. sambucifolia</i>	<i>V. Fauriei</i>
Flowers 6-7 mm long	Flowers 4-5.5 mm long
Fruits 4-5 mm long	Fruits 3-4 mm long
Stem with 4-6 nodes	Stem with 2-4 nodes
Leaves with 3-4 segments	Leaves with 2-4(5) segments
Distribution: Central and Western Europe.	Distribution: Russian Far East, Japan, Korea, North Eastern China (Manchuria).

As is demonstrated in the above comparative table of characters, these two species partly overlap only in one trait, the number of leaf segments. In the light of this evidence, it appears to be more reasonable to maintain *V. Fauriei* as a distinct Far Eastern species, rather than a variety of *V. sambucifolia*. There is no indication in bibliographic sources on the phytochemistry (composition of the essential oils) of both of these species. It is possible, however, that phytochemical differences between them might serve as additional criterion for their taxonomical delimitation.

Even though it is apparently evident that *V. sambucifolia* does not occur in the Far East, all combinations published by Hara seem to be based on the misapplication of this name. To this should be added that *V. amurensis*, as it was explained above, can not be grouped with *V. sambucifolia* because it belongs to a different series in the genus.

In Manchuria and the Russian Far East other members of the *V. officinalis* complex different from the *V. Fauriei* in various respects are found with the latter.

*) Many European botanists believe that this is the correct (earliest legitimate) name for *V. sambucifolia* (Coquillat; Coste; Neuman & Ahlfvengren; Rouy; Voroshilov, 1959).

**) Voroshilov (1959) explains this similarity by ancestral relationship: both species originated from one ancestral species which in the Tertiary was distributed from Great Britain to Sakhalin.

The question arises, then, how should these races be treated? The problem will be discussed in detail in the ultimate and penultimate sections of this paper. At this point it could be said only that on the basis of certain botanical criteria, it seems, that they should be treated as distinct taxa, although of different ranks. Thus we approach the standpoint from which the authors of the papers of the second of the above mentioned groups view the classification of the Far Eastern valerianas.

This particular group of articles includes two revisions of the *V. officinalis* complex, one by Yenin *et al.* (1953) and the other by Voroschilov (1959). The first of these books does not appear to be a very reliable source of information so far as the taxonomy of valerianas is concerned, and therefore I will not dwell on reviewing it. But in the second one, there are some new and interesting ideas concerning classification of this group and, since Voroschilov's book has been published only in Russian, I will discuss it more detailly.

In his paper titled "Lekarstvennaia valeriana" [Medicinal valeriana], Voroschilov, as it appears, has proved that although delimitation of the different species comprising the *V. officinalis* complex is difficult, it is feasible. In this book he reports five species of these perennials from the Far Eastern region. Taxonomically, he divides these five species into two groups: 1) the *V. officinalis* complex (or group of series sensu Voroschilov) with four species, *V. Fauriei* Briq., *V. alternifolia* Ldb., *V. Stubendorffii* Kreyer, and *V. pseudoumbrosa* Vorosch.; and 2) distinct series of species closely related to the former to which, of the Far Eastern valerianas only *V. amurensis* P. Smirnov belongs.

In recapitulation of all previous discussion, it is possible to say that the members of the *V. officinalis* complex in the Far East have been and are still being classified by a number of authors in different ways. In general the students of this group are pursuing one of two mutually opposed courses: they refer all races of valerianas either to one or to different species. The supporters of the first method hold that variation in the group is of a random character and that this makes impossible any orderly grouping of these plants. On the contrary, the advocates of the second method state that there exist certain principles that govern this variation, and that this enables them to distinguish a number of taxa within the complex. The whole history of classification of Manchurian valerianas demonstrates how these two methods have been employed by different writers on Manchurian flora. For the most part, they attempted to employ the compound method by referring all Far Eastern valerianas to one species subdivided into various infraspecific taxa. The rank of these taxa was different depending on the author. It ranged from the form (Grubov, 1958) to the small (or elementary) species (Komarov, 1932). Of all the authors on Manchurian flora only Maximowicz consistently employed the first method and Voroschilov the second one,

Taxonomic position of the *V. officinalis* complex in the genus *Valeriana* L.

Valeriana officinalis L. s.l. has long been known as a very polymorphous species. Early authors regarded all races of it as belonging to one species, although the morphological description of *V. officinalis* by Linnaeus (“...*floribus triandris, foliis omnibus pinnatis*”) is not a description of a species, but is based partly on generic characters and partly on the characters of a series. Later it was proved that this group is a complex of small geographical species, since it became obvious that populations of *Valeriana* in different parts of the vast Eurasian continent, living under various ecological conditions, could not be identical. Along with this it was proved that Western European strains of *Valeriana* were definitely distinct from those in Eastern Europe, and that the latter differ from Siberian. Siberian plants, in their turn, differ from the Far Eastern plants. On the other hand, all members of the complex in all parts of Eurasia share common characters and are markedly different morphologically and phytochemically from other infrageneric groups. Therefore medicinal valerianas form a distinct taxonomical unit in most of the subgeneric classifications. For example, Höck (1891) grouped all members of the complex under Ser. 3. *Valerianae officinales* of the Sect. 1. *Euvaleriana*. Grubov (1958) credited them to the Subg. *Valeriana*. Sect. 2. *Rhizophorae*, and Ser. 8. *Officinales*. Janchen (1963) referred them to the Subsect. 1 a. *Pinnatisectae* (= *Officinales*) of Sect. *Valeriana* (= *Euvaleriana*). Only Voroschilov (1959) did not believe that members of this complex belonged to one collective species nor to one natural geographical series. He thought that they were in different series in the botanical sense or in different species in zoological sense.

According to the majority of authors, the traits peculiar to the members of the series (or subsection) *Officinales* are shortened rhizome, presence in the roots of valeric acid, essential oils (composition of which may vary in different species), and of some other substances responsible for the medicinal properties of the plant, and pinnate leaves. With regard to the latter character, it is necessary to say that it is understood by some authors very broadly. Voroschilov (1959), *e. g.*, believed that species with partly or wholly entire leaves may be also included in the group. He also thought that indumentum consisting of simple hairs and bristles is typical for the members of the complex, and plants with different types of pubescence must be separated into a different group.

Theoretical principles of the classification of valerianas.

The history of the *V. officinalis* complex is an example of geographical fragmentation of an original population. Therefore Voroschilov's classification of valerianas (1959) was developed on the morphologo-geographical basis. He believed that migration is one of the most important factors of race formation in the group. Within the territory of Eurasia he distinguished several centres of speciation of valerianas. It appears that Eastern Siberia and the Far East are one of these centres. In this

centre such species as, *V. Fauriei*, *V. alternifolia*, and *V. amurensis* have developed. Each of the centres mentioned above was inhabited, at the very beginning, by one original (initial) population (or species). In the course of geological time these populations spread out from the central part of their geographical ranges into the surrounding areas. The groups of individuals being established in the new environmental conditions developed into new morphological races of the initial species. This process led to the fragmentation of the original (initial) population into a natural series of local geographical races morphologically different both from each other and from the members of original (initial) population.

Geographical races, which are formed by this process and which have a peculiar combination of morphological characters and distinctive geographical areas, according to Voroschilov, should be taxonomically differentiated. This is the most important condition for the development of any system of classification. In what rank these races will be classified is not so important. This depends on the personal opinion of each taxonomist. Voroschilov, *e. g.*, regarded treating them as elementary, or geographical, species as most convenient. Thus for the classification of valerianas he offered to employ two categories of species: 1) "large species" for the designation of the whole natural series of local geographical races which was developed as a result of the fragmentation of an original (initial) population (species). In other words, these "large species" are geographical complexes of species, or series in Komarov's sense; 2) "small species" (geographical or elementary species) for the designation of the separate geographical races which constitute "large species".

