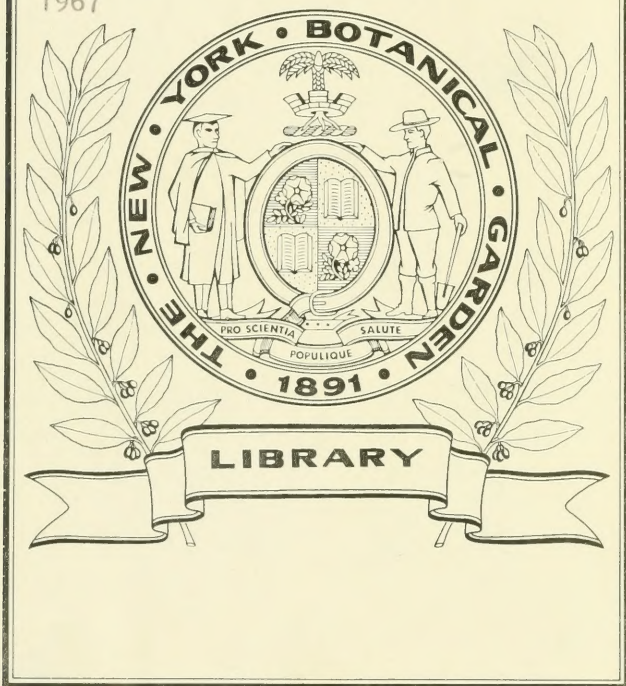


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PLANT MONOGRAPH REPRINTS

EDITED BY

J. CRAMER & H. K. SWANN

VOLUME 2

AN ACCOUNT OF THE GENUS *SEDUM* AS FOUND IN CULTIVATION

by

L. R. PRAEGER



REPRINT 1967

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AN ACCOUNT OF THE GENUS *SEDUM* AS FOUND IN CULTIVATION.

By R. LLOYD PRAEGER, B.A.

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PART I.—INTRODUCTORY.

I. PRELIMINARY.

It is doubtful if any genus of plants which is widely cultivated is in such a confused state in our gardens and horticultural books as is the genus *Sedum*. Even in collections where the owners pride themselves on correctness of nomenclature, misnomers and *nomina nuda* abound; and common species masquerade under many different names.

This does not arise from any special difficulty in the identification of the species of *Sedum*. Some of the species, it is true, are variable and in some of their forms not at once recognizable by the uninitiated;

but the majority are stable and distinct plants recognizable at a glance, and more easily diagnosed than, for instance, the Saxifrages, which nevertheless, in gardens, are usually more correctly named.

The confusion among the Sedums appears to be due mainly to the fact that some of them are rampant growers which invade the territory of neighbouring plants and overwhelm them. In nurseries this undoubtedly leads to the intruders being sent out sometimes under the names of the species which they have ousted. The smallest scrap of many of these plants—in many cases single leaves—will take root and grow, and thus pieces accidentally dropped or carried by wind or other agencies may establish the species at a distance from the parent. Again, some of the species of the *rupestre* group, notably *S. altissimum* and *S. Douglasii*, have a habit of dropping in autumn numerous short barren shoots, which are rolled about by wind and so on, and take root wherever they find a refuge. There is little doubt that these facts go far to account for the numerous names under which common free-growing Sedums, such as *album*, *acre*, *sexangulare*, *reflexum*, *rupestre*, *anopetalum*, *altissimum*, and *spurium* are found in gardens. But a large number of misnomers are due to mere carelessness.

Another regrettable feature as regards the Sedums is the number of *nomina nuda*—names which belong to no described species—which are found in connexion with them. Many nurserymen's catalogues are full of such names. Some are clearly perversions, due to carelessness, of well-known names—such, for instance, are *crimealense* for *himalense*, and *glaciale* for *gracile*; but the majority seem to be deliberate unlicensed christenings. I have given elsewhere* a list of such of these as I have encountered—and suffered from—and it is to be hoped that they will disappear from our catalogues. Many of them have not even the merit of being applied consistently to any one species.

Another cause of misnaming among the Sedums is the fact that, like most succulents, these plants dry very badly, often losing all their leaves in the process, and unless killed with boiling water continuing to grow for weeks while being pressed; herbarium material is thus generally poor and unsatisfactory, often almost useless for comparison with the living plants, and identification is rendered correspondingly difficult. Figures of the species thus assume a special value, and many of the Sedums found in cultivation have never been drawn, while figures of many others are found only in publications inaccessible to the majority of gardeners. For this reason I have been at pains to have a drawing made by Miss Eileen Barnes of every species of which I could obtain fresh material. The descriptions likewise have in every instance where fresh material could be obtained been taken from the plants themselves, and checked with the descriptions given by the original describer and by leading authorities.

* *Gardeners' Chronicle*, 3rd Ser., 56, 334, 1914.

The cases in which the descriptions or figures are in whole or part not drawn from living material may be summarized as follows :

Fresh material not available—

S. rubricaulle, *S. Hemsleanum*, *S. japonicum*, *S. Zentaro-Tashiroi*.

Plants which have not flowered with me, or which died before flowering :

S. chapalense, *S. cyaneum*, *S. dendroideum*, *S. frutescens*, *S. Hallii*, *S. lenophylloides*, *S. oaxacantum*, *S. polyrhizum*, *S. trulipetalum*.

Description helped out by dried material :

S. Cockerellii, *S. glabrum*, *S. purpureoviride*, *S. Stevenianum*.

With the design of helping those to whom the technical terms of descriptive botany are unfamiliar, I have prefaced the description of each species with a brief note of the characteristics by which it may be distinguished from its nearest allies. I would like to warn readers that reliance on the figures alone may sometimes lead them astray in a genus so large and complicated ; even if the full description of the plant is not used, a careful study of the short note mentioned is quite necessary if pitfalls are to be avoided.

II. HISTORICAL.

As might be expected in a genus of which a number of species, of sufficiently noteworthy appearance, grow in regions associated with early civilizations, species of *Sedum* were known to the ancient naturalists (e.g. *S. Cepaea*, *S. maximum*, *S. roseum*), being referred to by Greek and Latin writers ; these and others were likewise known to the medieval herbalists. Coming to the dawn of modern botany, we find 15 species enumerated in the first edition (1753) of LINNÆUS' "Species Plantarum," all of these being European except *S. Aizoon* and *S. hybridum* (both Siberian) and *S. verticillatum* (Japanese, &c.). In the 4th edition (1799) of the same work the number has risen to 29, mainly by the addition of other European species. In 1828 DE CANDOLLE ("Prodromus," 3, p. 401) enumerates 88 species of *Sedum*, some of them tentatively as *non satis nota*, but almost all now recognized as good species. DE CANDOLLE'S list includes a good many additions from the Caucasus, a few from Siberia, the Himalayas, Japan, North Africa, the United States, and Mexico, and one each from Madeira, Ecuador, and Venezuela. In 1862 BENTHAM and HOOKER ("Genera Plantarum," 1, p. 660) put down the number of known species at 120. This total is increased to 130 in standard works published during the next ten or twenty years, and this figure is raised only to 140 in such standard recent works as ENGLER and PRANTL, "Naturliche Pflanzenfamilien," iii. a (1891)

and DALLA TORRE and HARMS, "Genera Siphonogamarum" (1901). But as a matter of fact, the number of known species has increased far faster than that. In "Index Kewensis" (1885) some 238 species are listed (some of which are now regarded as synonyms or varieties); the four supplements which have since appeared raise this number (up to the end of 1910) to 391; and a fair estimate would put the total number of species at present known at about 500. The large increase during the last half-century is due mainly to the botanical exploration of Mexico and of Western China (see pp. 8, 10).

The great majority of these 500 species are not, and have never been, in cultivation, and are known (especially the many recently described Chinese species) only from dried specimens. A good many of them are annuals, or of no horticultural value. But there remain many handsome or interesting plants, which one would like to see introduced into our collections. As regards the number of species in cultivation, Dr. MAXWELL MASTERS, in his account of the cultivated Sedums* (1878), lists 65 species; but a critical examination of his list shows that of these only 44 were certainly examined by himself, or, if not seen, were certainly correct. These are all in cultivation still. Four more were apparently seen by him. Eleven not seen by him I regard as doubtfully correct, and probably referable to species already in his list, while finally six of his species are now to be set down as synonyms, additional species erroneously named, or varieties. These last are:

- S. arboreum* = *S. moranense* var. *arboreum*.
S. Beyrichianum = *S. Nevii* var. *Beyrichianum*.
S. Maximowiczii = *S. Aizoon*.
S. pruinatum = *S. rupestre*.
S. sarmentosum = *S. mexicanum*.
S. stoloniferum = *S. spurium*.

As the first, fifth, and sixth of these are not in his list under their correct names, the number certainly in cultivation, according to his paper, is raised to 47. At least half a dozen tender species (with which his paper was not concerned) were also certainly in cultivation at that time.

As regards the present list, I went further afield than Dr. MASTERS, and to the best of my ability ransacked the gardens of the world, till the war put an end to such activities. European gardens yielded a good many species unknown to MASTERS; others came from the Himalayas, China, and Japan, while important contributions of Mexican species were received from Washington and New York. As a result I have received and grown a total of 151 species, 13 of which proved to be new to science, and have been described.† I know of only four species which I believe to be at present in cultivation,

* MASTERS, M. T., "Hardy Stonecrops: Sedums." *Gard. Chron.* N.S. 10, 1878, ii.

† *Journal of Botany*, vols. 55, 56, 57.

which I have not seen—*S. rubricaula* at Washington, *S. Hemsleanum* at St. Louis, and *S. Zentaro-Tashiroi* and *S. japonicum* (var. *senanense*) at Tokio. Some other species were in cultivation not many years ago—for instance, *S. clavifolium*, *S. delicatum*, *S. filiferum*, *S. Painteri*, *S. semiteres*, *S. submontanum* at Washington, and *S. Englerianum* at Dahlem, but they appear to be now lost.

Some details as to the sources from which the species described in the following pages were derived will be found on p. 19.

In addition to species already in cultivation, some species hitherto unknown in gardens were introduced, thanks to the kind offices of correspondents in Asia and America; and a few others which had been lost to cultivation, such as *S. pruinaatum* from Portugal and *S. lancerottense* from Teneriffe, were reintroduced and distributed.

III. DISTRIBUTIONAL.

The genus *Sedum* is spread in varying abundance throughout the Northern Hemisphere. The majority of the species inhabit temperate countries, or, if found in lower latitudes, have their homes on the mountains, so that most of them are hardy in our gardens. A few species run very far north, and the genus is represented in Iceland, Nova Zembla, Arctic Siberia, Alaska, and Greenland; these northern forms belong mostly to the section *Rhodiola*. Southward, a few endemic species are found in the Philippines; others reach the Equator on the great mountains of Central Africa; while in America the genus has spread down the backbone of the continent and has crossed the Equator, the most southern outpost being in Bolivia. Over part of its wide range, the genus exhibits well-marked geographical groups, allied species being concentrated in particular areas—for instance, the large *Rhodiola* group in Asia from the Himalayas to China, the *Involucrata* group in the Caucasus, the *rupestre* group in Europe; on the other hand, the rich *Sedum* flora of Mexico shows extraordinary variety of forms mostly without close relationship. The succeeding paragraphs briefly describe the *Sedum* flora of the main areas occupied by the genus; on pp. 22, 23 will be found notes as to the distribution of the phylogenetic groups into which the genus divides itself.

Europe.

About sixty species of *Sedum* altogether occur in Europe, the number increasing generally from the north-west to the south-east. The great bulk of these are representatives of the section *Seda Genuina*—mostly small creeping plants with very thick leaves, and yellow or white flowers. Among them, the well-marked *Rupestre* group is characteristically European. About one-third of the total are annual plants; these are mostly southern, and increase eastward to find their maximum in the region extending from Greece to Persia. Of other sections of the genus, three *Telephiums* occur—*S. Telephium*,

S. maximum, and *S. Anacampseros*, and one *Rhodiola*, the ubiquitous *S. roseum*—if we except *S. quadrifidum*, which spreads from Arctic Asia just into Russia. Almost all the perennial species are in cultivation, though in some cases very rarely; a few Balkan and Greek plants are yet unknown in gardens. Some of the annual plants are found in gardens, but the pretty blue *S. coeruleum* is the only one of value.

In our own islands eight species are undoubtedly native—namely, *roseum*, *Telephium*, *album*, *anglicum*, *acre*, *reflexum*, *rupestre*, *villosum*. Several others, such as *dasyphyllum* and *sexangulare*, are naturalized. Most of our native species have been spread by human agency much beyond their original native limits.

LITERATURE.—NYMAN, "Conspectus Florae Europae," and Supplements.

Africa.

The Mediterranean littoral yields a number of the familiar species of southern Europe, and also some endemic plants, such as *S. multiceps* (well known in cultivation) and the curious *S. tuberosum*. A few species occur on the mountains of Abyssinia, and one or two others have recently been discovered as far south as the Equator, on Mt. Ruwenzori. R. HAMET reduces* the nine species which have been described from the interior of Africa to five—namely, *abyssinicum* Hamet, *Meyeri-Johannes* Engler, *ruwenzoriense* Baker fil., *Epidendrum* Hochstetter, *sediforme* Hamet. None of these is known in cultivation.

The Atlantic Islands.

Madeira yields three species of *Sedum*—*S. farinosum* Lowe (possibly an extreme form of the European *album*) and two yellow-flowered species, *fusiforme* and *nudum*, apparently related to those of Central Africa and Central America. The Canaries possess *S. lancerottense* (closely allied to the Madeiran *nudum*) and the Mediterranean annual *rubens*; possibly also a third species undescribed (a poor specimen in Herb. Kew.). Of the above, *nudum* and *lancerottense* are in cultivation.

The Caucasus.

The Caucasian region is particularly interesting as being the headquarters of two very distinct sections of the genus—the group *Involucrata* of MARSCHALL VON BIEBERSTEIN, of which the familiar *spurium* is a characteristic example; and the still more distinct little group of the *Sempervivoides*. Most of these are confined to the Caucasus, but a few are found in the adjoining regions of Asia Minor or Persia. The *Involucrata* number half a dozen species, with roundish, flat, mostly opposite leaves and red or white flowers. Of these, *spurium* is very widespread in cultivation, with crimson, pink, or

* In litt., Herb. Brit. Museum.

white flowers; *stoloniferum* is less frequently seen in gardens, and *Stevenianum* and *proponticum* almost unknown. The remaining members of the group, *obtusifolium*, *Millii*, and *involucratum*, from the Caucasus, and *Baileyi* from China, are not, I believe, in cultivation. The Sempervivoides group includes two remarkable biennial plants, *S. sempervivoides* and *S. pilosum*, which form dense plump leaf-rosettes like those of the genus *Sempervivum*, and in their second year produce masses of showy red flowers. Both species are now well known in good collections. For the rest, the Sedums of the Caucasus region, which number some twenty in all, include a few familiar European species—*maximum*, *album*, *acre*, *sexangulare*—a few small perennials not found elsewhere—*gracile*, *tenellum*, and *subulatum*, the first of which is in cultivation—and some little annual species.

LITERATURE.—LIPSKY, "Flora Caucasia," 1899 (in Russian). HAMET, "Révision des Sedums du Caucase." *Trd. Bot. Sada, Tiflis*, 8, Part III., 1908.

NOTE.—Syria, Mesopotamia, and Persia yield a number of Sedums, mostly small annuals.

Siberia and Central Asia.

Just as the Caucasus region is the headquarters of the small and distinct group of Sedums of which the familiar *spurium* is typical, so we find focussed in Eastern Siberia and the northern parts of China and Japan a compact little group of thick-rooted, flat-leaved, yellow-flowered species—the Aizoon group. These include five—*Aizoon*, *Selskyanum*, *hybridum*, *kamtschaticum*, and *Middendorffianum*—of which the first and third were known to LINNÆUS, and all have been long in cultivation; and the two more, *Ellacombianum* and *floriferum*, lately described by myself from living material. Only two of the group are not in cultivation—*S. Sikokianum* and *S. Yabeanum*, both of Japan. For the rest, the Siberian and Central Asiatic Sedum flora is made up mainly of plants of the *Rhodiola* and *Telephium* sections, many of which occur, some of them extending far to the northward. But the main centre of the *Rhodiola* section lies farther south, in the Himalayan region, and that of the *Telephiums* south-eastward, in China and Japan.

LITERATURE.—MAXIMOWICZ, "Diagnoses Plantarum Novarum Asiaticarum." *Bull. Acad. Impér. des Sciences de St. Pétersbourg*, 29, 1883. (Reprinted in *Mélanges Biologiques*, 11.)

The Himalayan Region.

The Himalayas are *par excellence* the headquarters of the *Rhodiola* section of Sedum; not that many species of that group are not found in neighbouring regions—*e.g.* Yunnan—but in the Himalayas the *Rhodiolas* are so abundant as to form a feature of the vegetation of the higher grounds, and only few other Sedums occur, while in Yunnan many other species are found. A good many of the earlier discovered

Himalayan *Rhodiolas* are in cultivation, and they are interesting plants. Farther north, in Tibet and Afghanistan, some very peculiar *Sedums* occur, such as *S. Balfouri*, *S. Hobsonii*, *S. Karpelesae*, *S. pachyclados*, which I group with the *Rhodiolas*. For the rest, the Himalayan and Tibetan flora includes a few of the Japonica series (which find here their western limit), a few small annuals, and some miscellanea, such as the *Telephium S. Ewersii*. Altogether close on fifty species are found within this region, almost all of them being perennials; about a dozen of them are in cultivation.

China.

In FORBES and HEMSLEY'S "Enumeration of the Plants of China" (which included the area extending from Formosa on the south to Korea on the north), published in 1887, 28 species constituted the list of *Sedums*. The floral wealth of the interior of China was at that time unknown. Since then the extraordinary results of the botanical explorations of HENRY, WILSON, FORREST, and the French missionaries have been published; hundreds of new plants have been described, and among them are at least 90 new species of *Sedum*. Most of these are from the inaccessible western provinces, and have been described almost entirely from dried specimens. Very few of them are as yet in cultivation. Many are small plants of the Japonica section, of no great horticultural importance; but they include a number of *Rhodiolas*, and some very interesting plants allied to the section *Telephium*, for which two new sections of the genus, *Pseudorhodiola* * and *Giraldiina*. † have been created; one species belonging to the first of these groups (*S. yunnanense* var. *valerianoides*) is in cultivation.

The earliest *Sedums* to come to us from China were *spectabile* and *sarmentosum*, and up to the present few have followed them. Not more than 30 of the 120 or so species known to occur in China are at present in cultivation. While the Japonica section cannot be expected to yield much of garden value, we may look for some interesting species among the Chinese *Rhodiolas*. Some of the Chinese *Sedums*, such as *S. Chaneti* and *S. limuloides*, are very curious plants indeed.

LITERATURE.—FORBES and HEMSLEY, "Enumeration of all the Plants known from China. . ." *Journ. Linn. Soc., Bot.*, **23**. R. HAMET, "Enumeration and Description of Species of *Sedum* (*Plantae Chinenses Forrestianae*)." *Notes R. Bot. Garden Edinb.*, **5**, 115, 1912. L. DIELS, "Catalogue of all the Plants collected by George Forrest . . ., 1904, 1905, 1906." *Ibid.*, **7** 1912-3. R. HAMET, "Enumeration of *Crassulaceae* collected in China" [by many collectors]. *Ibid.*, **8**, 139, 1913.

Japan.

In Japan, the latest census (by MATSUMURA, 1912) puts the *Sedum* flora at 25 species, which subsequent additions raise to over

* *Pseudorhodiola* Diels in *Engler's Bot. Jahrbücher*, **29** (1901), p. 360.

† *Giraldiina* Diels in *Engler's Bot. Jahrbücher*, **36** (1905), Beibl. 82, p. 48.

30. A few of these, such as *Aizoon* and *kamtschalicum*, are plants which have their headquarters in Siberia; two others, *Telephium* and *roseum* (which occurs in the var. *Tachiroi*), have a much wider range; but the majority are endemic. A few of them, such as *alboroseum*, *Sieboldii*, and *spectabile*, have long been known in cultivation, the last two being among the handsomest of the garden Sedums. To the *Telephium* section belongs nearly one-half of the species represented in the Japanese flora, while an equal number belongs to the Japonica section, which consists mostly of smallish plants with yellow flowers. Of the latter, a ternate-leaved species, *S. lineare*, is in cultivation in our gardens, and two others, *japonicum* var. *senanense* and *Zentaro-Tashiroi*, are reported as in cultivation in Japan. Of the whole Japanese Sedum flora, one-half is known in gardens.

LITERATURE.—MATSUMURA, "Index Plantarum Japonicarum," 2, Part II., 1912. MAXIMOWICZ, "Diagnoses Plantarum Novarum Asiaticarum," v., in *Bull. Acad. Imp. des Sciences de St. Pétersbourg*, 29 (reprinted in *Mélanges Biologiques*, 11), 1884. MAKINO, various papers in *Bot. Mag., Tokio*, &c.

NOTE.—Formosa yields half a dozen Sedums, and the Philippines several. One of the former, *S. formosanum*, is included in the present paper.

The United States and Canada.

Sedums are widely scattered throughout North America, but a larger number is found in the mountainous regions of the west than in the east. Two widespread species, *ternatum* and *pulchellum*, long grown in European gardens, were described by MICHAUX in his "Flora Boreali-Americana" as early as 1803. Another plant found in the Eastern States, *Nevii*, is also long known in British gardens. From the Western States have come two pretty species, *spathulifolium* and *oreganum*; also two *reflexum*-like plants of less merit, *Douglasii* and *stenopetalum*, and the tall and handsome *rhodanthum*. Many species found in the Western States do not appear to be anywhere in cultivation, and my efforts to procure them have had only a limited success. The polymorphic Rose-root, *S. roseum*, which has a circum-polar range, is by American botanists restored to its place as a separate genus (*Rhodiola*); it spreads in varying form along the western mountains, and has been split up into half a dozen species. Except for *S. roseum* s.s. sent me from Washington, I cannot find that any of the American *Rhodiola* forms are in cultivation. Altogether about 50 species of *Sedum* (including some of the "split" genera) occur in the States, mostly in the south-western portion. Two European species, *annuum* and *villosum*, range in the native state west to Greenland, and are thus included also in the American flora. Several familiar Old World kinds—*acre*, *reflexum*, *spurium*, and *Telephium* subsp. *Fabaria*—are naturalized and run wild in the Eastern States.

The most marked feature of the *Sedum* flora is the occurrence in the west of a well-marked group of small perennial species with spathulate leaves and mostly yellow flowers, of which *S. spathulifolium* and *S. oreganum*, already referred to, are examples. Some of these have the petals joined together in the lower portion (thus approaching the genus *Cotyledon*), and have been separated on this account from *Sedum* by some American botanists; but I have preferred to retain them in that genus.

LITERATURE.—BRITTON and ROSE, "Crassulaceae," in "North American Flora," 22, Part I., 1905.

Mexico.

Mexico, which is now known to be extraordinarily rich in *Sedums* and other *Crassulaceae*, was until recent years a *terra incognita*. Two species of *Sedum*, *moranense* and *oxypetalum*, were described in 1823 among the plants collected on HUMBOLDT'S voyage (vol. 6, pp. 44, 45), and five years later DE CANDOLLE included two more, *dendroideum* and *ebracteatum*, in his "Mémoire sur la famille des Crassulacées" (1828). As a result of herbarium work carried out in connexion with the great "Biologia Centrali-Americana," HEMSLEY was able, in 1879-88, to enumerate 22 species from Mexico in the first volume of the botanical section of that publication. During the last thirty years the explorations of a number of United States botanists have resulted in the discovery of a surprising number of new and interesting species of *Sedum* and of closely allied plants for which new genera have been created, though in a broad sense many of them may be ranked as *Sedums*; so that the species known from Mexico is now verging towards a hundred. Living plants of many of these have been sent to the States by their collectors, and are in cultivation at Washington and other places. They are still almost unknown in British and other European gardens, though many of them are handsome and interesting plants, strikingly different in appearance from any of the Old World *Sedums*. By the kindness of American correspondents, notably Dr. J. N. ROSE (the describer of most of the new species) and Dr. N. L. BRITTON, I have received living specimens of a large number of these species. Plants of all or nearly all of them have now been placed at Kew, Edinburgh, and Dublin (wherever they were not already represented in the collections), and we may hope that these interesting species will now become better known on this side of the Atlantic. They display a remarkable range of form, from stout shrubs several feet in height, such as *oxypetalum* and *praealtum*, to tiny creeping species like *compactum* and *humifusum*; the leaves show every variety of shape and size, and the flowers range through almost every hue. Many of the species are striking and decorative plants, such as *alamosanum*, *cupressoides*, *Stahlii*, *Palmeri*, *bellum*, *nutans*, *pachyphyllum*, and *versadense*.

The correlation of the Mexican Sedums with those of the Old World presents difficulties. The shrubby species appear best placed in the *Seda Genuina*, with which they possess many connecting links. To accommodate another characteristic Mexican group a new section, *Mexicana*, has been instituted.

LITERATURE.—BRITTON and ROSE, "Crassulaceae," in "North American Flora," 22, Part I., 1905, and subsequent papers, mostly by J. N. ROSE, in "Contributions from the U.S. National Herbarium," and elsewhere.

Central and South America.

A few species, of no importance horticulturally, occur in Guatemala, to the south of the great Sedum-centre of Mexico. Farther south, we find that the genus has in old days spread along the great backbone of America, and makes on the Andes its only appearance in the Southern Hemisphere,* a few species being found as far south as Peru, and one as Bolivia.

IV. STATISTICAL.

From the point of view of the gardener anxious to identify a Sedum which is unknown to him, the bringing together, as in the present paper, of all the species in cultivation, instead of helping him, may tend to have the opposite effect, since the comparatively small number of more or less common species (to one of which his plant probably belongs) is buried among a complex of other rarer plants which he is unlikely to encounter. With a view of mitigating this difficulty, I attempt below to indicate the species of most frequent occurrence, and also those at the other end of the scale, thus :

Species very common in Cultivation.

<i>acre</i>	<i>rupestre</i>	<i>spurium</i>
<i>album</i>	<i>sexangulare</i>	<i>Telephium</i>
<i>reflexum</i>		

It is probably no exaggeration to say that out of every ten plants (of Sedum) found in British gardens, nine belong to one or other of these species ; and, furthermore, that of every ten names applied in British gardens to Sedums, five refer to one or other of the seven species above.

Species common in Cultivation.

<i>Aizoon</i>	<i>hybridum</i>	<i>oreganum</i>
<i>altissimum</i>	<i>kamtschaticum</i>	<i>roseum</i>
<i>Anacampseros</i>	<i>maximum</i>	<i>spectabile</i>
<i>anopetalum</i>		

* It just reaches the Equator in Africa (see p. 6).

These are followed in frequency by :

<i>dasyphyllum</i>	<i>Lydium</i>	<i>populifolium</i>
<i>Ellacombianum</i>	<i>Middendorffianum</i>	<i>pulchellum</i>
<i>Ewersii</i>	<i>multiceps</i>	<i>Sieboldii</i>
<i>hispanicum</i>	<i>Nevii</i>	

The above-mentioned species, twenty-seven in all, represent those most usually found in English and Continental gardens, many of them under a multiplicity of names. In identifying a garden Sedum, if it will not fit the figure and description which are given under the name in the present paper, or if the name under which it was received does not appear in the Index, it will be well, first, to compare it with the figures and diagnostic notes relating to the seven species first mentioned. If it clearly cannot be matched there, there is a great probability that it belongs to the second or third list given above.

In many cases the quickest way of "running down" a plant will be found to be to match it roughly by eye by a rapid survey of the illustrations, and then to turn to the description of the suspected species for confirmation. In doing this, the following species may for practical purposes be ruled out, as being extremely rare, and known in Great Britain in only two or three (mostly public) collections :

Species very rare in Cultivation.

<i>adenotrichum</i>	<i>himalense</i>	<i>Selskianum</i>
<i>alpestre</i>	<i>hirsutum</i>	<i>Semenovii</i>
<i>alsinefolium</i>	<i>longicaule</i>	<i>stellatum</i>
<i>bhutanense</i>	<i>monregalense</i>	<i>Stevenianum</i>
<i>bupleuroides</i>	<i>multicaule</i>	<i>Stribnyi</i>
<i>cauticolium</i>	<i>Praegerianum</i>	<i>Taquetii</i>
<i>Cepaea</i>	<i>pruinatum</i>	<i>Tatarinowii</i>
<i>dumulosum</i>	<i>pseudospectabile</i>	<i>tibeticum</i>
<i>elongatum</i>	<i>purpureoviride</i>	<i>verticillatum</i>
<i>floriferum</i>	<i>quadrifidum</i>	<i>villosum</i>
<i>gracile</i>	<i>rhodanthum</i>	<i>yosemitense</i>
<i>gypticolum</i>	<i>rubroglaucum</i>	<i>yunnanense</i>
<i>heterodontum</i>		

Also all the Mexican species, with the exception of *praealtum*, *moranense*, and *Stahlii*; and some Indian, Chinese, and Japanese species, including the Japonica series of MAXIMOWICZ and a few others :

<i>Celiae</i>	<i>japonicum</i>	<i>Someni</i>
<i>Chaneti</i>	<i>Leblancae</i>	<i>trullipetalum</i>
<i>Chauveaudi</i>	<i>lineare</i>	<i>varicolor</i>
<i>formosanum</i>	<i>multicaule</i>	<i>viscosum</i>
<i>indicum</i>	<i>sarmentosum</i>	<i>Zentaro-Tashiroi</i>

And, lastly, the plants listed on p. 5, which though they are or were in cultivation, I have not succeeded in seeing.

V. VARIATION.

The species of the genus *Sedum* present a wide range of size, form, and colour. Minute creeping species are found in both the Old and New Worlds, and many of the annual species are very small; on the other hand, some of the herbaceous perennials of the *Telephium* section produce annually stems a yard or more in height, and a few of the sub-shrubby Mexican species are equally tall. As regards duration, about four-fifths of the known species are perennials—many herbaceous (that is, dying back to the root in autumn), many evergreen, a few deciduous (that is, having perennial stems but losing their leaves in winter); the remaining species are mainly annuals, a few being biennials.

Hairiness is rare in the genus; and the most constant characteristic is a tendency to succulence, which in many species attains a very marked development, and enables them to live in very dry places. As an example of the amount of water which these plants may contain, a leaf of *S. nutans*, a Mexican species bearing the largest leaves found in the genus, weighed $\cdot 75$ ounce fresh, and when thoroughly air-dried $\cdot 02$ ounce—in other words, $\frac{7}{8}$, or over 97 per cent., of its weight was due to water stored up in the leaf.

The species of *Sedum* differ much as regards the variability which they display. Some are very stable and constant in character; many others vary within limits, mostly as regards habit and leaf; while some are highly variable, and, as regards at least general appearance, differ more from their type than some allied but quite distinct species do from each other. Thus, *S. roseum*, at once the most variable and the most widely distributed of *Sedums*, has flowers which range from the normal yellow through red to deep purple, and which may be dioecious or hermaphrodite; the stem may be stout or slender, a couple of inches or a foot in height; the leaves green to very glaucous, broadly ovate to linear, entire to deeply toothed. Other conspicuously variable species are *S. album*, *altissimum*, *anopetalum*, *reflexum*, *Aizoon*, *spurium*, *Telephium*.

Appended are notes of the more conspicuous cases of variation (including "sports") found among the cultivated *Sedums*:

Roots varied and often characteristic—thick and tuberous (section *Telephium* especially), woody and hard (section *Aizoon*), or fibrous.

Root-stock thick and elongate with conspicuous scale-leaves (many *Rhodiolas*), or spreading laterally into a fleshy mass (other *Rhodiolas*, *Sedastrum*), or absent.

Stem very variable as regards form and duration; perennial and semi-woody (e.g. *S. populifolium* and many Mexican species), creeping and branching indefinitely (*Seda Genuina*), annual and erect (*Telephium*, *Aizoon*, &c.).

Leaves mostly entire, sometimes serrate, never more divided than pinnatifid (*S. trifidum*); spherical or cylindrical to flat, but never really thin; green or glaucous, rarely hairy or glandular; sessile or stalked, often spurred at base.

Inflorescence mostly cymose, flattish on surface and roundish in outline: sometimes racemose or paniculate. Fig. 1 (*S. lineare*) shows a very characteristic and common type, formed of three dichotomous branches with a flower in the primary and secondary forks, and a bract subtending each flower.



FIG. 1.—Inflorescence of *S. lineare*, from above.

Sepals regular in European and most Asiatic species, often markedly irregular in Chinese and Mexican plants.

Petals very small and inconspicuous (some *Rhodiolas*), or relatively large and mostly brightly coloured, patent or seldom erect, entire or seldom fringed.

Stamens normally 10; 5 in a few species, most of which have no near relationship to each other.

Carpels erect or stellate; seeds borne in a row along the inner face of the carpel, very seldom (e.g. *S. Celiae*) in a bunch near the base of the carpel.

Hybrids.

Hybrids are rare in the genus. A notable exception occurs in the case of *S. Telephium* and its near ally *S. maximum*, which cross freely in the wild state and in the garden. Otherwise only a very few hybrids are known.

- S. altissimum* × *reflexum* = *S. luteolum* Chaboisseau (France).
- S. acre* × *sexangulare* = *S. Füreri* K. Wein (Harz Mountains).
- S. annuum* × *sexangulare* = *S. erraticum* Brügg. (Switzerland).
- S. annuum* × *alpestre* = *S. engadinense* Brügg. (Switzerland).
- S. atratum* × *annuum* = *S. Derbezi* Petitmengin (Maritime Alps).
- S. Aizoon* × *kamtschaticum*. (Wisley, where it was received from a garden as *S. kamtschaticum*. Also seen at Cambridge.)
- S. Telephium* × *maximum*. (Frequent in gardens where the two species are grown.)

Owing no doubt to the fact that the genus is not a popular one among plant-fanciers, we have escaped so far from the production of endless uninteresting artificial hybrids, such as now confuse the allied genus *Saxifraga*.

Sports.

Variation in the way of teratology is rare in the genus.