In each of the "large species" one of the "small species" is the original or initial one. This is phylogenetically the most ancient member of the complex, the progenitor of all other members which originated from it in the process of fragmentation. "Large species" were named by Voroschilov after one of the included "small species". This particular "small species" was the one described prior to all others in the given complex. Usually the name of the "large species" duplicates the name of original (initial) species in the series. In order to distinguish "large species" from the "small" ones of the same, *sensu lato* (*s. l.*) is added after the names of the former, and *sensu stricto* (*s. str.*)—after the names of the latter. the following concrete example illustrates how this method of classification is practically employed:

Valeriana alternifolia Ldb. *s. l.*
 "large species" including four
 "small species":
 ↓
 1) *V. alternifolia* Ldb. *s. str.*
 original or initial species
 ↓
 derivative species

2) *V. Stubendorffii* Kreyer; 3) *V. umbrosa* Sumn; *V. jacutica* Sumn.

Voroschilov's "large species" are the real species or the species in the orthodox sense. They have clear, reliable distinctive characters and are readily recognizable. They have a different morphology and origin, well defined geographical ranges and different chromosome numbers. They usually do not interbreed and do not produce intergrading forms.

The "small (geographical) species" are morphological races occupying their own distinctive geographical areas. They differ from each other in peculiar combinations of morphological traits, but the differences are not so pronounced and so wide as in the "large species". "Small species" are distinguished mostly by the length of stem, width and dentation of leaf segments, color of the flowers, size of the fruits and character of their pubescence, etc. Furthermore, in geographical species, various morphological adaptations tend to be correlated with differences in their ecology. All of these characters are inherited and retained under cultivation. "Small species" do have intergrading forms. Taxonomical status of these species, for the most part, is approximately equal. Some of them, however, are more segregated from the "large species" to which they belong. The latter kind of "small species" is more deserving of treatment as a distinct species.

For obvious reasons Voroschilov's theory of two categories of species can not be accepted. Therefore in this paper only "large species" are maintained as species, and the "small" ones are treated as varieties.

Taxonomical description of the *Valeriana officinalis* complex.

Perennials. Rhizome biennial *), vertical, shortened, 2-3 cm. long. Root system fibrose. Stolons in some species present, in some absent. Stem to 2 m. tall, slender or thick, coarsely grooved to nearly smooth, hard or soft, hollow, green or anthocyanine-colored, with 2-8 nodes, glabrous or pubescent. Leaves normally opposite, odd pinnate; abnormally alternate or whorled. Radical and basal leaves are often entire, lyrate or tripartite, while cauline leaves are pinnate (heterophylly); leaf blade thin or thick, smooth or rough, hispid or ciliate along the margin, or pubescent on both sides or only underneath, on the whole surface or along the veins; the most fully developed pair of cauline leaves may be the 1-st, 2-nd or 3-rd, starting from the base of the stem, depending on the species; leaf segments—from linear to broadly ovate, 2-11 (13)-jugate, entire or toothed, large or small. Inflorescence contracted, nearly capitate, or loose, divaricate, corymbose-paniculate. Bracts 2-8 mm. long, from linear-subulate to ovate-lanceolate, along the margin \pm densely ciliate. Flowers small to large, ca. 3-7 mm. long, fragrant. Corolla white, pale pink or lilac. Anthers dark violet or greenish. Fruits narrow, sublanceolate to broad subovate, with narrow, un-thickened margin, small to large, ca. 25 mm. long, brown, or yellowish- or reddish-brown,

*) The rhizome in this group of valerianas is vegetatively replaced by a new one every two years. This change, however, does not cause any interruption in the life activity of the plant as a whole. Such types of plants may be termed "perennials with biennially regenerating rhizomes".

glabrous or pubescent on both sides, or only on the ventral side. Pappus brownish or dirty brown, \pm long.

The species in Europe and Asia: *Valeriana dubia* Bge., *V. nitida* Kreyer, *V. excelsa* Poir., *V. Fauriei* Briq., *V. alternifolia* Ldb., *V. officinalis* L., *V. collina* Wallr., *V. armena* Smirn., *V. pseudoumbrosa* Vorosch., *V. subbipinnatifolia* sp. nov.

The complex as it is described above corresponds, for the most part to the Ser. *Officinales* in the sense of Grubov (Fl. URSS 1. c.) or to the Subsect. *Pinnatisectae* Janchen (Cat. Fl. Austr. 1. c.).

To the formal description of the complex given above should be added that the type and arrangement of the indumentum is a very important character for the classification of the medicinal valerianas. Pubescence on the stem is usually present on the basal internodes. The nodes may be bearded or very shortly pubescent. Trichomes may be short, adpressed, or long patent, or reflexed, soft or stiff (bristly), or pulverulent, but never are glandulose. Pubescence of the leaves may be \pm dense. Trichomes may be; stiff (bristles) or soft (hairs), long or short, adpressed or patent.

Cytotaxonomical and phytochemical characters are not taken into consideration in the above formal description since they are very incompletely known and therefore inconclusive. It seems that the group is heterogeneous with regard to these characters and they may serve as subsidiary criteria for the delimitation of infrageneric taxa.

In the geographical varieties (Voroschilov's "small species") the following characteristics mentioned in the formal description of the group are variable: the presence and absence of stolons, thickness of the roots, height of the stem and number of the nodes, presence of heterophylly, number, shape and type of dentation of the leaf segments, type of pubescence, shape of the inflorescence, size and color of the flowers, size and shape of the fruits and type of their pubescence, chromosome number, phytochemical characters, flowering time and ecology. Each of these traits in each particular variety may be highly variable or constant. In general, none of the traits can be regarded as obligatory to all of the varieties. Therefore for the delimitation of each variety or group of varieties it is necessary to select constant characters peculiar to them which may be not suitable for the characterization of other varieties.

Manchurian members of *V. officinalis* complex are viz., *V. Fauriei* var. *Fauriei*, *V. alternifolia* var. *alternifolia* and var. *Stubendorffii*, *V. pseudoumbrosa*, and *V. subbipinnatifolia*. They may be divided into two groups: 1) a group including *V. Fauriei* and its allies. These plants produce annual stolons which develop leaf rosettes on the apex by the flowering time of the plant; 2) a group including *V. alternifolia* and its allies. These plants do not produce stolons or if they produce them the latter usually do not develop leaf rosettes in the first year of their life. They winter over and produce these rosettes in the spring of their second year.

The plants listed above apparently represent, for the most part, one evolutionary

group. They stem from one ancestral species, *V. Fauriei*. This species represents the Tertiary type of *Valeriana* and therefore is phylogenetically the oldest in Manchuria. The species derived from *V. Fauriei* may be arranged in the following sequence. *V. alternifolia* var. *alternifolia* may be interpreted as a xeric form of *V. Fauriei* and *V. alternifolia* var. *Stubendorfi* as a mesic form of *V. alternifolia*. The relationships between *V. pseudoumbrosa* and *V. Fauriei* are not clear, but the former species is undoubtedly close to the latter. Also not clear are the relationships of *V. subbipinnatifolia* which, however, seems to be closer to *V. alternifolia* than to *V. Fauriei*. The fifth species which occurs in Manchuria is *V. amurensis*. In the opinion of Voroschilov (l. c., 1959) the glandulose pubescence very typical for this species is not peculiar to representatives of the *V. officinalis* complex; consequently, *V. amurensis* does not belong to this group. Furthermore, following the same author, ternate and lyrate leaves in valerianas are more primitive than many-segmented pinnate leaves. On the basis of this criterion, he concludes that *V. amurensis* (which, incidentally, has this type of leaf) is phylogenetically very old, probably older than the members of the *V. officinalis* complex.

Key to Manchurian species of *Valeriana*.