VARIEGATION.—The best known and most pleasing of the few variegated forms of *Sedum* are *S. Sieboldii* with a gold patch in the middle of each leaf, and *S. kantschaticum* with the leaves splashed with gold. A fine variegated form of *S. maximum* is figured in "Flore des Serres," 16, t. 1669. Of *S. alboroseum* there is a form with a large silver patch in the centre of each leaf, and another with a marginal band of white, or rather of pale green. Two variegated forms of *S. acre* are in cultivation, one of which has the tips of the shoots golden in spring, the other silver. Of the tender *S. lineare* a form has been long in cultivation with the leaves silver-margined.

Of *S. Telephium*, *S. maximum*, *S. album*, *S. spathulifolium*, forms are grown in which purple pigment is conspicuously present in the stem and leaves.

In *The Garden* for 1901, Mr. S. Arnott refers to a small silver-variegated *Sedum* under the name *S. caespitosum*. I have not been able to trace this plant.

FASCIATION.—This monstrosity is rare in *Sedum*, but one remarkable example is frequent in gardens—the "Cock's-comb *Sedum*," which is a sport of *S. reflexum*. From Messrs. BACKHOUSE of York came a smaller plant resembling the last, which is possibly a fasciate *S. anopetalum*, but no normal branch which might flower has been produced yet. I have received from New York a similar sport of the Mexican *S. praealtum*; the last was included a few years ago in HAAGE and SCHMIDT'S list, under the name *S. dendroideum cristatum*. The var. *arbozeum* of *S. moranense* has a persistent tendency to fasciation at the ends of the branches.

The botanist who consults the present paper in the hope of finding an epitome or revision of the described varieties of the more variable species of *Sedum*, such as *S. roseum*, *maximum*, *Telephium*, *anopetalum*, *reflexum*, will be disappointed. In the first place, the paper deals only with the plants as found in cultivation; and in the second place, the varietal characters as found in cultivation themselves vary so much in degree, and are, moreover, so variously grouped, that frequently no form can be found differing in more than a single character from that nearest to it; and these characters individually are not of sufficient importance nor sufficiently stable to warrant the erection upon them of varieties, using the term in its usual botanical sense.

Thus, if we take three leading characters such as varieties are usually constructed upon in this genus, for instance, shape of leaf, colour of leaf, and colour of flower, and designate the normal characters by *a*, *b*, *c*, and the variants by *a'*, *b'*, *c'*, we shall in a large collection of growing plants, such as the writer got together for the purposes of the present paper, be able to find many of the possible combinations

of these, such as $ab'c$, $ab'c'$, $a'b'c$, $a'bc$, and so on. The best-marked variant from the type abc would be $a'b'c'$, and even such a form as $ab'c'$ might be allowed varietal rank were it not for the existence of the forms $ab'c$ and abc' . To this must be added the fact that a , b , c , a' , b' , and c' are not constant quantities, but exist in intermediate degrees which connect a and a' , and so on. Thus, glaucescence may vary by imperceptible degrees into green, and an ovate leaf into a lanceolate or linear leaf. So that in diagnosis we have to deal not only with the number of characters in which a form may agree with or approach a well-marked variety, but with the degree in which each of these characters is present. To conclude, the study of a large growing series of forms of the variable species of *Sedum* as found in cultivation puts one out of conceit with the application of varietal names to most of them.

But it may be pointed out that, owing to the absence of intermediates in a given area, such forms may assume a very definite local importance, which may fully justify their being dealt with in local floras, though on a wider view their distinctness may disappear. It may be added that the study of a large series of *Sedums* derived from garden sources has this bearing on the botanical as opposed to the horticultural side of the question: that as *Sedums* are almost invariably propagated by division, and as they do not tend in most cases to seed themselves in gardens, the numerous garden forms undoubtedly mostly represent wild forms, and give a true conspectus of the natural range of variation of the different species.

VI. CULTIVATION AND PROPAGATION.

Most *Sedums* are of the easiest cultivation, and given perfect drainage and a light soil no difficulty will be experienced. Many—though not all—are especially at home on an old wall, where they will withstand any degree of drought. The vitality as against want of water of many *Sedums* is indeed remarkable, and few plants are better fitted to endure the adverse conditions of soil and moisture which are found, say, on a wall-top. But it would be a mistake to imagine that such conditions are necessary or favourable to their growth. The majority flourish best under ordinary garden treatment; some, such as the *Telephiums*, prefer a rich moist soil; and one or two, such as the European *S. villosum* and the North American *S. pulchellum*, though possessing a succulence as great as many of the most xerophilous species, actually require in many gardens marshy conditions to secure their continuance.

The majority of the *Sedums* found in cultivation are quite hardy in our climate, but a considerable minority cannot be so classed. Thus, the Mexican *Sedums* come from a tolerably warm climate, and as a whole are best suited to a cool house. Their hardiness in the British climate has not as yet been fully tested save in a few

instances. The following notes are arranged in descending order of hardiness.

- | | | |
|---------------------------|--|---|
| R <i>S. moranense</i> | —Hardy throughout greater part of British Isles. | |
| R <i>S. confusum</i> | Less hardy than the last. Injured, but not killed in the open in Dublin in bad winters. <i>S. Palmeri</i> has been grown in the open for many years at Great Warley, Essex. At Wisley, in the severe winter of 1916-17, <i>S. retusum</i> , <i>S. Palmeri</i> , and <i>S. compressum</i> withstood in the open a temperature of -2° F. (34° of frost) on grass twice, and -4° F. once. | |
| <i>S. retusum</i> | | |
| R <i>S. compressum</i> | | |
| R <i>S. Palmeri</i> | | |
| R <i>S. praealtum</i> | | |
| R <i>S. Bourgaei</i> | Barely survive a mild winter at Dublin in the open. | |
| <i>S. cupressoides</i> | | |
| R <i>S. diversifolium</i> | | |
| R <i>S. griseum</i> | | |
| R <i>S. mexicanum</i> | | |
| <i>S. oaxacanum</i> | Uninjured in a cold frame in Dublin, where frost sometimes penetrated slightly: | |
| <i>S. alamosanum</i> | | |
| R <i>S. amecamecanum</i> | | |
| <i>S. compactum</i> | | |
| <i>S. frutescens</i> | | |
| <i>S. mellitulum</i> | | |
| <i>S. rhodocarpum</i> | | |
| <i>S. allantoides</i> | | Very sensitive to frost. A cold frame was often not sufficient protection in Dublin, even when covered when frost was expected. |
| <i>S. humifusum</i> | | |
| <i>S. Liebmannianum</i> | | |
| <i>S. longipes</i> | | |
| <i>S. nutans</i> | | |
| <i>S. pachyphyllum</i> | | |
| <i>S. potosinum</i> | | |
| <i>S. Treleasei</i> | | |
| <i>S. versadense</i> | | |

The species marked R have succeeded well in the open in the garden of Sir John Ross-of-Bladensburg, at Rostrevor, Co. Down, an exceptionally mild spot.

Hardiness in these cases cannot, so far as the slight evidence goes, be gauged by the altitude of the Mexican habitats. Thus, the quite tender *Liebmannianum*, *nutans*, and *pachyphyllum* grow in their native haunts about as high on the mountains (6,000-7,500 feet) as the hardy *moranense* and *retusum* (6,000-8,000 feet).

Of the tender Chinese species, the majority belong to the Japonica series, and they vary from hardy in most parts of the British Isles, e.g. *S. sarmentosum*, to distinctly tender, e.g. *S. lineare*. The rest include the peculiar *S. Chaneti* and some annual plants.

The other Sedums found in cultivation which are not hardy come from various parts of the world: *S. nudum* from Madeira,

S. lancerottense from the Canaries, *S. formosanum* from Formosa. *S. proponticum* from Asia Minor has several times died in the open with me, and M. CORREVON reports that it is not hardy at Geneva.

To sum up, none of the Mexican Sedums are fully hardy throughout the British Isles (though some of them are nearly so). The same remark applies to the species of the Japonica series known in cultivation, and other Chinese species. The remaining tender Sedums found in cultivation are few; they come from various southern regions, and belong to various groups.

Very little need be said as to propagation. The Sedums are notorious for the ease with which any scrap will take root and grow, and this applies throughout the whole genus. With the fleshy-rooted species, such as *S. Telephium*, root-cuttings will strike; and similarly pieces of the fleshy caudices of the Rhodiolas will root at once; the

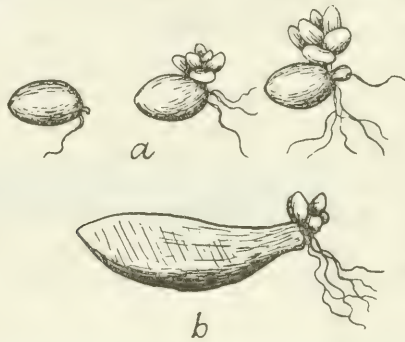


FIG. 2.—Propagation of Sedum from leaves
a. *S. Stahlia*; b. *S. Adolphi* (nat. size).

flowering-shoots of the latter group, if pulled off with a "heel" when half-grown, will often strike likewise.

Another and interesting means of propagation results from the capacity possessed by single leaves, when detached, of producing a bud and roots from their base (fig. 2), which speedily form a new plant. This power is found widely spread in the genus, and equally in terete-leaved and flat-leaved, large-leaved and small-leaved plants: for instance, in *S. brevifolium*, *Stahlia*, *album*, *reflexum*, *pachyphyllum*, *diversifolium*, *bellum*, *nutans*, *praealtum*, *versadense*, *Treleasei*, *Telephium*; even some of the annual or biennial plants—for instance, *S. indicum*—can produce young plants from the leaves, and thus cease to be annuals or biennials. I have not observed this power of budding in any member of the Rhodiola or Aizoon sections.

Some of the *Telephium* section—*S. viviparum* notably, and also its ally, *S. verticillatum*—produce in the upper part of their annual stems numerous small leafy buds which, when the stems fall, root readily and form new plants. Similar short shoots are produced on the flowering stems of the N. American *S. Douglasii*.

Fertile seed is usually produced abundantly in the genus, and germinates readily.

VII. SOURCES OF MATERIAL.

It may be well to indicate from what sources the material used in the present study was obtained ; this will enable any student of the genus who comes after to know what fields were explored and what were not, and will indicate the directions in which possible fresh material may be sought. The following paragraphs must also serve as a very inadequate acknowledgment of invaluable assistance received from many quarters in the supplying of living material.

In the case of the following collections, all the Sedums contained in them were examined, either by means of personal visits or through having received and where necessary grown a plant of each species :

Kew, Royal Botanic Gardens.
 Edinburgh, Royal Botanic Gardens.
 Dublin, Royal Botanic Gardens.
 Wisley, Royal Horticultural Society's Garden.
 Cambridge, Botanic Garden.
 Oxford, Botanic Garden.
 Dublin, Trinity College Botanic Garden.
 Chelsea, Physic Garden.
 Bristol, University Botanic Garden.
 Brussels, Jardin Botanique.
 Copenhagen, Universitets Botaniske Have.
 Stockholm, Bergianska Trädgården.
 Upsala, Universitets Botaniska Trädgård.
 Lund, Botanic Garden.
 Petrograd, Jardin Impérial Botanique de Pierre le Grand.
 Berlin, Dahlem Botanischer Garten.
 Hamburg, Botanischer Garten.
 Bremen, Botanischer Garten.
 Leipzig, Botanischer Garten.
 Heidelberg, Botanischer Garten.
 Dresden, Botanischer Garten.
 Paris, Muséum d'Histoire Naturelle.
 Cap d'Antibes, Villa Thuret.
 Naples, Orto Botanico.
 Catania, Orto Botanico.
 New York, Botanic Garden.
 Ottawa, Botanic Garden.
 Sapporo, University Botanic Garden.

Also many private collections, such as those of the late Lady HANBURY (La Mortola), E. A. BOWLES (Waltham Cross), the late Canon ELLACOMBE (Bitton), H. J. ELWES (Colesborne), F. J. HANBURY (East Grinstead), the late Sir FRANK CRISP (Henley-on-Thames), Rev. R. H. WILMOTT (Hereford), G. B. MILNE-REDHEAD (Frome), Miss WILLMOTT

(Great Warley) ; and a number of nurseries, including those of Messrs. BACKHOUSE (York), CUNNINGHAM, FRASER & Co. (Edinburgh), the TULLY NURSERY (Kildare), LISSADELL NURSERY (Sligo), &c.

Plants were also received from :

Christiania, Botaniske Have,
Tiflis, Botanic Garden,
Washington, Smithsonian Institution,
St. Louis, Missouri Botanic Garden,

and from many private gardens and nurseries, including those of Messrs. REGEL & KESSELRING (Petrograd), F. SÜNDELMANN (Lindau), H. CORREVEON (Geneva), HAAGE & SCHMIDT (Erfurt), and at home those of Messrs. BEES, Ltd., T. S. WARE, J. WOOD, CLARENCE ELLIOTT, BOWELL.

My best thanks are due to a number of foreign botanists who sent collected plants or seeds, and thus helped in many cases to introduce additional species into cultivation, some of which have proved to be new to science :

L. R. ABRAMS (California).
D. M. ANDREWS (Colorado).
THE DIRECTOR, Botanical Survey of India (Darjeeling).
Miss EASTWOOD (California).
REGINALD FARRER (Kansu).
Prof. H. M. HALL (California).
Prof. J. A. HENRIQUES (Portugal).
Mrs. HENSHAW (British Columbia).
Rev. Père E. E. MAIRE (Yunnan).
Dr. G. V. PEREZ (Teneriffe).
Mrs. STOKER (British Columbia).
E. R. WARREN (Colorado).

The baneful influence of the European war hindered work after the first year of the period of my investigation, and subsequently stopped practically all intercourse with foreign countries so far as the receipt of material was concerned. I was unable to carry out a trip which had been planned to include gardens at Frankfurt, Darmstadt, Vienna, Lindau, Geneva, and Paris, at some of which, I have no doubt, additional species of *Sedum* would have been obtained, and many requests for material, which in happier times might have had interesting results, were rendered abortive.

VIII. NOTES ON THE TEXT.

A word as to the arrangement of the material under each species. Following on the reference to original publication, a limited number of further references are added to writings where the species has been especially fully dealt with. More references are given to obscure species or those new to cultivation than to well-known ones—in the case of familiar species references to standard works are omitted.

The notes on synonymy which follow are limited to names still sometimes used in gardens for the plants in question.

Then follow references to published figures of the plants. These, like the references mentioned above, have all been verified by consultation of the original works, and they include only useful illustrations: poor figures are not referred to.

There follow notes pointing out the distinctions between the species under notice and its nearest allies. These together with the figure will in most cases be sufficient to identify any plant.

A tolerably full description of each species is then given, taken in almost every case from the living plant and afterwards checked by comparison with descriptions in the leading floras. In every case where I saw a living plant at all I was able also to grow it, mostly for several years, and could observe it at all seasons. In the case of plants certainly in cultivation which I did not succeed in seeing (4 out of 151 species described in the paper), the descriptions are quoted from an authority which is named.

Descriptions of varieties are added, and miscellaneous notes relating to the plant in its native or cultivated state, and to the sources from which it was obtained.

PART II.—DESCRIPTIVE.

IX. CHARACTERS OF THE GENUS.

Sedum Linn.

LINNAEUS, "Genera Plantarum," No. 579. DE CANDOLLE, "Mémoire sur la famille des Crassulacées," 1828. *Ibid.*, Prodrômus, 3, p. 401. BENTHAM and HOOKER, "Genera Plantarum," 1, p. 659. Schönland in ENGLER and PRANTL, "Naturliche Pflanzenfamilien," III. 2a, p. 29. DALLA TORRE and HARNES, "Genera Siphonogamarum," p. 197.

Succulent plants, mostly perennial, very rarely hairy. *Leaves* flat to cylindrical, entire or nearly so, usually alternate, rarely opposite or verticillate. *Inflorescence* usually cymose. *Flowers* usually bisexual (rarely unisexual by abortion), and 5- (sometimes 4-, rarely 3-, 6-, or 7-) parted, white or yellow, more rarely red or purple, very rarely blue. Sepals, petals, and carpels equal in number, stamens twice as many (very rarely equalling them in number). *Sepals* often fleshy and leaf-like. *Petals* separate to the base, or nearly so. *Stamens* free, or those opposite the petals adnate to them in the lower portion. *Hypogonous scales* small, entire or slightly toothed. *Carpels* separate, or nearly so. *Follicles* almost always many-seeded.

Most of the genera of Crassulaceae have rather indefinite boundaries, and the present genus is no exception. There is a difficulty about deciding on the best line to be drawn between *Sedum* and *Crassula*, *Cotyledon*, and *Sempervivum*. This is especially felt in the case of many of the species discovered in recent years in Mexico and the

western United States. American botanists have created a number of new genera for the reception of these, but they do not appear to be generically distinct in the accepted sense, nor does this tend to facilitate their determination or the understanding of their relationships; and I have retained some of them (*Cremnophila*, *Clementsia*, *Sedastrum*, *Gormaniana*) in *Sedum*, under which genus they were first described. Some of the others (e.g. *Allamiranoa*, *Dudleya*, *Stylophyllum*, *Villadia*) appear best placed in *Cotyledon*.

Other generic names now included in the genus *Sedum* are *Rhodiola* L. (now section *Rhodiola*); *Anacampseros* Tournefort (now section *Telephium*); *Procrassula* Grisebach (= *Aithales* Webb. & Berth), a small 5-stamened group included below in section *Epeteium*; *Telmis* Fenzl, characterized by being one-seeded, but closely approached in this respect by a few other species.