1. Plants with the stem in the uppermost part and with inflorescence \pm densely clothed with long hairs and stipitate glands. Leaves lyrate. Wet or swamped meadows, marshes, river banks, bank or damp forests, and shrub thickets.....
.....*V. amurensis*
 - 1.1. Plants without glandulose pubescence. Indumentum consists of simple hairs or bristles. Leaves lyrate or non-lyrate.
 2. Flowers 0.4-0.5 cm. long. Inflorescence loose, divaricate. Fruits 0.3-0.4 cm. long, narrow (their length more than two times exceeds the width), usually glabrous. Leaves thin, generally few-segmented. Leaf segments relatively wide, dentate.
 3. Stolonerous plant. Stem with 2-4(5) nodes. Leaves lyrate, underneath usually pubescent. Leaf segments (1)2-4 pairs. Forest meadows.....
.....*V. Fauriei* var. *Fauriei*
 - 3.3. Estoloniferous plant. Stem with 4-5 nodes. Leaves non-lyrate, underneath subglabrous. Leaf segments (4)5-7 pairs. Forests.....*V. pseudoumbrosa*
 - 2.2. Flowers large, 0.5-0.55 cm. long. Inflorescence contracted (loose in one case). Fruits 0.3-0.5 cm. long, wider than in preceding species (their length ca. two times exceeds the width), usually hairy. Leaves thickish, many-segmented. Leaf segments relatively narrow.
 3. Leaf segments entire or \pm distinctly dentate or serrate. Inflorescence contracted.
 4. Stolonerous plants. Stem at base usually shortly hispid. Leaves along the margin beset with minute bristles, on the surface clothed with more long bristles. Marshes and wet meadows.....*V. alternifolia* var. *Stubendorfi*

- 4.4. Estoloniferous plants. Stem while young is clothed at base with long, soft hairs, later often glabrescent. Leaves underneath with long, erect hairs. Dry meadows and grassy slopes.....*V. alternifolia* var. *alternifolia*
- 3.3. Leaf segments profoundly lacinate-serrate (*i.e.* leaves subbipinnate). Inflorescence loose. Stem at base densely, shortly hispid. Leaves underneath shortly hispid. Very dry meadows in river valleys.....*V. subbipinnatifolia*
1. *V. Fauriei* Briq. in Ann. Conserv. Jard. Bot. Geneve XVII, p. 327. 1914; Kom. et Alis., Key Pl. Far East. Region USSR 2, p. 983. 1932; Hara, Enum. Spermatophyt. Japon. 2, p. 72. 1952; Ohwi, Fl. Jap. p. 1113. 1953, idem p. 845. 1965; Voroschilov, Lekarstvennaia valeriana p. 101. 1959, pro syn.—*V. officinalis* sensu auct. flor. Orientis Extremi p. p., non L. 1753.—*V. officinalis* varr. *angustifolia* et *latifolia* Miq., Ann. Mus. Lugd. Batav. 3, p. 114 in nota. 1867.—*V. coreana* Briq., l. c. p. 326. 1914—*V. coreana sensu lato sensu* Voroschilov, l. c. p. 101. 1959. p. p.—*V. japonica* sensu Nakai, Kōryō-shikenrin-no-ippan, p. 60. 1930, nom. nud., non Miquel 1867.—*V. chinensis* sensu Kreyer ex Kom., Bull. Jard. Bot. Ac. Sci. USSR 30(1-2), p. 215. 1932, non L. 1753.—*V. dageletiana* Nakai ex Maekawa, Bot. Mag. Tokyo, 47, p. 618. 1933.—*V. nipponica* Nakai, Rep. First Sci. Exped. Manch. 4(4), p. 49. 1936, nom. nud.; Kitag., Lineam. Fl. Mansh., p. 413. 1939.—*V. leiocarpa* Kitage., Rep. Inst. Sci. Res. Manch. 5(5), p. 158. 1941.—*V. taigicola* Kom. ex Sumn., Lekarstvennaia valeriana Aziatskoi chasti SSSR, p. 25. 1941.—*V. pulchra* Nakai, Bull. Nat. Sci. Mus. Tokyo 31, p. 109. 1952, nom. nud.—*V. sambucifolia* Mikan var. *Fauriei* (Briq.) Hara cum f. *dageletiana* (Nakai) et varr. *dasycarpa* et *sachalinensis* Hara, Jour. Fac. Sci. Univ. Tokyo, Sect. III, 6(7), p. 387. 1956.—

Stoloniferous or estoloniferous plants. Stolons (if present) by the flowering time of the plant are usually crowned with leaf rosettes. Leaves few-segmented*), dentate. Flowers lilac, usually 4-5 mm. long. Fruits elongated, often glabrous, usually 3-4 mm. long. Bracteoles subulate, 4-6 mm. long. Chromosome number $2n=56$ (Voroschilov, 1959).

A word here about the name of this species is in order. Briquet published two names for it at the same time and in the same paper. One name is *V. coreana* and the other *V. Fauriei*. Voroschilov (1959) has chosen the first name as the legitimate one. He based his selection on the supposed existence of a rule of nomenclature that of the two names for the one species published in the same paper, the one that goes first in the text of this paper has priority against another one. Actually there is no such rule. In accordance with the Article 57 of the Code of Nomenclature "When two or more taxa of the same rank are united...The author who first united taxa bearing names of the same date has the right to choose one of them, and his choice must be followed", I follow Hara, who was the first (in 1952) to unite *V. coreana*

*) Few-segmented leaves are those having less than six pairs of segments. Correspondingly leaves having more than six segments are many-segmented.

and *V. Fauriei* into one species, and who selected the name *V. Fauriei* for this species. Moreover, besides Hara, this name was and is employed by a number of authors on Far Eastern plants (*e. g.*, Ohwi, 1953 and 1965) so that it seems to be the one that is more generally accepted.

var. *Fauriei*.—*V. coreana* Briq. *s. str.* sensu Voroschilov, *I. c.* p. 101-105, fig. 17. 1959. Tab. nostra I, figs. 1 et 2.

Description from Manchurian specimens.

Plants of two types: small- or medium-sized with slender stem and weakly developed leaves, or large-sized and vigorous with divaricate, ramose, inflorescence. Stolons, at least in the part of specimens, present. Stem simple or ramose in the inflorescence, at base with remnants of old petioles, green or violet, 45-108 cm. tall, 0.2-0.8 cm. across, usually glabrous or with few short bristles, more rarely totally or partly ± densely setose. Nodes 2-5, more often sparingly or scantily setose. Internodes much longer than the leaves, hence the plants appear to be sparsely foliated. Radical leaves by flowering time wither off or, very rarely, persist, large, lyrate, to 34 cm. long. Lowermost cauline leaves sometimes entire, elliptic-ovate or obovate, or ternate, long petioled; the middle and upper ones pinnate, lyrate, subsessile or petioled (petioles (0.4)2-8 cm. long), either glabrous or all over or partly ± densely setose. Leaf blade 2.7-14 cm. long, (0.9)1.3-10 cm. broad; segments beset along the margins with minute patent bristles. Lateral segments 1-4 pairs, sessile or shortly petioled, from narrow linear or linear-lanceolate to elliptic or ovate, 1.1-5(7.3) cm. long, 0.2-2.1 cm. broad, entire or ± definitely (sometimes coarsely), acutely serrate. Terminal segment from narrow or broad obovate, ovate or elliptic to lanceolate or linear-lanceolate, sessile or short petioled, ± narrow cuneate at base and ± acuminate at the apex, 1.9-6.3(8.7) cm. long, (0.6)1.0-2.5(4) cm. broad, *i. e.* larger than lateral ones. Inflorescence ca. 3-8.5 cm. tall, ca. 6.5-16 cm. broad, rather loose, divaricate. Branches of inflorescence scabrous or minutely setose, especially at the nodes. Bracts long, linear, 0.6-2.1 cm. long, usually long ciliate along the margin, more rarely partly glabrous, sometimes at the apex abruptly protracted in a long narrow point. Bracteoles linear-lanceolate, lanceolate or ovate, 0.3-0.5 cm. long, rather long acuminate, with green centers and colorless, ciliate margins. Fruits glabrous or hairy.