The genus includes some well-marked groups, and others of less definite boundaries; these groups being founded mainly on general

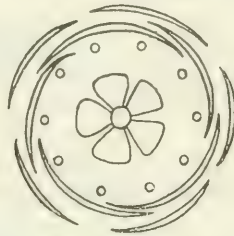


FIG. 3.—Floral Diagram of *Sedum* (after De Candolle).

growth-form. In the ensuing pages the generic subdivisions used, and their definitions, are as follows:

Section I. *RHODIOLA* Scopoli (char. amplific.).—Perennial. Rootstock fleshy, crowned with leaves with a broad clasping base (often reduced to membranous deltoid or semi-orbicular scales, or becoming so with age), from the axils of which annual leafy flowering shoots are produced. Flowers 4- or 5-parted, diœcious or hermaphrodite. Hardy plants, mostly Asiatic. (P. 26.)

Section II. *PSEUDORHODIOLA* Diels.—Perennial. Flowers diœcious, 4-parted, and otherwise as frequent in *Rhodiola*. Vegetative parts and carpels as in *Telephium*. Hardy Chinese plants. (P. 73.)

Section III. *TELEPHIUM* S. F. Gray.—Perennial. Rootstock usually thick, branched, often of carrot-like tubers, summit without scales. Stems mostly annual, produced from buds beside or above the bases of the stems of the previous year. Flowers hermaphrodite, 5-parted, white, red, purple, or green. Hardy plants, mostly Eurasian. (P. 77.)

[Section IV. *GIRALDIINA* Diels.—Not in cultivation—two Chinese species only.] (P. 107.)

Section V. *AIZOON* Koch.—Perennial. Rootstock thickened, roots slender. Stems annual (except *S. hybridum*). Leaves flat.

Flowers hermaphrodite, 5-parted, bright yellow. Hardy East Asiatic plants. (P. 107.)

Section VI. *MEXICANA* Praeger.—Perennial. Rootstock thickening horizontally, or contracted. Stems tufted, erect (at least at first), usually biennial, dying to the root after flowering, the succeeding set when annual usually arising when the previous set is flowering, so that the plants are evergreen. Flowers hermaphrodite, 5-parted, mostly white, rarely red or yellow. Tender Mexican plants. (P. 127.)

Section VII. *SEDA GENUINA* Koch.—Perennial. Stems perennial, creeping, or erect and sub-shrubby, bearing barren and annual flowering shoots. Flowers hermaphrodite, usually 5- (rarely 4- to 9-) parted. Hardy or tender. (P. 144.)

Section VIII. *SEMPERVIVOIDES* Boissier.—Annual or biennial. Leaves flat, root-leaves forming a rosette. Inflorescence corymbose or racemose-paniculate. Hardy or tender Eurasian plants. (P. 279.)

Section IX. *EPETEIUM* Boissier.—Annual, rarely biennial. Leaves semi-terete or cylindrical (rarely flat), not rosulate. Inflorescence cymose 2- or many-branched, or corymbose. Hardy or tender. (P. 293.)

The present paper purports to deal only with those species of *Sedum* which are known in cultivation at the present time. The majority of these species, and almost all the better-known ones, are hardy in the British Isles, and are plants of the rock-garden, more rarely of the herbaceous border. The tender plants come mainly from Mexico and China, and are unevenly distributed among the different sections of the genus. A conspectus of the cultivated species from this point of view appears as follows, the test of the rather vague term "hardy" being capacity for enduring an ordinary winter in Dublin :

	Hardy.	Tender.
Section I. <i>Rhodiola</i> Scop.	20	0
„ II. <i>Pseudorhodiola</i> Diels	1	0
„ III. <i>Telephium</i> S. F. Gray	13	0
„ IV. <i>Giraldiina</i> Diels	0	0
„ V. <i>Aizoon</i> Koch	7	0
„ VI. <i>Mexicana</i> nov. sect.	0	15
„ VII. <i>Seda genuina</i> Koch	40	40
„ VIII. <i>Sempervivoides</i> Boiss.	3	2
„ IX. <i>Epeteium</i> Boiss.	6	3
„ X. <i>Telmissa</i> Fenzl	0	0
	90	60

The division of a plant-group into tender and hardy species, although convenient for the horticulturist, is quite unscientific. In the case of the present genus, however, this inconvenience is at a minimum, since, as seen from the above conspectus, the species composing its natural subdivisions are in many cases either all hardy or nearly so, or all tender or nearly so. Using the term "hardy" as meaning hardy in suitable situations throughout the British Isles, we find that the

definition includes the whole *Sedum* flora of Europe, of Asia (except the series *Japonica*, which is with very few exceptions tender, and a few others), and one (*S. multiceps*) of the endemic African species, also the *Sedum* flora of Canada and the United States; the large Mexican group being treated as tender, though one or two are nearly hardy.

The hardy category includes the whole of the Eurasian groups *Rhodiola*, *Pseudorhodiola*, *Telephium*, *Aizoon*, most of the Eurasian *Seda Genuina* except the *Japonica* series, and several species of the *Sempervivoides* and *Epeteium* sections, which consist of annual or biennial plants.

The half-hardy and tender *Sedums* which are in cultivation belong to three geographical groups. They include a small portion of the very rich *Sedum* flora of Asia; the greater part of the remarkably varied *Sedum* flora of Mexico and the lands which border it; and a couple of species from the Atlantic Islands off the coast of Africa.

In many respects the tender group differs as a whole in character and affinities from the Eurasian and North American plants which constitute the hardy *Sedums*.

Mexican Species.

The Mexican *Sedums* (with which may be included a few related species from the south-western United States), which form the largest group among the tender species, present an array of forms bewildering in their variety, and many of them not easy to place in any scheme of classification adapted to the *Sedums* of the Old World (which constitute the bulk of the genus). The sections *Rhodiola*, *Pseudorhodiola*, *Telephium*, and *Aizoon* (the first and third of which have representatives in the United States) are absent. But there are present a number of species, which, though possessing no other affinity with these, agree with them and differ from the *Seda Genuina* in having stems which die back to the rootstock after flowering. These stems are mostly but not always annual, usually arising in summer or autumn and lengthening to a varying extent, resting during the winter, and flowering and dying in the following spring or summer. The rootstock is sometimes large and fleshy, as in some members of the *Sedastrum* group, more often small, with a tuft of fibrous roots. The flowers are mostly white, but one species has red and one yellow flowers; and the stems and leaves exhibit considerable variety. Nevertheless, the growth-form is distinctive; they are best classed together as a separate section, MEXICANA.

The bulk of the Mexican species fall under the section *Seda Genuina* of Koch, but display a much wider range of form than is found in the Old World. A tendency to shrubbiness, as seen in the Old World in *S. populifolium* Pallas from Siberia, and in a reduced measure in *S. multiceps* Coss. & Dur. from Morocco and *S. varicolor* from China, is well developed in many Mexican species, many of them forming

much-branched bushes from one to several feet in height. The flowers and leaves of these sub-shrubs vary in form and colour, and there is no general affinity between them. It is to be noted also that while in some of the shrubby species (e.g. *S. oxypetalum*, *S. retusum*) the upright single-stemmed habit is retained in old plants, in others which are for some time erect (e.g. *S. allantoides*, *S. pachyphyllum*, *S. Treleasei*) the branches at length sag under their own weight, and, resting on the ground, take root, so that eventually a patch is produced differing in no essential particular from the characteristic mat form of the *Seda Genuina*.

Another unusual feature of some of the Mexican *Seda Genuina* is that the inflorescence is not terminal, but lateral. An intermediate stage is seen in *S. Palmeri* S. Watson and *S. compressum* Rose, in which the young inflorescence appears in the centre of the leaf-rosette, but soon a shoot arises from just below the flowering-shoot, and growing and straightening out pushes the flowering-shoot to one side, so that when in bloom the latter is lateral and springs from a point below the leaf-rosette. In a few other species, e.g. *S. nutans* Rose, *S. pachyphyllum* Rose, *S. Adolphi* Hamet, the inflorescence is frankly lateral, borne on a short axillary branch which arises several inches below the summit of the stem. This is a step towards the characteristic feature of the Eurasian section *Rhodiola*, in which an annual crop of flower-shoots arises from the axils of scale-leaves on the fleshy caudex.

Few of the Mexican Sedums display any near relationship with those of the United States or Canada, and some of the yellow-flowered species, such as *S. mexicanum* Britton and *S. oaxacanum* Rose, strikingly recall Japanese and Chinese plants of the series *Japonica* of MAXIMOWICZ.

The Mexican species vary in hardiness from quite tender (the majority) to nearly hardy (e.g. *moranense*, *Palmeri*, *compressum*, *retusum*, *confusum*, *praealtum*, which are hardy in all the milder parts of the British Isles [p. 17]).

Of over 75 species so far described from the area, 44 are listed below as at present in cultivation.

Tender Asiatic Sedums.

The tender Asiatic species belong mostly to the series *Japonica*, founded by MAXIMOWICZ to include a few glabrous perennial plants with fibrous roots, slender, procumbent, mostly rooting stems, spurred leaves, 5-parted stellate yellow flowers, narrow acuminate petals, carpels $\frac{1}{2}$ -connate, and stellate-patent fruit. Recent exploration, especially in China, has raised the number of them considerably, and has broadened their definition. They have, as MAXIMOWICZ remarks, more affinity with some of the American Sedums than with European or other Asiatic groups. A few (e.g. *varicolor*, *Chauveaudi*, *sarmentosum*) are hardy in the milder parts of the British Isles.

The remaining Asiatic tender species are few, and various :

<i>Chaneti</i> Hamet	(section Seda Genuina, but anomalous).
<i>indicum</i> Hamet	} section Sempervivoides.
<i>viscosum</i> Praeger	
<i>formosanum</i> N. E. Brown	} section Epeteium.
<i>Leblancae</i> Hamet	
<i>Someni</i> Hamet	

Finally, of the few species of *Sedum* inhabiting the Atlantic Islands, two are in cultivation belonging to the section Seda Genuina—*S. lancerottense* Murray, and *S. nudum* Aiton.

The only large geographical region where *Sedums* occur not represented in the species known in cultivation is Central Africa, where a few interesting species are found on high mountains (see p. 6).

X. DESCRIPTION OF SPECIES.

SECTION I.—RHODIOLA.

Section RHODIOLA Scopoli, "Introd. ad Hist. Nat.," 255, 1777 (*char. ampl.*). Praeger in *Trans. Bot. Soc. Edinb.*, 27, 107, 1917.

Rhodiola Linn., "Genera Plantarum," ed. i. 318, 1777 (*pro genere*).

Perennial. Caudex fleshy, crowned with leaves with a broad clasping base (often reduced to membranous, deltoid or semi-orbicular scales, or becoming so with age) from the axils of which leafy flowering-shoots are produced. Flowers 4- or 5-parted, diœcious or hermaphrodite. Hardy plants, mostly Asiatic.

LINNAEUS founded his genus to include a single species, *R. rosea*, the well-known Roseroot. SCOPOLI reduced *Rhodiola* to a section of *Sedum*, and most authors have followed him in this. While some have limited *Rhodiola* to species which, like *roseum*, have unisexual and 4-parted flowers, others have included plants like *S. crassipes*, which have hermaphrodite 5-parted flowers combined with the characteristic thick scaly *Rhodiola* rootstock. I have endeavoured* to show that a continuous series of forms leads from the *roseum* type with diœcious 4-parted flowers, poorly developed scales, and massive rootstocks, through others with hermaphrodite 5-parted flowers and larger scales with a leaf-like tip, to forms like *S. Praegerianum* and *S. primuloides*, with hermaphrodite flowers, well-developed leaves instead of scales crowning the rootstock, and short or slender rootstocks. Some members of each group are in cultivation.

Series I. RHODIOLAE sensu stricto.

Flowers usually unisexual and 4-parted, caudex usually elongate or greatly thickened. Carpels usually short and crowned with short styles reflexed in fruit.

* PRAEGER, "On the Affinities of *Sedum Praegerianum* W. W. Smith, with a Tentative Classification of the Section *Rhodiola*." *Trans. Bot. Soc. Edinb.*, 27, 1917.

Group 1. ROSEAE.—Caudex-leaves scale-like, short, membranous, seldom green even when young. Old flower-stems not persistent. (P. 28.)

<i>roseum</i> Scop.	<i>elongatum</i> Wall.
<i>heterodontum</i> H. f. and T.	<i>bhutanense</i> Praeger.
<i>Kirilowii</i> Regel.	<i>purpureoviride</i> Praeger.
<i>longicaule</i> Praeger.	<i>bupleuroides</i> Wall.
<i>rotundatum</i> Hemsl.	

Group 2. HIMALENSES.—Caudex-leaves scale-like, usually green and fleshy when young, often prolonged into a short narrow blade or tail. Old flower-stems usually persistent. (P. 49.)

<i>tibeticum</i> H. f. and T.	<i>himalense</i> Don.
<i>quadrifidum</i> Pallas.	<i>fastigiatum</i> H. f. and T.

Series II. CRASSIPEDES.

Flowers hermaphrodite and 5-parted. Caudex as in the Rhodiolae s.s. Caudex-leaves as in the Himalenses. Flower-stems persistent or deciduous. Carpels usually slender, with slender styles not reflexed in fruit. (P. 55.)

<i>crassipes</i> Wall.	<i>trifidum</i> Wall.
<i>Stephani</i> Cham.	<i>Semenovii</i> Masters.
<i>dumulosum</i> Franch.	<i>rhodanthum</i> A. Gray.

Series III. PRIMULOIDES.

Flowers as in the Crassipedes. Caudex slender elongate, or short not much thickened (comparatively). Caudex-leaves leaf-like, with a distinct blade, usually stalked.

Group 1. LONGICAULES.—Rootstock elongate, much branched.

primuloides Franchet.

Group 2. BREVICAULES.—Rootstock very short, branched slightly or not at all.

Praegerianum W. W. Sm.

Rhodiola is essentially an Asiatic and sub-alpine group, finding its maximum development in the great mountain area stretching from Afghanistan to Yunnan. Northward it extends into the Arctic Regions; southward its range is limited. One species, *S. roseum*, which is also the most variable of the group, is circumpolar in its distribution. Another, *S. rhodanthum*, is confined to North America. Of the group in its wide sense, as used in this paper, about fifty species have been described, of which twenty-one are in cultivation, as listed above and described below.

The great variability of many of the species (see HOOKER and THOMSON in *Journ. Linn. Soc., Bot.*, vol. ii. p. 93) renders diagnosis often difficult. Especially as regards the colour of the different

parts of the flower, the following descriptions must not be taken as exhausting the range of variation which many of the plants possess.

Series I. RHODIOLAE s.s.

Group 1. ROSEAE.

1. *Sedum roseum* Scopoli (fig. 4).

S. roseum Scopoli, "Flor. Carniolica," ed. 2, 1, 326, 1772.

SYNONYMS.—*Rhodiola rosea* Linn., "Species Plantarum," 1035. *Sedum Rhodiola* De Candolle, "Prodromus," 3, 401; Maximowicz in *Bulletin Acad. Pétersbourg*, 29, 128; Masters in *Gard. Chron.*, 1878, ii. 267.

ILLUSTRATIONS.—Sowerby, "English Bot.," ed. 3, pl. 525. De Candolle, "Plantes Grasses," tab. 143. "Flora Danica," tab. 183. Cusin and Anserque, "Herb. Flor. Française, Crassul.," tab. 3. *Trans. Russian Hort. Soc.*, 1863, tab. 129.

A very variable species, of which the common European (and British) form is described below. *S. roseum* includes plants which vary from very glaucous to bright green, with leaves much toothed or entire, and of a wide range of shape, and flowers green, yellow, red, or purple. Nevertheless, it can generally be easily separated from its allies: *S. heterodoxum*, which may be only an extreme variety, is distinguished at once by its short, very broad, much-toothed leaves; *S. Stephani* has 5-parted (not 4-parted) flowers, usually hermaphrodite (instead of diœcious), or if diœcious the male ovaries are comparatively large, and the plant is green; *S. Kirilowii* is also green, with 5-parted diœcious flowers, the leaves are usually much longer than in *roseum*, and broadest at the base instead of near the apex, and the plant taller (a foot or more); but the last three are variable, and caution is necessary.

DESCRIPTION.—A glaucous, diœcious, herbaceous perennial. *Rootstock* thick, branched, eventually long, aerial, covered with grey rind marked with elliptic scars of old stems; old stems not persistent; scales at the crown of the rootstock (from the axils of which the stems arise) chaffy, not well developed. *Stems* annual, several from the summit of each branch of the rootstock, erect, unbranched, leafy, smooth, round, 6–12 inches high. *Leaves* scattered, imbricate, sessile, strap-shaped to obovate, acute, rounded at base, about 1½ inch long by ¾ inch broad, flat, fleshy, glaucous, more or less toothed near the apex, larger near summit of stem. *Inflorescence* terminal, compact, convex. *Buds* subglobular. *Flowers* 4-parted, yellow or greenish yellow, shorter than the pedicels. **MALE FLOWER**:—¾ inch across; *sepals* narrow, tapering; *petals* linear, blunt, 1½ times the sepals; *stamens* slightly exceeding the petals, filaments yellow, anthers purple; *scales* conspicuous, orange, oblong, emarginate; *carpels* yellow, erect, shorter than the petals. **FEMALE FLOWER**:—*sepals* and *petals* similar, linear, greenish, sometimes flushed red; calyx-tube ½ as long as the calyx segments; *stamens* absent; *scales* as in the male; *carpels* 1½ the petals, 3 to 4 sixteenths of an inch long, greenish.

Flowers May (in gardens); about July on the mountains. Hardy.

HABITAT.—Circumpolar, ranging in its various forms from Nova Zembla and Greenland southward to the Pyrenees, Japan, and New Mexico. One of the hardiest of Sedums, capable of enduring, according to KERNER, for weeks a temperature of –10° C. without injury.

This is the well-known Roseroot, so called from the fragrant odour of the fleshy rootstocks, which is strongest when these are

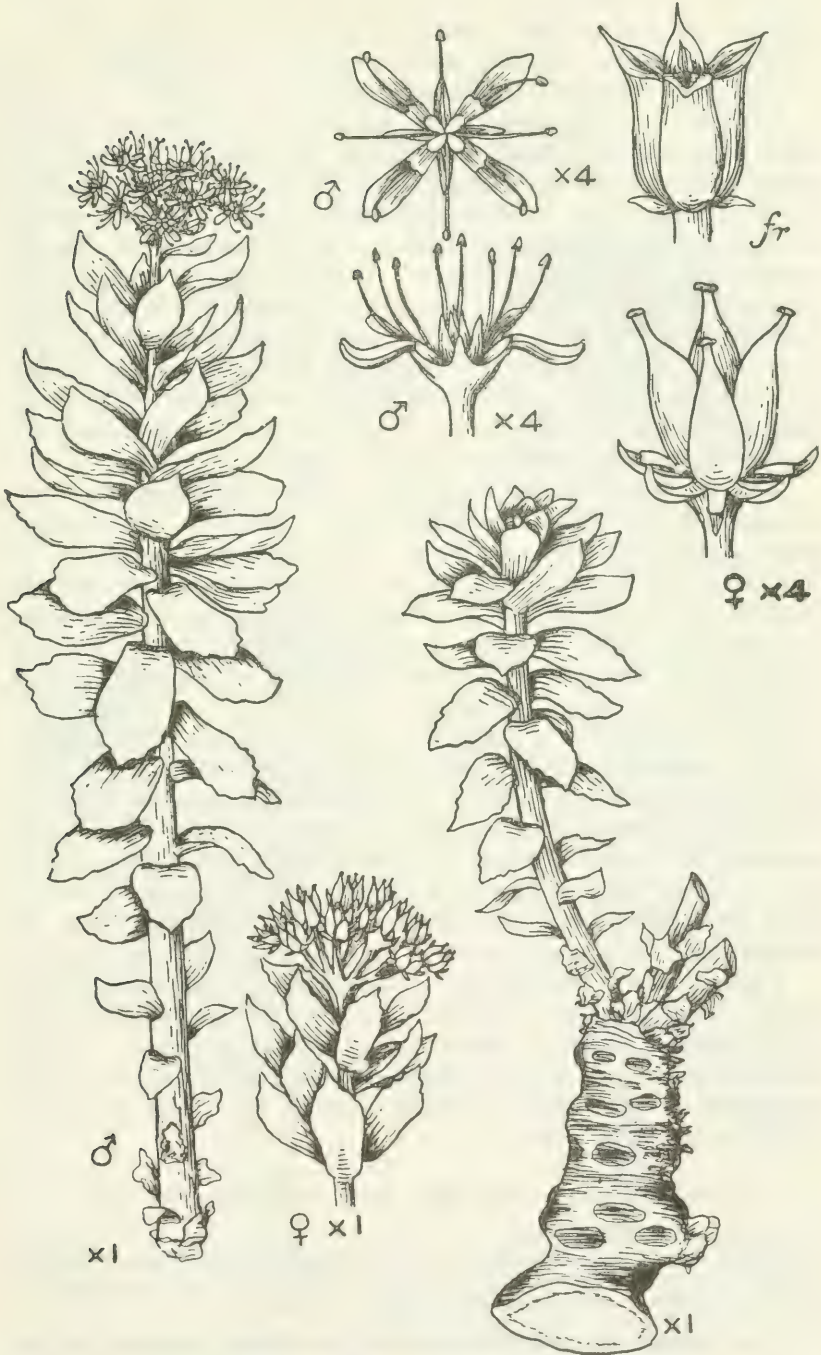


FIG. 4.—*Sedum roseum* Scopoli.

dried. It is a familiar member of the alpine flora of our own country, and is one of the most polymorphic of the variable group to which it belongs. Our native form, which is chosen for illustration (fig. 4), displays very little variation within the limits of our islands; it is sub-var. *continentalis* of MAXIMOWICZ (*Bull. Acad. Pétersb.*, 29, 129), and appears to be the form which prevails on the European mountains, spreading to Iceland and Canada. In Asia and America the plant becomes variable. REGEL and TILING ("Flor. Ajanensis," p. 88) enumerate as varieties *latifolium*, *vulgare*, *oblongum*, *viride*, *crispum*, *pumilum*, *dentatum*, *Stephani*, *humile*, *involutum*, *ovatum*, *lanceolatum*, *tenuifolium*, *Kirilowii*. While allowing *Stephani* and *Kirilowii* the rank of species, MAXIMOWICZ reduces the rest to three varietal types—*vulgare*, *elongatum*, and *atropurpureum*. The form occurring in Japan—*Tachiroi* of FRANCHET and SAVATIER—he admits as a fourth varietal type. Probably MAXIMOWICZ's arrangement goes as far as is advisable in the way of subdivision, considering the manner in which the forms run into each other.

As regards America, six "species" are described under the genus *Rhodiola* in the "North American Flora" (vol. xxii. 1905)—*rosea*, *neo-mexicana*, *alaskana*, *integrifolia*, *polygama*, and *roanensis*. I have seen only *R. rosea*, but from the descriptions the others do not seem to differ from the type more than the numerous Asiatic forms, and probably ought at most to be given varietal rank. Further exploration of the American mountain regions will no doubt reveal intermediate and additional forms.

I have got together in my garden a large series of cultivated forms, received under all kinds of names from many different sources. They show a wide range of variation:—FLOWERS—unisexual or bisexual, yellow, green, brick-red to dark purple. LEAVES—linear-ob lanceolate to oblong or broadly obovate, entire to pectinately toothed, green to very glaucous (fig. 5, *a*). STEM—slender to very stout, 3 inches to a foot high. RHIZOME—forming a thick horizontal mass or elongate, very thick and knotted to slender, cylindrical, and smooth.

I have found much difficulty in allocating these and other forms, which I have been able to study, to MAXIMOWICZ's four group-varieties. In the following notes are given first the leading characters of these group-varieties according to MAXIMOWICZ's description, and then comments on the cultivated plants which I have studied, which appear to belong to them.

a. vulgare Maximowicz, *Bull. Acad. Pétersbourg*, 29, 128.

ILLUSTRATIONS.—See p. 28.

Height, 7–12 inches. *Very glaucous*. Leaves imbricate, more or less elliptic, acute. Inflorescence dense, generally leafless. *Flowers yellow*, longer than the pedicels, stamens exserted, *scales twice as long as broad*.

Here belongs the native British and Continental Roseroot, which is also the common garden form. European herbarium specimens show but little variation. The extreme glaucescence is characteristic,



FIG. 5.—*S. roseum* varieties.

but a very short leafy green form received as *Stephani* from Bremen appears to belong here; also glaucous narrow-leaved forms from Brussels, &c.

β. elongatum Ledebour, "Flor. Rossica," 2, 178 (*pro specie*).

Height, 7-12 inches. *Green* or greenish. Leaves more or less elliptic or oblong, acute or acuminate. Inflorescence dense, with bracts on the main branches. *Flowers yellow*, shorter than the pedicels. *Scales thrice as long as broad*.

The only growing plant which I can place here with any confidence came from Regel and Kesselring as *Rhodiola ovata* (fig. 5, *b*). It is a pretty slender male plant, pale green, inflorescence slightly bracteate, flowers shorter than the pedicels, sepals and petals red on back, yellow on face, stamens $1\frac{1}{2}$ times the petals, anthers buff, scales orange, thrice as long as broad, carpels green, one-third the stamens.

γ. atropurpureum Turczaninow in *Bull. Soc. Mosc.*, 13, 70 (*pro specie*).

Height, 3-7 inches. *Glaucous*, rarely greenish. Leaves elliptic, spatulate, or oblong-lanceolate, acute. *Flowers purple*, equalling the pedicels. Stamens slightly exserted. *Scales quadrate or oblong*.

MAXIMOWICZ describes the flowers as usually dark purple. The only dark purple flowers I have seen are on a female plant in the rock-garden at Kew; it has glaucous oblong-oblancheolate leaves, and appears fairly typical of the variety. Two peculiar plants with less highly pigmented flowers appear to belong here also: a female, stems 6 inches, leaves dark, rather glaucous green, pectinately toothed, scales short, bright red, carpels purplish (fig. 6, *a*, *b*)—this came from Mr. BOWLES' garden; and a very dwarf male plant, leaves green, flowers brick-red, grown at Edinburgh under the name *Rhodiola lanceolata* (fig. 5, *c*).

δ. Tachiroi Franchet and Savatier, "Enum. Plant. Jap.," 2, 366.

Height, 3-7 inches. *Glaucous*. *Rhizome cylindrical, elongate*. Leaves imbricate, later lax, the lower elliptic subentire, the rest oblong- or linear-spathulate. Inflorescence dense, leafy. *Flowers yellow*, longer than the thick pedicels. Stamens slightly exserted. *Scales oblong, emarginate*.

This is the Japanese form of *S. roseum*. A very distinct male plant, received as *Tachiroi* from Bremen and from REGEL and KESSELRING, though quite green, agrees well with Japanese specimens of *Tachiroi* at Kew and the British Museum. These growing plants have the rhizome quite slender, cylindrical, smooth; stems many, 3-4 inches; leaves shining, green, small and obovate below, larger and oblanceolate above, where they form an involucre; inflorescence small, compact; flowers yellow; anthers pale red; scales oblong, orange; carpels small, less than half the stamens (fig. 6, *c*).



FIG. 6.—*S. roseum* varieties.

2. *Sedum heterodontum* H. f. and T. (fig. 7).

S. heterodontum Hooker fil. and Thomson in *Journ. Linn. Soc., Bot.*, 2, 95, 1858; Clarke in Hooker, "Flor. Brit. India," 2, 417.

A plant of very distinct appearance, but the similarity of its floral parts to those of *S. roseum* may eventually place it as a variety of that polymorphic species, as suggested by HOOKER and others. Easily identified among the species of the *Rhodiola* section by its very short, broad, sessile, coarsely-toothed leaves, scattered along tall stems, 1-1½ foot high.

DESCRIPTION.—A dioecious herbaceous perennial. *Rootstock* thick, elongate, aerial, occasionally branched, similar to that of *S. roseum*. *Stems* annual, several together from the summit of the branches of the rootstock, erect, 1-1½ foot high, smooth, green, round, unbranched, leafy throughout. *Leaves* alternate, triangular to ovate, from a clasping base, coarsely toothed, fleshy, flat, ½-¾ inch long by about ¼ inch broad, green or glaucous, loosely disposed on the stem. *Inflorescence* terminal, dense, about an inch across, not leafy, branches very short. *Flowers* 4-merous, on very short pedicels. **MALE FLOWER**:—¼-⅓ inch long; *sepals* linear, blunt, distant, greenish; *petals* linear, blunt, yellowish or reddish, 1½ times the sepals, spreading; *stamens* wide-spreading, slightly exceeding the petals, filaments streaked red, anthers buff flushed red; *scales* large, half as long as the carpels, oblong or quadrate, emarginate, bright red; *carpels* erect, blunt, linear-oblong, much shorter than the stamens, equalling the sepals, about twice the scales, greenish. **FEMALE FLOWER**:—*petals* and *sepals* similar, of about the same length, linear, blunt, green or purplish, erect; *scales* oblong, orange, 2-3 times as long as broad, half the petals; *carpels* large, 1½-2 times the petals, erect, rather oblong, green, tipped purple, styles very short.

Flowers April-May. Hardy.

HABITAT.—Western Himalayas, 8,000-14,000 feet; Afghanistan; Tibet.

Rare in cultivation. A handsome glaucous form has been grown in the rock-garden at Kew for some years. A greener form was in Canon ELLACOMBE'S delightful garden at Bitton, and Mr. G. B. MILNE-REDHEAD of Frome has sent me a less-toothed plant. I have not heard of it elsewhere. These plants are all females except that at Kew, where both sexes are represented. One of the earliest of the *Rhodiola* section, it pushes (in Dublin) sometimes as soon as January, and never later than March. In this respect it resembles *S. Kirilowii*, and differs from *S. roseum*.

CLARKE, in Hooker's "Flora of British India," describes the leaves as "prominently white-margined." This applies to a certain degree to some of the specimens in the Kew Herbarium; none of the living plants I have seen show this character.

The specific name refers to the unequal toothing of the leaves.

3. *Sedum Kirilowii* Regel (fig. 8).

S. Kirilowii Regel in *Nowv. Mém. Soc. Nat. Moscou*, 11, 92, 1859. Maximowicz in *Bulletin Acad. Pétersbourg*, 29, 128, 1883.

The remarkable brownish-red flowered form of this species is one of the handsomest of Sedums, and is not infrequent in cultivation,

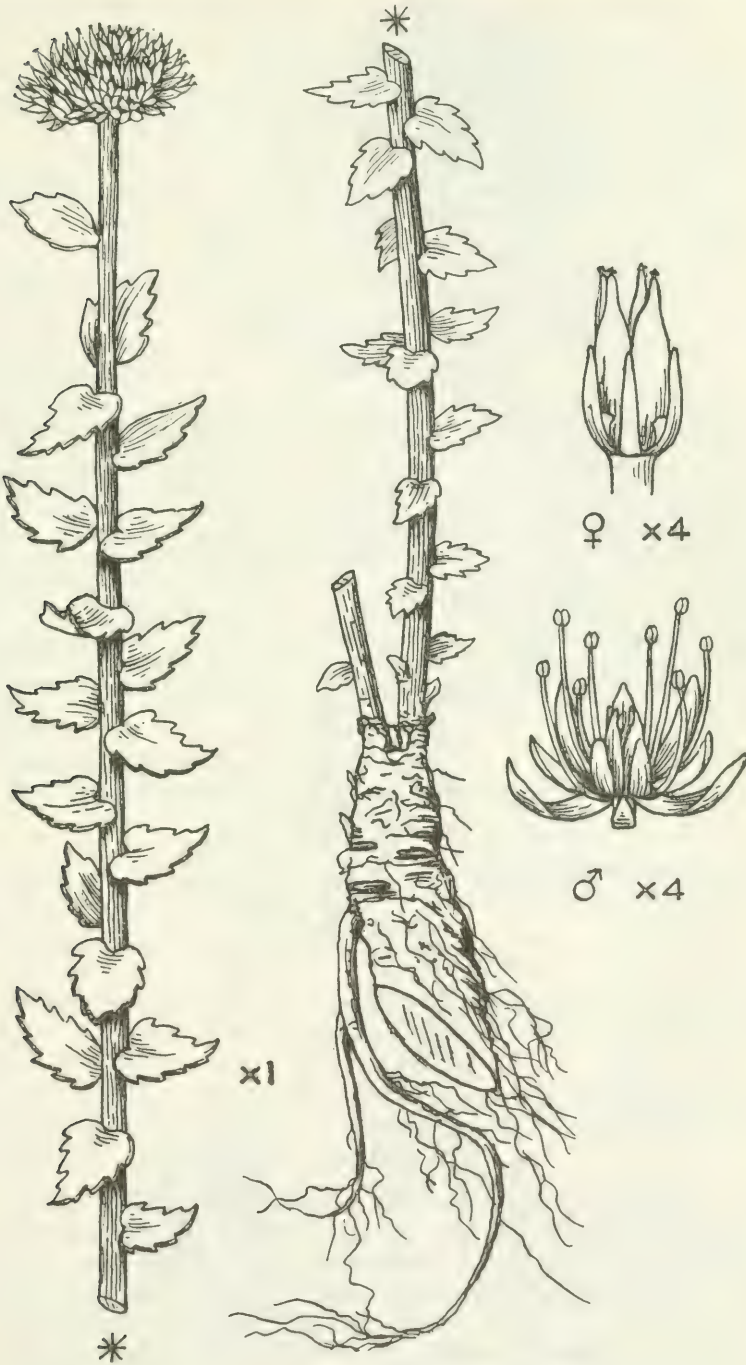


FIG. 7.—*S. heterodontum* H. f. and T.