Hab. Meadows in forests and river valleys in the mountainous forest regions of eastern and northeastern Manchuria.

Gen. distribution: Russian Far East (Amurland, Ussuriland and Sakhalin), Manchuria, Korea and Japan.

Specimens examined: Manchuria. Heilungkiang prov., Yichun district, 2. VIII. 1956, *T. N. Liou* No. 7866; *idem*, 11. VII. 1956, *T. N. Liou* No. 7129; Tailing, 25. VII. 1954, *T. N. Liou* No. 6044; Maoehrshan, 24. VI. 1951, *B. V. Skvortzov s. n.*; Liaoning prov. Ts'aohok'ou, Peitalatzu, 19. V. 1950, *M. Noda* No. 683; Mt. Changpaishan, 19. VIII. 1950, *T. N. Liou* No. 1418; *idem*, 25. VIII. 1957, *Y. L. Chou* No. 1801 et 2545.

The constant and typical characters of this species are bright pink or lilac corollas and the presence of stolons, although in Manchurian specimens the latter are not always developed.

Manchurian plants of *V. Fauriei* are also different in some other respects from the generalized description of the species given by Voroschilov (l. c., 1959). These plants are usually more vigorous. They are taller, their stems are thicker, have a larger number of nodes. Their leaves are larger and have somewhat broader segments. Following Voroschilov, the leaves in *V. Fauriei* are not lyrate or are weakly lyrate. But in Manchurian plants the terminal segments are definitely larger than the lateral ones, and the leaves, therefore, might be characterized as clearly lyrate. The same leaf character is observed in the plants from Japan (Hara, 1956).

The general mass of the plants of *V. Fauriei* in Manchuria belongs to the group with the characters described above (See Plate I, fig. 1). But there is one small population of these plants which stands quite apart from the others. This form is found very locally on the Changpaishan Mountain at high elevations (ca. 1400 m.). The members of this population differ from the normal plants in low stature (plants ca. 45 cm. tall), slender, very scantily foliated stem, small very pronounced lyrate and/or ternate leaves, weakly developed root system and indumentum, and small inflorescence, ca. 3 cm. tall and ca. 6 cm. broad (See Plate I, fig. 2). The taxonomic status of this form is not clear and it seems to be better not to differentiate it taxonomically. It should be noted that this form has nothing in common with other type of *V. Fauriei* also found on the Changpaishan Mountain. This type was described by Kitagawa under the name of *V. leiocarpa*. The latter appears to be a rather robust plant with a glabrous stem ca. 1 m. tall, a dense inflorescence to 7 cm. broad, and long, narrow, ciliate bracts. (Kitagawa, 1941).

V. Fauriei is polymorphic with regards to some traits not only in Manchuria, but in other parts of its geographical area. The most variable of these traits is pubescence. It may be developed in different ways in different populations. For example, normally the stem in *V. Fauriei* is glabrous or sparsely pubescent with long, patent hairs, except for the lowermost portion which is more densely hairy (Voroschilov, 1959). The plants from Japan match fairly well with this description (Hara, 1956), but in Manchuria densely hairy plants are found along with glabrous or partly sparsely hairy plants. Again, normally the leaves in *V. Fauriei* are more often hairy underneath and more rarely are glabrous (Voroschilov, 1959). In Manchurian plants they range from glabrous to \pm densely hairy, while in Japan the leaves are usually glabrous (Hara, 1956). The same is true for the fruits which are usually glabrous in the plants from Japan, usually hairy in the plants from Korea (Hara, 1956) and range from glabrous to hairy in Manchurian plants. In generalized descriptions of the species, the fruits are characterized as being usually glabrous and more rarely hairy (Voroschilov, 1959). The bracts in different populations of

V. Fauriei may be glabrous or may be beset with long cilia at the margin. Intergrading forms also exist. There are variations among the populations of this species in length of stem, in number and size of leaf segments, and in size of the flowers as well. The Manchurian plants are 45-108 cm. tall, while in Japan they are 40-80 cm. tall (Ohwi, 1965). The leaves in Manchurian plants have 1-4 pairs of segments, in the plants from Japan they have 2-3 pairs of segments (Ohwi, l. c.). In Korea and North China they have 3-5 pairs, and in Sakhalin 4-7 pairs (Hara, 1956). As regards the size of the segments, they are in general shorter and narrower in the plants from Japan than in those from Manchuria. On the other hand, the flowers in the plants from Japan are larger (4-7 mm. long) (Hara, 1956; Ohwi, 1965) than in populations from elsewhere where they are 4-5.5 mm long. Finally, the chromosome numbers may be also different in various populations of *V. Fauriei*. Besides the normal number (see above), in certain small, very local populations from Japan the numbers $2n=ca. 70$ and $2n=ca. 98$ have been reported (Hara, 1966).

Polymorphism in *V. Fauriei* is responsible for the fact that some of the morphologically different populations of this species have been described as separate taxa. At least some of these populations are also geographically segregated. For instance, *V. dageletiana* Nakai (= *V. Fauriei* f. *dageletiana* (Nakai) Hara) is an entirely glabrous, robust form of Dagelet Island off the coast of Korea; *V. pulchra* Nakai is a very narrow-leaved form of this species from Korea and Japan; var. *dasycarpa* (Hara) Hara is a form with the stem densely, retrorsely hairy at the base and the fruits hairy on both sides; var. *sachalinensis* (Hara) Hara is a form from Sakhalin with glabrous fruits and a larger number of leaf segments which underneath are beset with stiff hairs (Hara, 1941 & 1956). Since pubescence in *V. Fauriei* is not a stable character, the varieties listed above seem to be rather weak. The well known fact that *V. Fauriei* was originally described by Briquet as two different species also is explained by the polymorphism of this species.

The species of *Valeriana* related to *V. Fauriei* are *V. nitida* Kreyer from Belorussia, Ukraine and part of central Russia (Voroshilov, 1959), the European *V. excelsa* Poir.

PLATE I

Semidiagrammatic figures of portions of plants, and of leaves, bracts, and fruits of *Valeriana Fauriei* Briq.

Fig. 1. *V. Fauriei* Briq. var. *Fauriei* (typical plant): a, basal portion of stem with root system and stolons; b, middle and upper portions of stem with leaves and inflorescence; c, lower cauline leaf; d, middle cauline leaves; e, upper cauline leaf; f, portion of leaf margin, magnified; g, bracts; h, bracteoles; i, fruits.

Fig. 2. *V. Fauriei* Briq. (Changpaishan plant): a, stem with root system, leaves and inflorescence; b, lower cauline leaves; c, middle cauline leaf.

(Plants $\times ca. 1/2$; leaves $\times ca. 1/1$; portion of leaf margin $\times ca. 8$; bracts $\times ca. 7$; bracteoles $\times ca. 8$; fruits $\times ca. 15$).

Original drawings by the author.

PLATE I



(= *V. sambucifolia* Mikan) (Hara, 1956; Voroschilov, 1959), and the western American *V. sitchensis* Bong. (Hara, 1956).

2. *V. pseudoumbrosa* Vorosch. in Bull. Princip. Bot. Gard. Ac. Sci. USSR, Fasc. 38, p. 51. 1960.—*V. transjensseensis* sensu auct. fl. Orientis Extr., non Kreyer 1930.

Estoloniferous plant. Roots thick. Stem straight, 50–100 cm. tall, 0.5–0.8 cm. across, entirely glabrous. Nodes 4–5. Leaves thin, nonlyrate, cauline with 4–7 pairs of segments. Segments lanceolate to oblong-lanceolate, 5–8 cm. long, 1.5–2.2 cm. broad, coarsely, distinctly or indistinctly serrate, acuminate, glabrous above, glabrous or with scattered bristles along the veins underneath. Inflorescence in the beginning contracted, ca. 3 cm. tall, ca. 4.5 cm. broad, later (in the fruits) strongly divaricate. Bracteoles subulate-lanceolate, 0.35–0.40 cm. long. Flowers lilac, 0.5 cm. long. Fruits oblong-ovate, 0.3 cm. long, 0.12 cm. broad, on both sides glabrous. Chromosome number unknown.

Hab. Forests.

Gen. distribution: Ussuriland.

This plant resembles *V. umbrosa* Sumn. from the Yenissei river in Siberia, but differs from the latter in stems glabrous at the base, in non-lyrate leaves which are often beset underneath with bristles, and in smaller fruits. It differs from *V. alternifolia* in its glabrous fruits and very thin leaves.

Valeriana pseudoumbrosa is a critical species from the *V. Fauriei* group. It is very close to *V. Fauriei* and overlaps with certain populations of the latter in stem and leaf characters, viz.,

<i>V. pseudoumbrosa</i>	<i>V. Fauriei</i>
Nodes 4–5	Nodes 2–5 (Manchurian plants)
Leaf segments 4–7 pairs	Leaf segments 4–7 pairs (Sakhalin plants).

In connection with this, *V. pseudoumbrosa* might be treated as a variety of *V. Fauriei*, but it differs from the latter in the absence of stolons and in inflorescence characters.. In *V. Fauriei* the ratio between height and width of inflorescence is 1:2, while in *V. pseudoumbrosa* this ratio is 1:1.5.

Voroschilov described this species on the basis of live plants cultivated in the Botanical Garden of Academia of Sciences of the USSR in Moscow. No voucher specimen was apparently prepared. Evidently because of this, the type is not designated in the diagnose of this species.

Valeriana pseudoumbrosa has not been found so far in Manchuria. Therefore the formal description of the species in this paper is made following Voroschilov's diagnosis. It is suspected, however, that *V. pseudoumbrosa* will in the future be recorded in the borderland between Manchuria and Ussuriland. In anticipation of this it is included in this paper.

3. *V. alternifolia* Ldb. in Fl. Altaica 1, p. 52. 1829; Kom. et Alis., Key Pl. Far East. Reg. USSR 2, p. 983. 1932; Kitag., Lineam. Fl. Mansh., p. 413. 1939.—*V. alternifolia*

Ldb. *sensu lato*, Voroschilov, *Lekarstvennaia valeriana*, p. 107. 1959.—*V. officinalis* sensu auct. flor. Orientis Extr. p. p., non 1753. L.

Plants mostly estoloniferous and only partly stoloniferous (var. *Stubendorffii*). Roots usually thick, more rarely thin. Leaves as a rule many-segmented, more rarely few-segmented. Inflorescence always contracted. Bracteoles long, subulate-linear, 0.5–0.6 cm. long. Flowers bright lilac; anthers more frequently dark colored. Fruits large, broad, hairy, rarely glabrous. Chromosome number $2n=42$ (Voroschilov, 1959).
var. *alternifolia*; *V. alternifolia* Ldb. s. str., Voroschilov l. c. p. 108–109, fig. 20. 1959.

Medium-sized plants. Stolons none. Stem at base with remnants of leaf petioles, straight±soft (especially when young), slightly sulcate, 60–85 cm. tall, 0.5–1.0 cm. across, ±lustrous, green, slightly tinged with red, in lowermost portion very densely clothed with long, soft, patent hairs, towards apex±glabrescent, or all over subglabrous. Nodes 4–5. Radical leaves by flowering time wither off, usually pinnate, non-lyrate, rarely pinnate-lyrate or entire. Cauline leaves non-lyrate; blade 8–15 cm. long, 4.0–8.5 cm. broad, with 5–9 pairs of segments. The most fully developed pair of cauline leaves is the second or third beginning from the base of the stem. Leaf segments 3.5–5.0 cm. long, 0.6–1.1 cm. broad, lanceolate or narrow lanceolate, finely and indistinctly dentate or acutely serrate to subsinuate-dentate, thickish, soft, bristly above, pubescent with long patent hairs underneath, or sometimes subglabrous. Inflorescence contracted, to 2 cm. tall, to 4.5 cm. broad. Bracts pinnate, to 1.5 cm. long. Bracteoles long, subulate-lanceolate, to 0.6 cm. long, narrowly membranaceous along the margin, reddish at the apex, almost non-ciliate. Flowers intensely lilac, 0.5–0.55 cm. long. Fruits ovate, broad, 0.3–0.4 cm. long, 0.15–0.23 cm. broad, hairy.

Hab. Open, mostly dry, situations, meadows of different types, rocky slopes, gravelly river banks, etc.; sometimes on wet meadows, swamp margins, in open forests or on the forest glades.

Gen. distribution: eastern part of Siberia, Inner Mongolia, northwestern Manchuria.

It is well known that this species is a xeric form of *V. Fauriei*. It has relatively narrow leaves with narrow leaf segments, hairy fruits and always occurs in open, dry habitats, while *V. Fauriei* is typically a forest plant. The geographical ranges of both species partly overlap, but in these portions of their areas they are ecologically isolated.

Valeriana alternifolia shares some parallel characters with *V. Fauriei*. For example, pubescence in *V. alternifolia* may be of long patent hairs or it may be completely absent, corollas are either typically bright pink, or lilac. However, there are differences between these species in other traits which are typical exclusively *V. alternifolia*. These characters are *viz.*, absence of stolons, many-segmented, thicker and more rigid leaves, contracted inflorescence, large flowers, and large, broad fruits, hairy on both sides. It should be borne in mind, however, that these distinctive features have only relative and not absolute value in discrimination between *V. alternifolia* and

other species. This is because *V. alternifolia* is extremely variable with regard to all morphological characters mentioned above. Nevertheless, the delimitation of the forms of *V. Fauriei* and *V. alternifolia* is always feasible and this fact enables us to maintain these two evolutionary groups of plants as distinct species (Voroshilov, 1959).

Alternate leaves are by no means typical of *V. alternifolia* although Ledebour described this species on the basis of alternate-leaved specimens. Alternate leaves and whorled leaves are abnormal conditions in the members of the genus *Valeriana* and are not peculiar of any species belonging to this group.

At the time when I studied valerianas, there were no specimens to represent *V. alternifolia* in the herbarium of the Institute of Forestry of Academia Sinica. Therefore the description of this plant in this paper is based purely on bibliographic sources.

var. *Stubendorffii* (Kreyer ex Kom.) A. Baranov stat. nov.

V. stubendorffii Kreyer ex Kom., Bull. Jard. Bot. Ac. Sci. USSR, **30**(1-2), p. 215. 1932; Kom. et Alis. Key Pl. Far East. Reg. USSR, **2**, p. 984. 1932; Voroshilov, Lekarstvennaia valeriana, pp. 111-113, figs. 21, 22. 1959.—*V. alternifolia* var. *stolonifera* Bar. et Skv., Acta Soc. Harbinensis Investig. Nat. et Ethnogr. **12**, p. 35. 1954.—Tab. nostra II, fig. 2.

Description from Manchurian specimens.