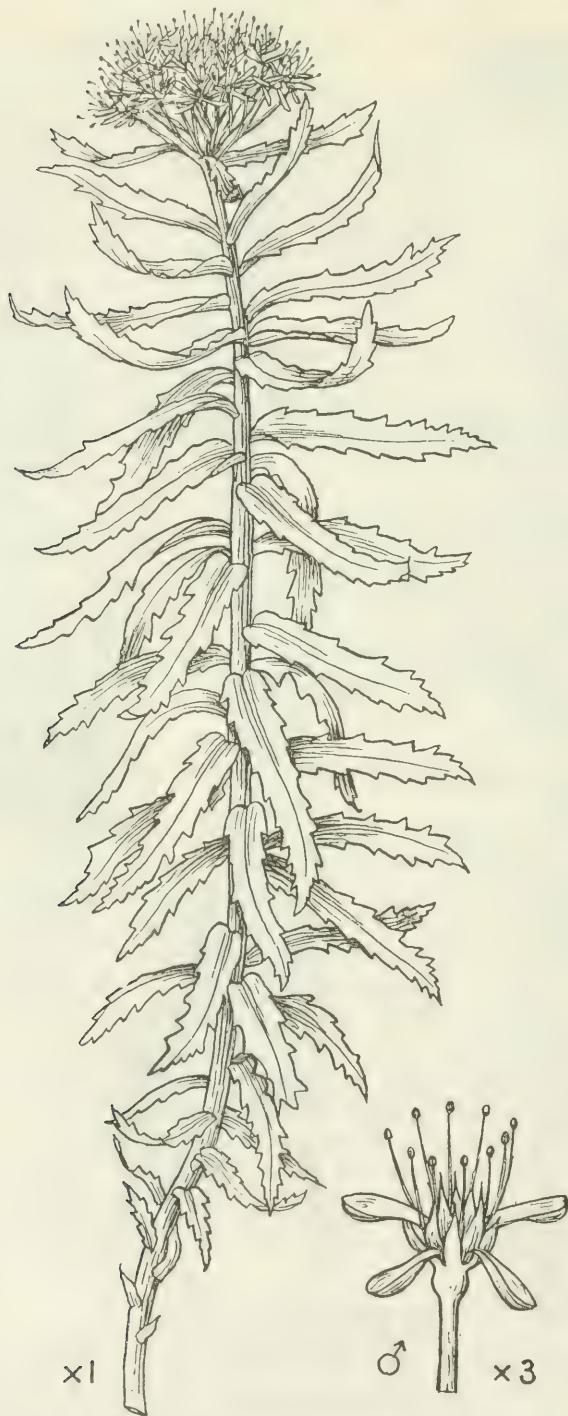


FIG. 8.—*S. Kirilowii* Regel.

usually under the name of *S. Rhodiola linifolium rubrum*. The yellowish- or greenish-flowered type is seldom seen. Apart from "*linifolium rubrum*" I succeeded in procuring the plant, male or female, from some fourteen different sources—all garden sources—and the series shows a wide range of variation, especially as regards leaf-characters. The leaves vary from linear-attenuate to lanceolate or elliptic-oblong, the ratio of length to breadth from 12 to 1 to 4 to 1; as regards dentition, they vary from sharply toothed throughout or in upper half to entire (Fig. 9, *a*). The dark-green colour is characteristic, and only once have I seen a slightly glaucous form. The best distinguishing marks between this and the wide range of forms of *S. roseum* are the five-parted flowers and the leaves almost always broadest at the base, not near the apex.

DESCRIPTION.—A glabrous herbaceous perennial. *Rootstock* thick, branched, resembling that of *S. roseum*. *Stems* annual, several from the summit of the branches of the rootstock, fewer and taller than in *roseum*, erect, pale green, smooth, round, unbranched, a foot high or more; barren stems absent. *Leaves* green, rather thin, tapering or oblong, almost always widest at the base, sessile, acute, usually about 1 to 1½ inch long by ¼ inch broad, sharply and irregularly toothed mostly near the apex or rarely entire, usually set at right angles to the stem, flat or recurved. *Inflorescence* a dense terminal cyme, naked or leafy or involucrate. *Flowers* 5- (sometimes 4-) parted, small, greenish yellow. **MALE FLOWER**:— $\frac{3}{16}$ inch long by $\frac{5}{16}$ inch across, shorter than the pedicel; *sepals* linear, green; *petals* slightly exceeding the sepals, wide-spreading, linear-lanceolate or linear-obovate, greenish; *stamens* exceeding the petals, greenish; *scales* large, oblong, emarginate, yellow; *carpels* small, erect, slender, green, equalling the petals. **FEMALE FLOWER**:—*sepals* and *petals* similar, linear, small, erect; *stamens* absent; *scales* as in the male; *carpels* slightly spreading, 1½ times the sepals and petals.

Flowers April–May. Hardy.

HABITAT.—Himalaya, Turkestan, Mongolia, north China.

Var. *rubrum* nom. nov.

SYNONYMS.—*S. Rhodiola* var. *linifolia* Regel and Schmalh. in "Acta Hort. Petrop.," 5, 583. *S. linifolium rubrum* or *S. Rhodiola linifolium rubrum* of gardens.

ILLUSTRATIONS.—Regel, "Gartenflora," t. 1080. *Trans. Russ. Hort. Soc.*, 1863, t. 129.

Usually stouter than the type, leaves elongate, not much toothed, inflorescence very dense, generally leafless, flowers rich brown-red, with bright orange scales.

Occurs both as male and female, the male being the commoner in cultivation, and much the more showy. In some male plants the colouring is deeper, of a purplish tinge.

In the relative length of the different parts of the flower, the species is somewhat variable, and between the yellow-flowered type and the red variety colour-intermediates occur. I have pale orange forms, and one handsome plant has petals, sepals, anthers, and carpels yellow, scales and filaments deep red.

The plant commences to flower long before the stem is fully grown, especially in the case of var. *rubrum*. Fig. 9 represents a stem in this condition.

Named after IVAN KIRILOV, Russian botanist.

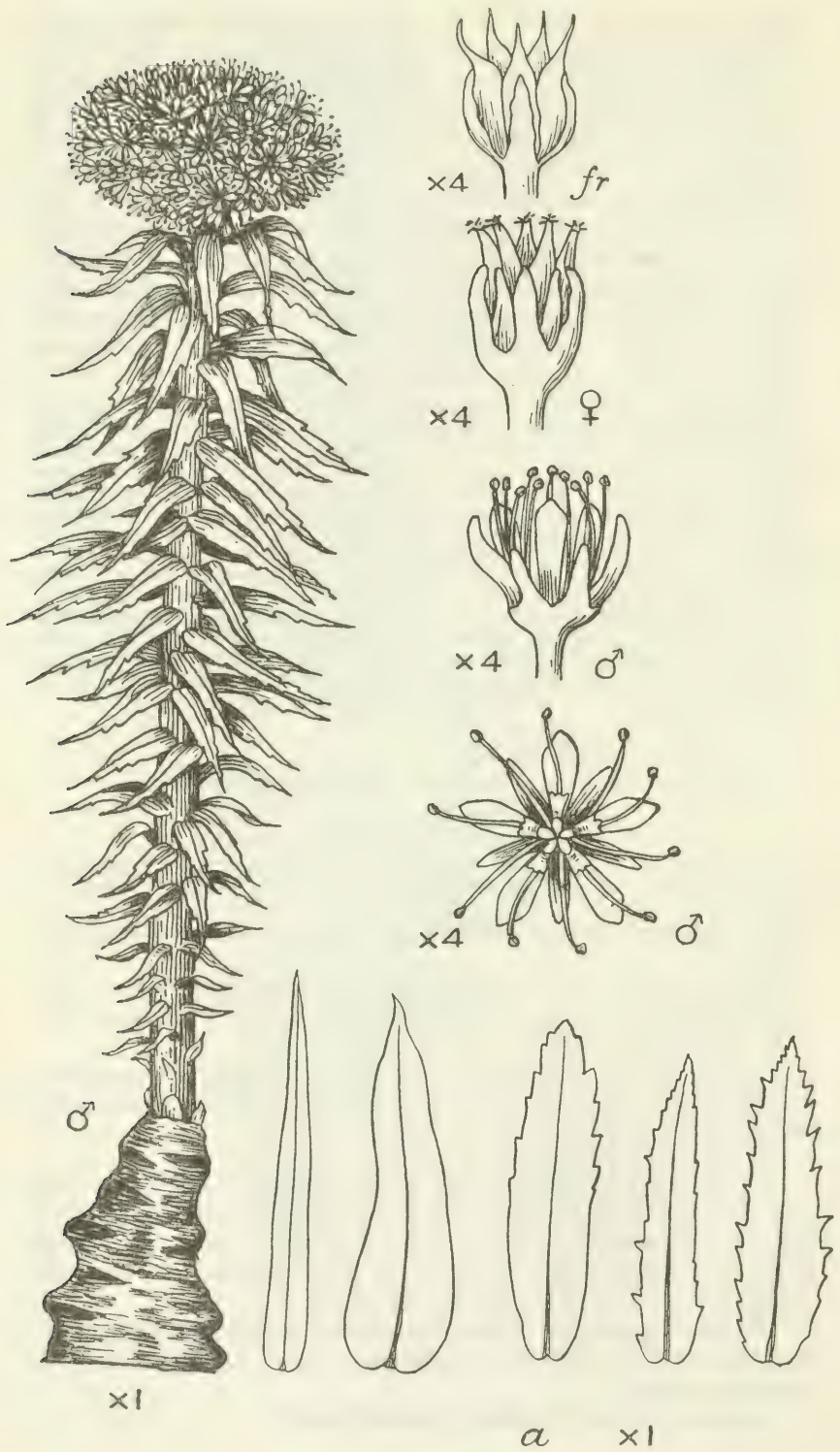


FIG. 9.—*S. Kirilowii* Regel.

4. *Sedum longicaule* Praeger (fig. 10).

S. longicaule Praeger in *Journ. of Bot.*, 54, 39, 1917.

A dioecious *Rhodiola* of remarkable stature, characterized by its very tall stems (2-3 feet long) clothed with long tapering entire leaves, which diminish towards the base of the stem into minute scales. It most resembles a much overgrown *S. Kirilowii*, but the leaves and stems are twice as long, and the flowers (of which the female alone is known) present points of difference.

DESCRIPTION.—A glabrous herbaceous perennial, without barren shoots. *Rootstock* massive, resembling that of *S. Kirilowii*. *Stems* 2-3 feet long, erect, round, smooth, reddish, unbranched, $\frac{1}{2}$ inch thick, clothed with leaves throughout. *Leaves* alternate, many, 2-3 $\frac{1}{2}$ inches long, $\frac{1}{4}$ inch wide at base, sessile, entire, linear-elongate, rounded or auricled at the base, tapering to an acute point, inserted at right angles to the stem; on face dark green with a whitish midrib, on back pale and rather glaucous with the midrib very prominent; smaller and fewer near the inflorescence; decreasing in size towards the rhizome till they become mere minute scales. *Inflorescence* about 2 inches across, flattish or convex, dense; bracts few, narrow. FEMALE FLOWER:—mostly 5- (frequently 6-, sometimes 4- or 7-) parted; *calyx* cup-shaped, fleshy, green, the lobes distant, tapering, fleshy, blunt, about equalling the tube; *petals* erect, linear-tapering, distant, blunt, green, subterete, 1 $\frac{1}{2}$ times the sepals; *scales* small, red-purple, slightly longer than broad, rounded at apex, less than $\frac{1}{2}$ the sepals; *carpels* green, stout, about twice the petals, with very short spreading styles.

Flowers June. Hardy.

HABITAT.—Unknown, but to judge from its affinities central or eastern Asia. I found the plant in the garden of Mr. H. J. ELWES, F.R.S., who is not certain whence it was obtained. Very possibly it originated from seed collected by one of the recent explorers of western China. The male plant is as yet unknown.

The plant half-grown, with its narrow leaves with white midribs, has much the appearance of some of the *Euphorbias*. Named from its remarkably tall stem.

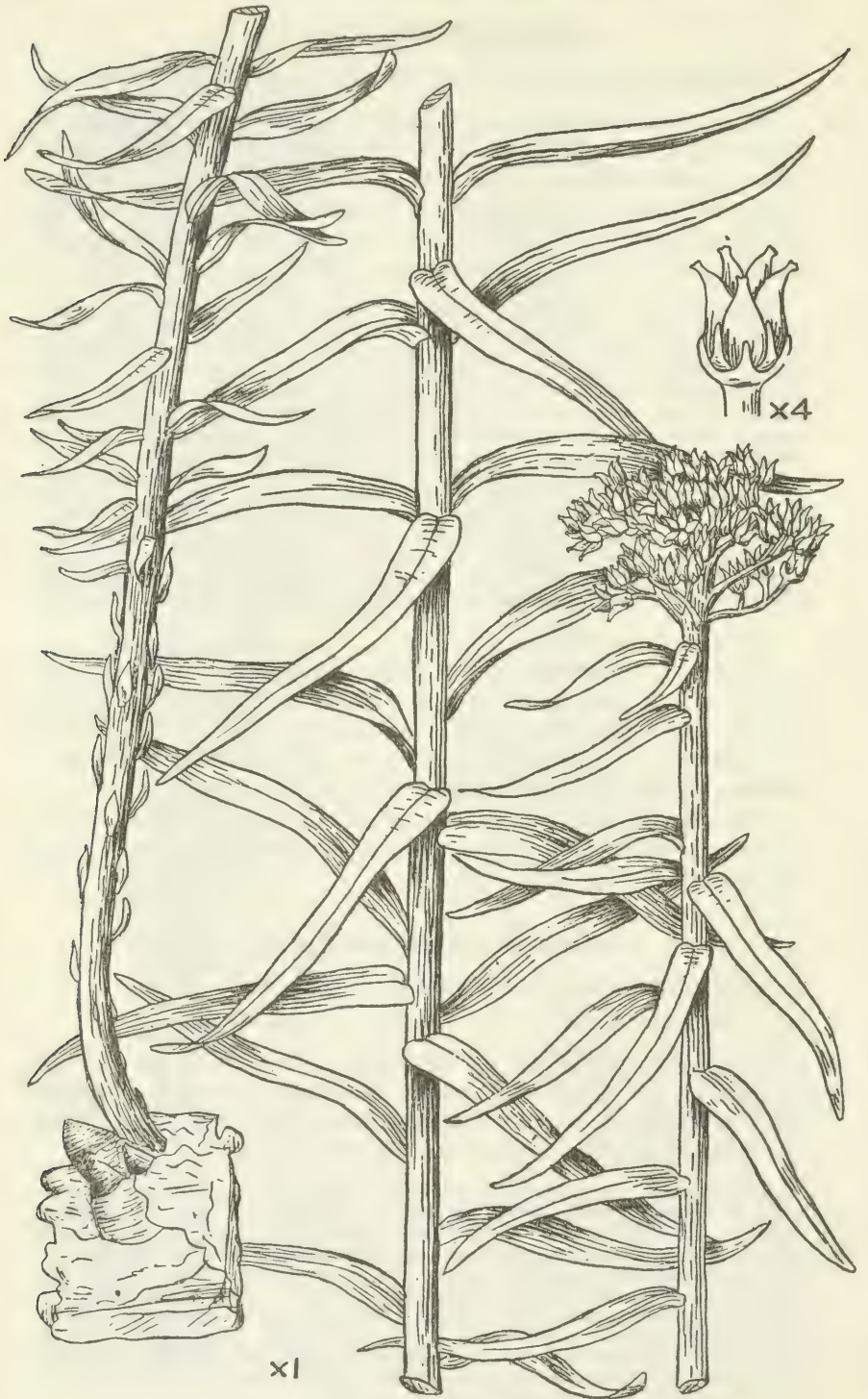
5. *Sedum rotundatum* Hemsley (fig. 11).

S. rotundatum Hemsley in *Kew Bulletin*, 1896, 210.

ILLUSTRATION.—Hooker, "Icon. Plant.," tab. 2469.

A species well marked by its robust growth, broad round entire leaves, and red stems and flowers, combined with a characteristic thick *Rhodiola* rootstock. The long linear claw of the petal below the insertion of the stamen is peculiar and unusual.

DESCRIPTION.—A smooth herbaceous perennial. *Rootstock* very thick, erect, elongate, blackish, clothed (at least in nature) with the blackish straw-like remains of old stems. *Stems* several, rather stout, simple, erect, about 6 inches high, $\frac{1}{2}$ inch thick, bright red especially below. *Leaves* broadly obovate to orbicular, entire, rounded at apex, very shortly stalked, about 1 $\frac{1}{2}$ inch long by 1 inch broad, dark green with a silvery sheen. *Inflorescence* lax, rather few-flowered. *Flowers* usually 5-parted, dark red. MALE FLOWER:—*sepals* ovate-oblong to deltoid, blunt, free part $\frac{1}{2}$ inch long; *petals* $\frac{1}{2}$ - $\frac{1}{4}$ inch long, linear below the insertion of the stamens, oblong blunt above that point; *stamens* $\frac{1}{2}$ inch long, the epipetalous ones adnate in lower third; *scales* roundish-quadrate *carpels* $\frac{1}{2}$ - $\frac{1}{4}$ inch long, yellowish, with short styles.



x1

x4

FIG. 10.—*S. longicaule* Praeger.

Flowers June. Hardy.

HABITAT.—Himalayan region; Yunnan.

This species has been in cultivation for some years, as at Kew, Edinburgh, Glasnevin, and Bees nursery at Chester, but it seems to be not a good doer in cultivation (though a very robust plant in

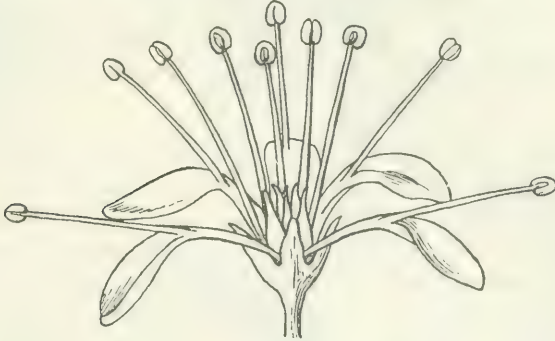


FIG. 11.—*S. rotundatum*. Male flower. $\times 5$.

the wild state), and it was only when this paper was at press that I at last saw flowers (at Edinburgh). The plants in cultivation were derived from seed collected by F. Kingdon Ward (No. 764), G. Cave (No. 1456), and G. Forrest (no number).