Medium- or large-sized plant. Stolons, at least in the part of specimens, present. Stem simple or branched in the inflorescence, at base with remnants of old petioles, 56-158 cm. tall, 0.5-0.9 cm. across, only in the lower part or all over either shortly hispid, or glabrous. Nodes 4-5, ± hispid. Radical leaves by flowering time wither off. Cauline leaves pinnate, non-lyrate, (1.1)3.5-24 cm. long, (0.6) 1.5-9.6 cm. broad, sessile or petioled. Petioles to 8.8 cm. long, along with rachis ± densely hispid or subglabrous. Leaf blade 0.7-6.3 cm. long, (0.05)0.3-2 cm. broad, along the margins beset with minute bristles, on the surface clothed with more long bristles. Lateral segments

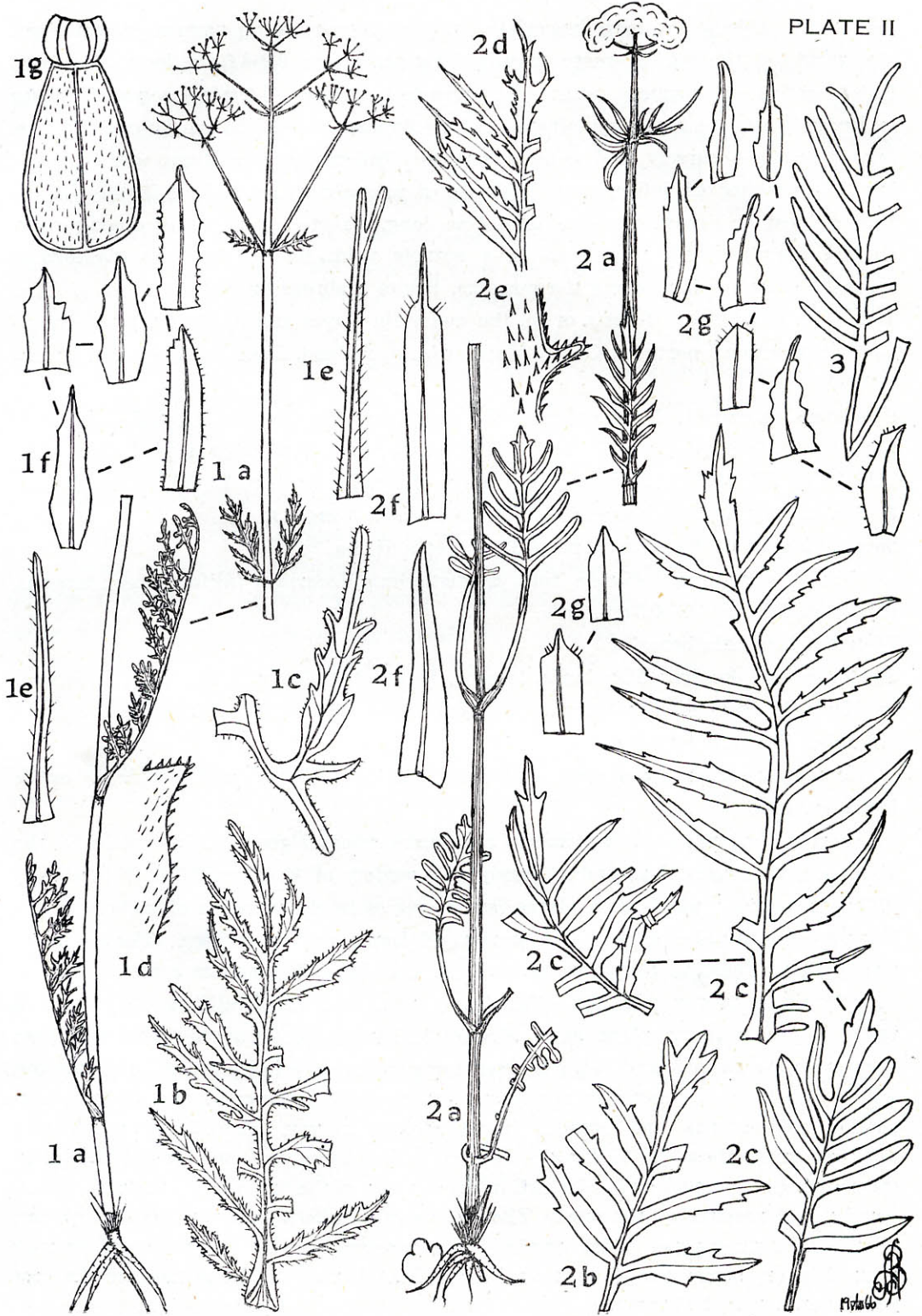
PLATE II

Semidiagrammatic figures of portions of plants, and of leaves, bracts, and fruit of the species of *Valeriana*.

- Fig. 1. *V. subbipinnatifolia* A. Baranov sp. nova: a, stem with root system, leaves and inflorescence; b, cauline leaf; c, leaf segment; d, portion of leaf margin, magnified; e, bracts; f, bracteoles; g, fruit.
- Fig. 2. *V. alternifolia* Ldb. var. *Stubendorffii* (Kreyer ex Kom.) A. Baranov: a, stem with root system, leaves and inflorescence; b, lower cauline leaf; c, middle cauline leaves; d, upper cauline leaf; e, portion of leaf margin (view from the underneath), magnified; f, bracts; g, bracteoles.
- Fig. 3. *V. alternifolia* Ldb. var. *Stubendorffii* (Kreyer ex Kom.) A. Baranov f. *filisecta* A. Baranov f. nova: leaf.
(Plants × ca. 1/2; leaves × ca. 1/1; leaf segment × ca. 2; portions of leaf margin × ca. 8; bracts × ca. 7; bracteoles × ca. 10; fruit × ca. 10).

Original drawings by the author.

PLATE II



Flora

3-11 pairs, oblong to linear-lanceolate, mostly narrow, with narrow cuneate base decurrent on the rachis, more usually long acuminate, 0.9-4.6 cm. long, 0.1-0.9 cm. broad, entire or ±coarsely, acutely and remotely serrate. Terminal segment oblong or linear-lanceolate, ±long acuminate, at base cuneate, 1.5-4.1(5) cm. long, 0.5-1.3 cm. broad, sessile, ±coarsely and acutely serrate. Inflorescence ca. 2 cm. tall, ca. 4 cm. broad. Branches of inflorescence glabrous or subglabrous, at nodes ±densely hispid. Bracts linear or linear-lanceolate, 0.6-1.2 cm. long. Bracteoles oblong or oblong-ovate, on the apex abruptly protracted in a narrow point, 0.25-0.5 cm. long, glabrous or sparsely, shortly ciliate along the margins. Fruits glabrous or hairy.

Hab. Wet meadows in forests or on the mountain slopes and in the river valleys.

Gen. distribution: northern China, Manchuria, Amurland, Ussuriland, eastern Transbaikalia.

Specimens examined: N. Manchuria. Heilungkiang prov., Tailing, 12. VII. 1956, *T. N. Liou* No. 7155; Sansiangfang, 25. VII. 1950, *A. Baranov*, *T. C. Chao* & *Y. C. Chu* No. 3; Harbin, 4. VII. 1951, *K. C. Wang* s. n.; Inner Mongolia. Arshan, 13. VI. 1950, *M. Noda* & *Y. L. Chang* No. 410; Yakeshi, 3. VII. 1954, *K. C. Wang* s. n.

forma filisecta *A. Baranov* f. nova Tab. nostra II, fig. 3.

Variat segmentis foliorum totis angustissime linearibus (filiformibus), integris, 0.7-2.4 cm. longis, 0.05-0.3 cm. latis.

Distrib. Manshuria borealis.

Specimen examination: Manshuria, locus ?, datum ?, collector ?, No. 2517. Holotypus in Herbario Instituti Silviculturae et Pedologiae Academiae Scientiarum Sinicae, (Mukden olim) conservatur.

A very peculiar form with extremely narrow (filiform) and completely entire leaf segments.

Voroschilov treats *V. Stubendorffii* as a distinct small geographical species in the *V. alternifolia* group. I regard it simply as a variety of *V. alternifolia*. This variety differs from the typical form of the latter species in the presence of stolons, in the less pronounced pubescence, in the more rigid leaves, and in ecology. These characters perhaps indicate that var. *Stubendorffii* may be interpreted as a mesic form of *V. alternifolia* proper. On the other hand, var. *Stubendorffii* differs from such a typically mesic forest plant as *V. Fauriei* in having certain xeric features. These characters are narrow and hairy leaf segments and usually hairy fruits. This variety differs also from *V. Fauriei* in non-lyrate leaves, more numerous leaf segments, contracted inflorescence, and broader fruits. Stolons in var. *Stubendorffii* are likewise different from those in *V. Fauriei*. As is well known, the members of the latter species produce annual stolons which in the summer of the first year of their existence, develop leaf rosettes on the apex. The stolons of *V. alternifolia* var. *Stubendorffii* are of the wintering type. They produce leaf rosettes usually in the second year of their life or, sometimes (*e.g.*, near Harbin, Manchuria), in the autumn of the first year (*Baranov* and *Skvortzov*),

The geographical areas of *V. alternifolia* var. *Stubendorffii* and *V. Fauriei* partly overlap. However, the latter species is centered in the eastern part of Manchuria and it apparently represents a Manchurian floristic element. Therefore it is confined in its distribution to the regions with Manchurian forest flora. Perhaps this is the reason that *V. Fauriei* has not been reported from the regions with a Daurian flora, e. g., The Great Khingan Mountains or Inner Mongolia. On the contrary, the area of *V. alternifolia* var. *Stubendorffii* covers western Manchuria and Inner Mongolia and extends as far to the west as eastern Transbaikalia.

The geographical areas of *V. alternifolia* var. *alternifolia* and var. *Stubendorffii* also partly overlap. The latter variety has formed from the typical *V. alternifolia* in the process of race formation and was segregated in the extreme south-eastern portion of the geographical area of *V. alternifolia*. Voroschilov believes (l. c., 1959) that of different races of *V. alternifolia* in Manchuria occurs only var. *Stubendorffii*. This is not true. *Valeriana alternifolia* proper has also been reported from western Manchuria. Since typical variety of *V. alternifolia* and var. *Stubendorffii* have different ecological adaptations, it is probable that they must be ecologically isolated in the places where both of them occur.

Manchurian plants of *V. alternifolia* var. *Stubendorffii* differ in several respects from the generalized description of this taxon given by Voroschilov (l. c., 1959). These plants are much more vigorous, with much taller stems, larger leaves, more numerous and more broad leaf segments. However, the number of nodes on the stem is the same. This means that internodes in the Manchurian plants are longer. Pubescence in these plants is in general more heavily developed although the fruits range from glabrous to hairy, while in generalized descriptions they are usually characterized as hairy.

4. *V. subbipinnatifolia* A. Baranov sp. nov. Tabula nostra II, fig. 1.

Planta mediocris ut videtur estolonifera. Caulis simplex, strictus, 3-nodosus, 61.7 cm. altus, basi cum residuis petiolorum foliorum radicalium dissolutis, parte inferiore dense—apicem versus sparsior—brevissime hispidulus, ad nodos plus dense breviter hispidulus. Folia pinnata, non lyrata, caulina inferiora 8–9 cm. lata, petiolata. Petioli ca. 0.3 cm. longi cum rachi modice hispiduli. Segmenta foliorum lateralia 7-juga, omnia linearia, rarius lineari-lanceolata, lobulo apicali longissimo, lineari, interdum rotundato-truncato instructa, basi longe, angustissime cuneata et segmentulis accessoriis gerentia, 1.8–3.2 cm. longa, 0.4–0.6 cm. lata, laciniatoserrata, ita subbipinnata, supra margine, subtus per totam superficiem hispidula, apud junctionem cum rachi barbata. Lacinii marginales obtusi, lineares. Segmentuli accessorii apud basin segmentorum lateralium breves, lineares vel anguste-triangulares, interdum incisi. Segmentum terminale angustissime lineari-oblancheatum, ca. 2.5 cm. longum, ca. 0.2 cm. latum. Inflorescentia in fructibus ca. 10 cm. longa, ca. 9 cm. lata, ramis sparsim scabris vel sublaevibus, apud nodos dense hispidis. Bractee lineares ± dense

hispidae, 0.5–1.1 cm. longae. Bracteolae oblongae, acumine brevi instructae, margine paulum breviter ciliatae vel glabrae, 0.2–0.4 cm. longae. Flores ignoti. Fructus pilosi, ca. 0.5 cm. longi, ca. 0.2 cm. lati.

Hab. in pratis siccis ripariis.

Distrib. Manshuria borealis.

Specimen examinatum: Manshuria borealis, prov. Cheilungkiang, prope pagum Siansiangfang (ad ripas fl. Amur), 25. VII. 1950, leg. A. Baranov et T. C. Chao No. 4. Holotypus in Herbario Instituti Silviculturae et Pedologiae Academiae Scientiarum Sinicae, Shenyang (Mukden olim) conservatur.

Only one specimen of this curious plant was collected by the writer during the expedition of the Botanical Institute of Northeastern Agricultural College in Harbin to the Amur river and Great Khingan Mountains in 1950. The outer appearance of the plant, which is covered with a short dense pubescence of stiff hairs and which has finely lacinate leaves, is quite unusual and is markedly different from the appearance of all other Manchurian valerianas. In the type specimen, the leaf arrangement is alternate, but this is, evidently, an abnormality frequent in other species of *Valeriana*. Since I could not identify this plant with any of the Manchurian valerianas, I propose to describe it as a new species. The specific epithet of this taxon indicates its most striking feature—subbipinnate leaves—in which the lateral segments are furnished at the base with additional segmentules. Another peculiarity of this plants' leaves is that the lateral segments on the apex end in a very long, linear, often bluntly rounded lobules.

Valeriana subbipinnatifolia seems to exhibit the most xeric characters of all the Manchurian valerianas. It is even more xeric than *V. alternifolia*. These xeric characters are relatively low stature, dissected, small leaves, and dense, short pubescence of all parts. This species is entirely different from *V. Fauriei* and its allies in absence of stolons, in the relatively small dimensions of all vegetative parts, non-lyrate, many-segmented leaves, narrow leaf segments, very short petioles, relatively broad fruits, dense short pubescence, and ecology. It is closer to the *V. alternifolia* group of

PLATE III

Fig. 1. Semidiagrammatic figures of portions of plant, and of leaves, bracts and fruit of *V. amurensis* P. Smirn. ex Kom.: a, basal portion of stem with root system and stolons; b, middle and upper portions of stem with leaves and inflorescence; c, lower cauline leaves; d, middle cauline leaves; e, upper cauline leaves; f, leaf subtending inflorescence; g, magnified portion of leaf segment; h, bracts; i, bracteoles; k, portions of pedicel and bracteole margin, magnified; l, types of glandular and simple hairs in the inflorescence; m, fruit.

(Root system \times ca. 1/1; stem \times ca. 1/2; leaves \times ca. 1/1; portion of leaf segment \times ca. 8; bracts \times ca. 4; bracteoles \times ca. 9; portions of pedicel and bracteole margin \times ca. 10; hairs in the inflorescence \times ca. 60; fruit \times ca. 20)

Original drawings by the author.

PLATE III



174666

species from which it differs only in loose inflorescence, smaller, more dissected leaves with narrower leaf segments, and in the type of pubescence.

5. *V. amurensis* P. Smirn. ex Kom. in Bull. Jard. Bot. Ac. Sci. USSR, **30**(1-2), p. 214. 1932; Kom. et Alis., Key Pl. Far East. Reg. USSR, **2**, p. 993. 1932; Grubov, Fl. URSS, **23**, p. 635, *Tab. 32*, f. 2. 1958; Voroschilov, Lekarstvennaia valeriana, fig. 11. 1959.—*V. sambucifolia* Mikan ssp. *amurensis* (P. Smirn. ex Kom.) Hara et f. *leiocarna* (Hara) Hara, Jour. Fac. Sci. Univ. Tokyo, Sect. III **6**(7), p. 387. 1956.—*Tab. nostra III*, fig. 1.