Named from its round leaves.

6. *Sedum elongatum* Wallich (fig. 12).

S. elongatum Wallich Catalogue, No. 7233, 1828. Hooker fil. and Thomson in *Journ. Linn. Soc., Bot.*, 2, 98, 1858. Clarke in Hooker, "Flor. Brit. India," 2, 419.

A peculiar *Rhodiola*, which in its tall growth and broad leaves recalls *S. Telephium* and its allies; but it is at once distinguished from these by its characteristic *Rhodiola* rhizome, its stems produced from the axils of broad scales, its globular buds, and its diœcious black-purple flowers with very conspicuous scales forming a cup round the carpels. Its broad leaves and large scales will identify it from among the other *Rhodiolas* found in cultivation.

DESCRIPTION.—A glabrous herbaceous perennial. *Rootstock* very fleshy, branched, growing points furnished with scales. *Stems* annual, arising from the axils of the older scales, erect, simple, leafy, round, smooth, 1-1½ foot high. *Leaves* alternate, sessile or very shortly stalked, obovate or elliptic, about 2 inches long by ¾ to 1 inch broad, often largest near the top of the stem, becoming minute at the base, more or less toothed, very smooth, green with a pale midrib, pale below. *Inflorescence* terminal, large, loose, leafy, its branches rather long, slightly pubescent. *Buds* globular, purple mottled with green. *Flowers* dark reddish-purple, nearly ¾ inch across, on slender pedicels longer than the flowers. **MALE FLOWER** :—*sepals* narrow, tapering, rather acute, purple; *petals* obovate-oblong, blunt, spoon-shaped at apex, dark purple, wide-spreading, 1½ times the sepals; *stamens* purple, slightly shorter than the petals; *scales* very broad, contiguous, emarginate, forming a deep purple shining cup round the carpels; *carpels* short, lightly exceeding the scales, erect, dull purple.

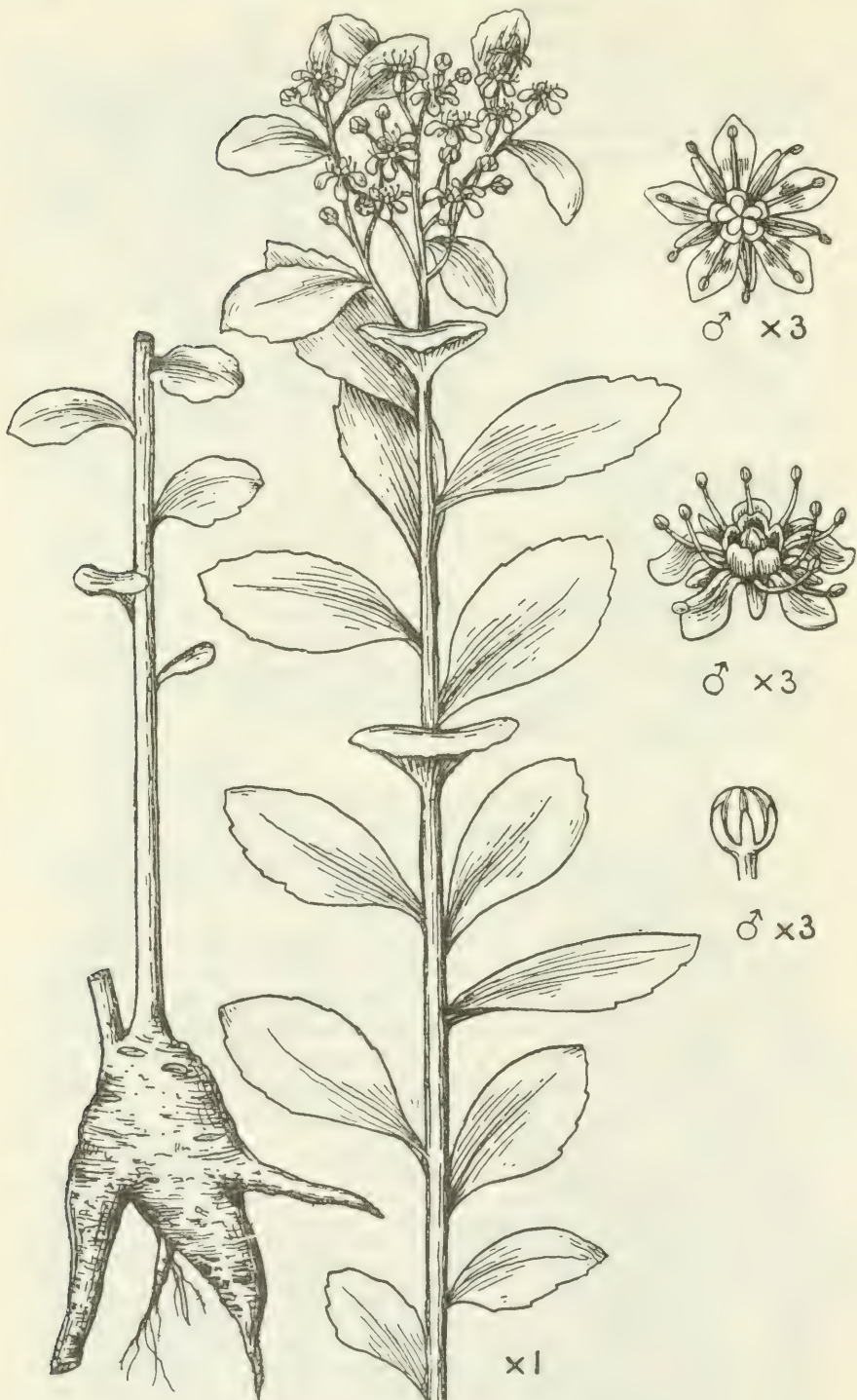


FIG. 12.—*S. elongatum* Wallich.

Flowers June. Hardy.

HABITAT.—Widely spread in the Himalayas, 10,000–12,000 feet.

Apparently less variable than most of the Himalayan *Rhodiola*s, but I have not seen many plants. Collected roots were received from the Lloyd Botanic Garden, Darjeeling, on two occasions, and I have also had plants from Edinburgh. I have not seen female flowers. Like many of the species of the *Rhodiola* and *Telephium* sections it does not like a very dry situation.

Named from its long stem, unusually tall for a *Rhodiola*.

7. *Sedum bhutanense* Praeger *nom. nov.* (figs. 13, 14).

SYNONYM.—*S. Cooperi* Praeger in *Journ. of Bot.*, 57, 49, 1919.

This plant resembles in stem and leaf a slender *S. elongatum* Wall., while it also recalls *S. bupleuroides* Wall. It differs from the former in its stem only half as thick, smaller leaves less distinctly stalked or sessile, less leafy inflorescence, flowers only half as large, more densely arranged on the branches, petals much narrower above, &c. *S. bupleuroides* has very different leaves, entire, quite sessile, and shorter, a laxer inflorescence, flowers half as large again, smaller scales, &c.

DESCRIPTION.—A glabrous herbaceous perennial. *Rootstock* massive, erect, branching, crowned with entire ovate-deltoid acute scales up to $\frac{3}{8}$ inch long, green when young, brown and chaffy when old. *Stems* several, simple, slender, erect, smooth, round, leafy throughout, 1–2 feet high, $\frac{1}{8}$ inch thick or less. *Leaves* alternate (or sub-ternate or sub-opposite), glabrous, longer than the internodes, sessile or very shortly stalked, scarcely fleshy, obovate or elliptic, rather distant, toothed above or nearly entire, rounded or pointed at apex, about $1\frac{1}{2}$ inch long, $\frac{3}{4}$ inch broad in middle of stem, becoming smaller above and very small below, dark green with a whitish midrib, whitish below. *Inflorescence* terminal, lax, up to 2–3 inches long and broad, of several flat-topped, forked, mammillate branches bearing a few leaf-like bracts. *Buds* sub-globular. *Flowers* dioecious, usually 4- (sometimes 5- or 6-) parted. MALE FLOWER:—*sepals* green or purple, linear, fleshy, blunt, free nearly to the base; *petals* oblong-ob lanceolate, blunt, concave, generally purple, patent or reflexed, $1\frac{1}{2}$ times the sepals, $\frac{1}{12}$ inch long; *stamens* equalling the petals, wide-spreading, filaments purple, anthers reddish; *scales* large, shining purple, erect, spreading and broader above, truncate-retuse-emarginate at apex, about $\frac{1}{3}$ the petals; *carpels* very small, blunt, greenish or purplish, much shorter than the scales. FEMALE FLOWER:—*sepals* as in male; *petals* spreading, resembling and equalling or exceeding the sepals; *scales* as in male, slightly exceeding the sepals and petals; *carpels* erect, lanceolate, green or purple, $\frac{1}{4}$ to $\frac{1}{2}$ longer than the sepals and petals, with short, stout, straight, capitate purple styles.

Flowers May. Hardy.

HABITAT.—Himalaya; Yunnan.

Seed of this species from Bhutan, 13,000 feet (Cooper, No. 3517), was apparently widely distributed. I saw young plants at Kew Edinburgh, Glasnevin, and the Bees Nursery near Chester, and grew plants from all four places. Female plants predominated largely. When the leaves are pseudo-ternate, the plant somewhat resembles a slender *S. yunnanense* Franchet, except for the inflorescence.

At first named after its discoverer, Mr. R. E. COOPER, who obtained it when collecting for Bees, Ltd., in 1913, but the name *S. Cooperi* is already occupied.



FIG. 13.—*S. bhutanense* Praeger.

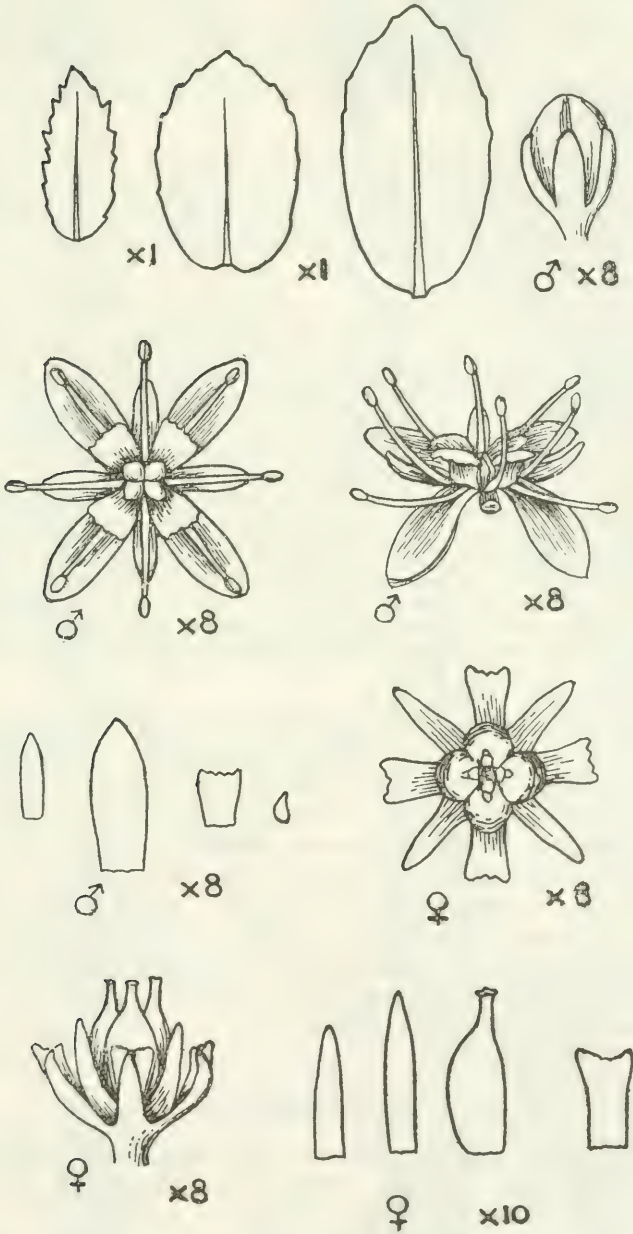


FIG. 14.—*S. bhutanense* Praeger.

8. *Sedum purpureoviride* Praeger (fig. 15).

S. purpureoviride Praeger in *Journ. of Bot.*, 54, 40, 1917.

An interesting species, readily diagnosed by the glandular-pubescence of the stem and of the under-side of the oblong-lanceolate greyish-green toothed leaves, and by its purple and green usually diœcious flowers.

DESCRIPTION.—A diœcious (sometimes hermaphrodite) herbaceous perennial. *Rootstock* erect, thick (about $\frac{1}{2}$ inch diameter), branched, aerial. *Stems* several from the summit of the rootstock, erect, annual, unbranched, 8–12 inches long, leafy throughout, round, whitish, densely pubescent with short glandular hairs; barren stems absent. *Leaves* many, alternate, patent or reflexed, increasing in size from base to apex of stem, up to 1 inch long by $\frac{1}{2}$ inch wide, narrowly oblong-lanceolate, rather acute, sessile, rounded at base, edges lightly toothed and reflexed, upper surface glabrous, of a dull dark greyish-green with a pale midrib, lower surface pale, glandular-pubescent especially on the much-raised midrib. *Inflorescence* a rather dense umbellate cyme, leafy, many-flowered, 1–1 $\frac{1}{2}$ inch across, surface convex; becoming concave, lax, and very leafy before fading, owing to growth of the branches and leaf-like bracts. *Buds* obovate to sub-globular, angular, rather apiculate. *Flowers* mostly 5-parted; pedicels slender, twice as long as the buds, very glandular. MALE FLOWERS:— $\frac{3}{8}$ inch across; *sepals* oblong-lanceolate, blunt, fleshy, green, wide-spreading, forming an open cup; *petals* linear-oblong-lanceolate, blunt, very concave on face both longitudinally and transversely, patent or somewhat reflexed, green with a purple base, twice the sepals; *stamens* ascending, equalling or slightly exceeding the petals, filaments purple, anthers pale orange-red; *scales* large, purple, arching, the tips deflexed, convex on face both longitudinally and transversely, emarginate, twice as long as broad, slightly wider upwards; *carpels* very small, erect, dark green. HERMAPHRODITE FLOWER:—similar to the male as regards size and shape of *sepals*, *petals*, *stamens*, and *scales*; *carpels* erect, green, the slender styles occupying nearly half their length, slightly shorter than the stamens.

Flowers May. Hardy.

HABITAT.—Yunnan, where it has been collected several times (for particulars see *Journ. of Botany*, 54, 40, 1917). All the available material belongs to male plants, with the exception of one specimen in the Edinburgh Herbarium, which is hermaphrodite. My description is drawn up mainly from living plants received from Edinburgh several years ago, under the name “*Sedum* sp. Yunnan, Forrest,” which began to flower with me in 1916. No further particulars relative to these specimens are available. The drawings are made from the living plant, excepting those of the hermaphrodite flower which is from the Edinburgh specimen referred to above.

Named from the colour of its flowers.

9. *Sedum bupleuroides* Wallich (fig. 16).

S. bupleuroides Wallich Catalogue, No. 7229, 1828. Hooker fil. and Thomson in *Journ. Linn. Soc., Bot.*, 2, 98. Clarke in Hooker, “*Flor. Brit. India*,” 2, 418.