Description from Manchurian specimens.

Medium-sized, stoloniferous plant. Stem simple, straight, 62.5-98 cm. tall, ±densely hispid or, at least in the upper part, glabrous. Nodes 4-5. Radical leaves by the flowering time wither off. Cauline leaves pinnate, lyrate, 3-16.5 cm. long, 1.1-7.8 cm. broad. Petioles 0-6.4 cm. long, as well as the rachis usually hispid, or more rarely glabrous. Lateral segments 2-6 pairs, oblong, elongate or linear-lanceolate to oblong-ovate or oblong-elliptic, ±acutely long acuminate at the apex, narrow cuneate at base and sometimes decurrent on the rachis, 0.6-3.7 cm. long, 0.3-1.2 cm. broad, on the surface minutely adpressed hispid or more rarely glabrous, along the margins hispid, almost entire or ±coarsely serrate. Terminal segment ±broad obovate-rhomboid, obovate or lanceolate, ±long acuminate, at base cuneate, 1.3-5 cm. long, 0.7-2.3 cm. broad (somewhat larger than lateral segments), sometimes confluent with the uppermost pair of lateral segments into one, large, broadly obovate segment. Inflorescence ca. 3 cm. tall, ca. 5 cm. broad, contracted. Branches of inflorescence hispid and ±glandulose, especially densely at the nodes. Bracts and bracteoles sparingly short ciliate and glandulose at the margins. Glands brown, stipitate. Bracts linear or linear-lanceolate, 0.5-4 cm. long. Bracteoles oblong, ovate or obovate, 0.3-0.4 cm. long, on the apex abruptly narrowed into short acute point. Fruits hairy.

Hab. Meadows.

Gen. distribution: Okhotsk region, Amurland, Ussuriland, Manchuria, Korea.

Specimens examined: Manchuria. Eastern part of Liaoning prov., Tsienshan, 27. V. 1950, *T. N. Liou No. 530*; Chikuanshan, 16. V. 1950, *M. Noda No. 539*; locus ?, 23. V. 1932, collector ? s. n.; locus ?, 17. VI. 1932, collector ? s. n.

Valeriana amurensis was described by Komarov on the basis of herbarium material from Ussuriland. This material was examined by P. Smirnov who was also the first to propose the species as new. Komarov indicates the following distinctive features of this plant, light green coloration of the intact plant, bright colored corollas, glandulose calyx, and leaves with 5-11 (most often 7) pairs of segments. Of these features the most important is the glandulose pubescence. It is spread not only over calyx but over all parts of the inflorescence. None of the other Far Eastern valerianas has this type of pubescence. The authors on the East Asiatic members of the group all take notice of this remarkable character.

The Manchurian plants of *V. amurensis* have no special differences with the generalized description of this species given in the Flora URSS by Grubov. The glabrous-fruited form of this plant from Korea was taxonomically differentiated by Hara under the name of f. *leiocarpa* Hara (Hara, 1941). This form is, apparently, of no large taxonomical value since, as is well known, the degree of hairiness of the fruits in valerianas is a very changeable character.

REFERENCES

- (1) BARANOV, A. ET SKVORTZOV, B.: Diagnoses plantarum novarum et minus cognitarum Mandshuriae. Fasc. 2. Acta Soc. Harbinensis Investig. Nat. & Ethnogr. No. 12: 27-38. 1954. (in Latin & Russian, with English summary).
- (2) COQUILLAT, M.: *Valeriana excelsa* (Poir.) à Lyon. Bull. mens. Soc. Linn. Lyon. 14 e année. No. 2: 28. 1945. (in French).
- (3) COSTE, H.: Flore descriptive et illustrée de la France. vol. 2. 627 pp. Paris. 1903. (in French).
- (4) FERGUSON, I. K.: The genera of *Valerianaceae* and *Dipsaceae* in the southeastern United States. Jour. Arn. Arb. 46(2): 218-231. 1965.
- (5) GRUBOV, V.: Genus *Valeriana*. In Fl. URSS 23. 775 pp. 34 pls. Moscow-Leningrad. (in Russian).
- (6) HARA, H.: Observationes ad Plantas Asiae Orientalis (XVIII). Jour. Jap. Bot. 17(3): 119-129. 1941. (in English).
- (7) _____: Enumeratio Spermatophytarum Japonicarum. Pars II. 280+36 pp. Tokyo. 1952. (in Japanese & Latin).
- (8) _____: Contributions to the study of variations in the Japanese plants closely related to those of Europe and North America. Part 2. Jour. Fac. Sci. Univ. Tokyo. Sect. III, Botany. vol. VI, part 7: 343-391. 1956. (in English).
- (9) HEGI, G.: Illustrierte Flora von Mittel-Europa. VI Bd. 1 Hälfte. 544 pp. Color pls. 234-263. München. 1913-1918. (in German).
- (10) HÖCK, F.: *Valerianaceae*. In A. Engler u. K. Prantl. Die natürlichen Pflanzenfamilien. IV Teil, 4 Abt. 194 pp. 1 pl. Leipzig. 1891. (in German).
- (11) JANCHEN, E.: Catalogus Florae Austriae. 1 Teil. 3 Heft. pp. 441-710. Wien. 1963. (in German).
- (12) KATINA, Z. F.: *Valerianaceae*. In Fl. URSS 10. 490 pp. Kiev (Kyiv). 1960. (in Ukrainian).
- (13) KITAGAWA, M.: Lineamenta Florae Manshuricae. 487 pp. 12 pls. 1 map. Hsinking. 1939. (in Latin & Japanese).
- (14) KITAGAWA, M.: A preliminary report on the vegetation of Mt. Changpaishan, E. Manchuria. Rep. Inst. Sci. Res. Manch. 5(5): 117-180. 1941. (in English).
- (15) KOMAROV, V. L.: Flora Manshuriae. 1 ed. vol. III, Part 2. 853 pp. 16 pls. St. Peterburg. 1907. (in Russian).
- (16) _____: Flora Manshuriae. 2 ed. 3. 814 pp. 16 pls. Moscow-Leningrad. 1950. (in Russian).
- (17) KOMAROV, V. L. & ALISOVA, E. N.: Abridged Key for the identification of the Far East plants. 1. 516 pp. Vladivostok. 1925. (in Russian).
- (18) _____: Key for the plants of Far Eastern Region of USSR. 2. pp. 624-1175. pls. 188-330. Leningrad. 1932. (in Russian).
- (19) MAXIMOWICZ, C. J.: Primitiae Amurensis. 504 pp. 10 pls. 1 map. St. Peterburg. 1859. (in German & Latin).
- (20) NEUMAN, L. M. & AHLFVENGREN, FR.: Sveriges flora. XII+XXXVI+832 pp. Lund. 1901. (in Swedish).
- (21) OHWI, J.: Flora of Japan. 1383 pp. Tokyo. 1953. (in Japanese).
- (22) _____: Flora of Japan (in English). IX+1067 pp. 16 pls. Washington, D. C. 1965.
- (23) ROUY, G. & CAMUS, E. G.: Flore de France. 8. 406 pp. Paris. 1903.

- (24) VOROSHILOV, V. N.: *Lekarstvennaia valeriana* [Medicinal valeriana]. 159 pp. Moscow. 1959. (in Russian).
- (25) _____: New plant records in the flora of Soviet Far East and descriptions of new species. *Bull. Princip. Bot. Gard. Ac. Sci. USSR. Fasc. 38*: 42-52. 1960. (in Russian).
- (26) YENIN, P. K. & *at*: *Valeriana lekarstvennaia* [Medicinal valeriana]. Moscow. 1953. (in Russian).