A very distinct plant, with the characteristic, much-thickened rootstock and unisexual flowers of *Rhodiola*; they are dark red-purple and small. *S. bupleuroides* shows a smaller range of variation than the majority of the *Rhodiolas*, and is generally immediately

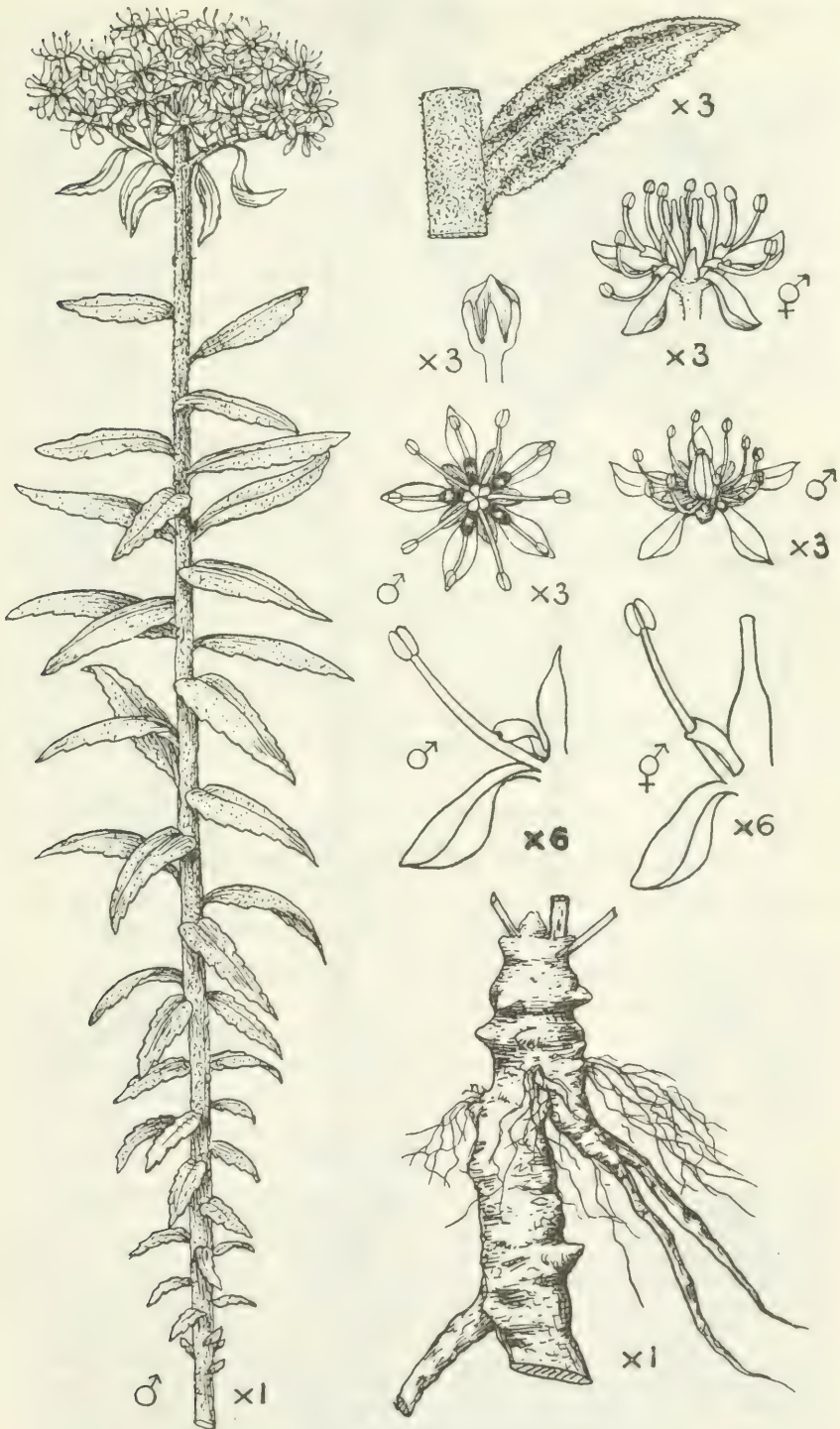


FIG. 15.—*S. purpureoviride* Praeger.

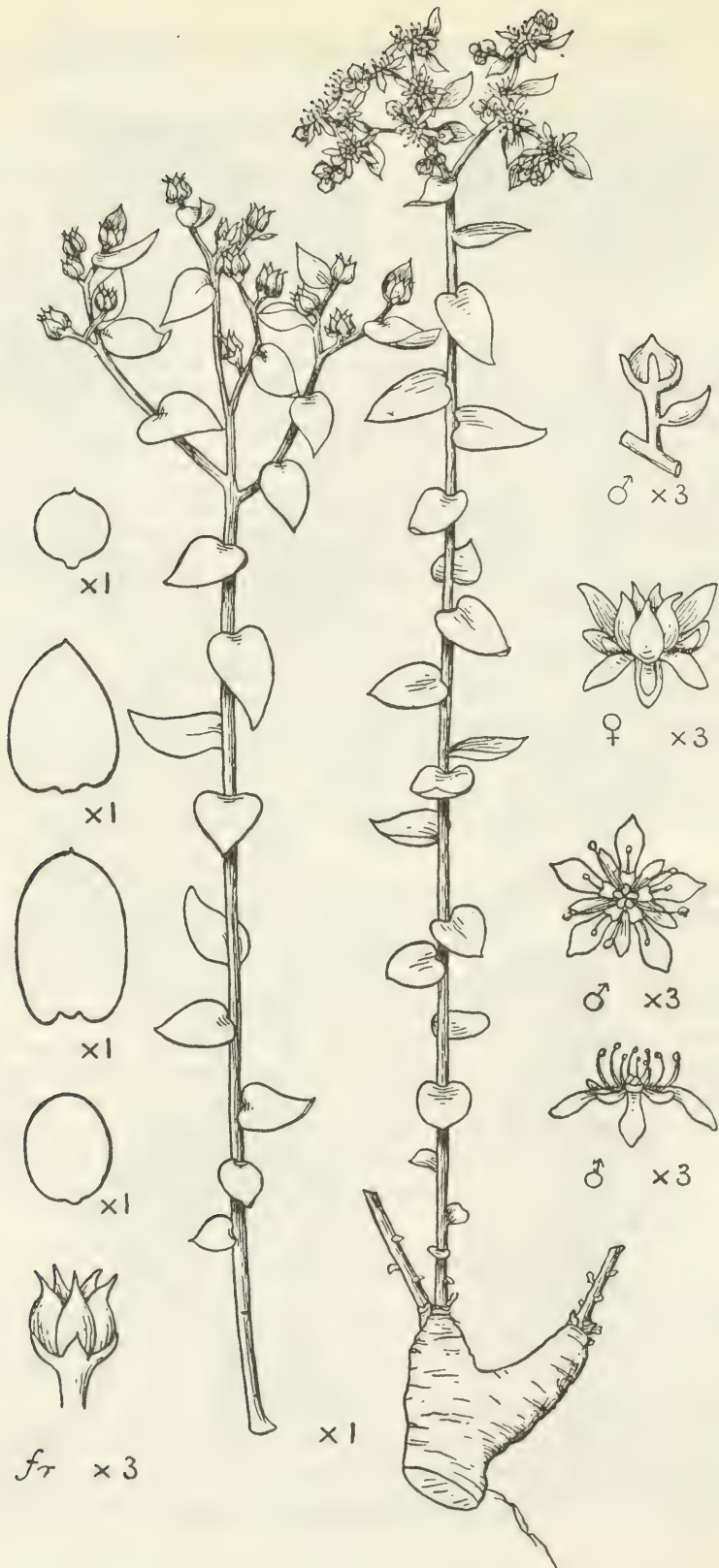


FIG. 16.—*S. bupleuroides* Wallich.

recognizable by its entire heart-shaped leaves, which vary chiefly as regards their length.

DESCRIPTION.—A glabrous herbaceous perennial without barren shoots. *Rootstock* massive, branched, the greater part subterranean (in cultivation). *Stems* annual, erect, several together, 9–12 inches long, slender, smooth, unbranched. *Leaves* alternate, rather distant, fleshy, triangular-ovate, ovate, or ovate-lanceolate, acute or blunt, sessile, cordate, $\frac{1}{2}$ –1 inch long by $\frac{1}{4}$ – $\frac{1}{2}$ inch or more broad, green, paler on back, tip often red. *Inflorescence* a flat, lax, leafy cyme, 1–3 inches across. *Buds* obovate or nearly globular, blunt or apiculate, ribbed, the clasping sepals occupying grooves between the petals. *Flowers* 5-parted, $\frac{1}{4}$ inch across. MALE FLOWER:—*sepals* linear, streaked dark purple outside, greenish or purple inside, tube short; *petals* $1\frac{1}{2}$ times the sepals, oblanceolate, non-contiguous, spreading, often reflexed, dark brownish purple or streaked purple and green; *stamens* reddish purple, shorter than the petals; *scales* conspicuous, dark shining purple, quadrate, often retuse, reflexed; *carpels* minute, erect, greenish, equalling the scales. FEMALE FLOWER:—*sepals* similar to the male; *petals* more linear; *stamens* absent; *scales* similar to the male; *carpels* large, purple, with short, blunt, linear spreading styles.

Flowers June. Hardy.

HABITAT.—Himalayas, 10,000–12,000 feet.

Rare in cultivation. I have it from Kew, Edinburgh, and the Lissadell nursery in Co. Sligo, all these plants having their origin in the Darjeeling Botanic Garden, whence I have also received it direct. It also came from Messrs. HOUSE & SON of Bristol under the name of *S. Hookeri*. The male plant (which is much the more attractive) is commoner in cultivation than the female, which I have seen at Edinburgh, and have raised from Darjeeling seed.

The specific name recalls the resemblance of the plant to some species of *Bupleurum*, a peculiar genus of Umbelliferae.

Group 2. HIMALENSES.

10. *Sedum tibeticum* Hooker fil. and Thomson (fig. 17).

S. tibeticum H. f. and T. in *Journ. Linn. Soc., Bot.*, 2, 96, 1858.
Clarke in Hooker, "Flora Brit. India," 2, 418.

A Himalayan *Rhodiola* which in appearance comes nearest to *S. himalense* D. Don, but it is usually glaucous and smooth, while *himalense* is mostly dark green and rough on leaf and stem. *S. tibeticum* also belongs to the group which has the inflorescence branches bare of leaves, while those of *himalense* are leafy. Both have usually dark-purple flowers, and are much slenderer than *S. roseum*, and much larger than *S. fastigiatum*.

DESCRIPTION.—A glabrous herbaceous perennial. *Rootstock* thick, erect, branched. *Stems* many, from the scales at apex of rootstock, annual, simple, smooth, round, reddish, slender, leafy, 6–9 inches long. *Leaves* alternate, longer than the internodes, patent, sessile, lanceolate to oblong, rounded at base, acute, mostly lightly toothed in upper part, generally rather glaucous, pale on back, about $\frac{3}{4}$ inch long. *Inflorescence* terminal, flattish, rather lax, 1–2 inches across, leafless or with few bracts at base of branches; branches several, forked. *Flowers* dark purple, $\frac{3}{8}$ inch across. FEMALE FLOWER:—*calyx* saucer-shaped, purple or green, lobes long-triangular, rather acute, exceeding the tube; *petals* lanceolate, acute, nearly twice the sepals, dark purple, wide-spreading; *scales* black-purple, oblong, blunt, erect, equalling or exceeding in length and breadth the sepals which cover their backs; *carpels* erect, oblong, equalling the petals, $\frac{1}{5}$ inch long, purple, the tips and the very short styles divergent.



FIG. 17.—*S. tibeticum* H. f. and T.

Flowers June–July. Hardy.

HABITAT.—Himalayan region.

Very rare in cultivation. Received from Lissadell Nursery (where it was raised from Darjeeling seed labelled *S. fastigiatum*); also from Edinburgh Botanic Garden unnamed, collected by Captain BAILEY on the Upper Brahmaputra. The former plants were male, the latter female. The male flowers were imperfect, and are not described here.

11. *Sedum quadrifidum* Pallas.

S. quadrifidum Pallas, "Reise," 3, 730, 1776. Hooker fil. and Thomson in *Journ. Linn. Soc., Bot.*, 2, 97. Clarke in Hooker, "Flor. Brit. India," 2, 418.

SYNONYM.—*S. coccineum* Royle, "Illustr. Bot. Himalayas," 223.

ILLUSTRATIONS.—Pallas, *loc. cit.* tab. 6, fig. 1. Royle, *loc. cit.* tab. 48, fig. 3.

In nature a smaller plant than any other *Rhodiola* in cultivation, with a caudex densely clothed with the fine wiry black stems of former years. In cultivation larger, but still smaller than any of the other species, with linear acute leaves about $\frac{1}{2}$ inch long and small few 4-parted flowers. The only specimens seen in cultivation were house-grown and still young, so only a brief description is given, helped out by Hooker's "Flora of British India."

DESCRIPTION.—A usually glabrous herbaceous perennial. *Rhizome* rather stout, elongate, in nature densely clothed with the black wiry old stems. *Stems* 6 inches (in nature more often 2 inches) long, erect, simple, leafy. *Leaves* linear, acute, flattened, about $\frac{1}{2}$ inch long by $\frac{1}{25}$ inch wide. *Inflorescence* 1- to 3-flowered. *Flowers* 4- or 5-parted. *MALE FLOWER*:—*petals* linear-lanceolate, blunt, wide-spreading, white in the living specimens, usually purple, at least twice the sepals; *stamens* erect, equalling the petals; *scales* oblong, notched, red; *carpels* lanceolate, erect, yellow, with short styles.

Flowers June. Hardy.

HABITAT.—Himalayan region, Siberia, Arctic Russia.

Young plants, raised from seed sent from Darjeeling, seen at Edinburgh as the present paper was going to press. Apparently not previously in cultivation, though a characteristic Himalayan and Siberian species.

Named from its (usually) quadripartite flowers.

12. *Sedum himalense* D. Don (fig. 18).

S. himalense D. Don, "Prodromus Flor. Nepalensis," 212, 1825. Hooker fil. and Thomson in *Journ. Linn. Soc., Bot.*, 2, 97. Clarke in Hooker, "Flor. Brit. India," 2, 418. Not *S. himalense* of many gardens, which is *S. Douglasii* Hooker, a plant of N.W. America, not related to the *Rhodiolas*.

Among cultivated *Sedums* this species most resembles, in general appearance, *S. tibeticum* Hooker f. and Thomson, but it differs from it in bearing bracts on the branches of the inflorescence; the leaves are dark green and the stems mostly red, and both are roughish,

while in *S. tibeticum* they are quite smooth and the leaves often somewhat glaucous. The few plants of both species which I have



FIG. 18.—*S. himalense* Don.

seen were not hard to distinguish, but Hooker states that in the Himalayas these and the other native *Rhodiolas* vary much in almost every character, so from a few specimens one cannot dogmatize about them.

DESCRIPTION.—An herbaceous perennial, usually with stem and leaves somewhat rough. *Rootstock* thickened, elongate, armed with the bases of the old stem, and crowned with conspicuous scale-leaves. *Stems* arising from the axils of the older scales, erect, slender, round, usually reddish, leafy throughout, 6–12 inches long, mostly rough with many transparent bead-like glands. *Leaves* alternate, sessile, loosely imbricate, flat, slightly fleshy, lanceolate to oblanceolate or obovate or oblong-oblanceolate, acute to apiculate, or obtuse, rounded at base, toothed near apex or entire, finely papillose especially on the edges, $\frac{5}{8}$ to 1 inch long, $\frac{3}{16}$ to $\frac{5}{16}$ inch broad, dark green, paler below, midrib rather prominent on under-side. *Inflorescence* leafy, not dense, usually small in cultivation. *Buds* almost globular. *Flowers* dark purple, $\frac{1}{4}$ inch across, pedicels slender, thickened upwards, longer than the flowers. **MALE FLOWER**:—*calyx* lobes tapering from a broad base, rather acute, fleshy, purple, equalling the green tube; *petals* oblong-lanceolate, blunt, patent, twice the calyx, red and yellowish inside (fading purple), deep red-purple outside; *stamens* $\frac{3}{4}$ the petals, ascending, filaments red or purple, anthers deep red; *scales* large, broadly cuneate, rounded or emarginate above, recurved, deep purple; *carpels* small, short, erect, purplish. **FEMALE FLOWER**:—*sepals*, *petals*, and *scales* as in male; *stamens* absent; *carpels* stout, erect, with very short diverging styles.

Flowers May–June. Hardy.

HABITAT.—Widely spread along the Himalayas, 12,000–17,000 feet.

Very rare in cultivation. Through the good offices of the Botanical Survey of India, I received very fine collected rhizomes, a foot in length and nearly 3 inches in girth. Specimens from Edinburgh, labelled *S. humile*, were received there from Calcutta, and an unnamed plant at Edinburgh, collected by Captain BAILEY on the Upper Brahmaputra, proved to be a female *S. himalense*—the only one I have seen.

Named after its habitat.

13. *Sedum fastigiatum* Hooker fl. and Thomson (fig. 19).

S. fastigiatum H. f. and T. in *Journ. Linn. Soc., Bot.*, 2, 98, 1858.
Clarke in Hooker, "Flor. Brit. India," 2, 419.

A typical Himalayan Rhodiola, and like most of them variable in flower as regards size and colour of parts. Allied to *S. himalense* and *S. tibeticum*, in both of which, however, the leaf is broader and much thinner in proportion to its length. In *S. himalense*, moreover, the leaves are usually rough, and in *S. tibeticum* usually glaucous; the small, narrow, fleshy, dark green shining leaves of *S. fastigiatum* will separate it from either at a glance. The leaves of *S. dumulosum* Franchet are somewhat similar to those of the present species, but *dumulosum* has erect petals forming white bell-shaped flowers. *S. quadrifidum* comes nearest to *S. fastigiatum*, but has smaller flowers and fruit.

DESCRIPTION.—An herbaceous glabrous perennial. *Caudex* elongate, thick, branched. *Stems* many, from the summit of the branches, simple, erect, leafy, smooth, round, 3–6 inches long, the old ones persistent. *Leaves* alternate, crowded, linear-oblong to lanceolate, blunt, sessile, dark green, smooth, shining, fleshy, rounded on face, flat or concave on back, $\frac{1}{4}$ – $\frac{1}{2}$ inch long. *Inflorescence* smallish, compact, bearing leaves on the branches, $\frac{3}{4}$ to 1 inch across. *Buds* ovate, blunt. *Flowers* $\frac{1}{4}$ inch long, $\frac{1}{4}$ inch across, exceeding the pedicels, 4- or 5-parted, narrow, cup-shaped. **MALE FLOWER**:—*sepals* linear to long-triangular, blunt, tube short; *petals* broadly lanceolate, blunt, $1\frac{1}{2}$ times the sepals; *stamens*



FIG. 19.—*S. fastigiatum* H. f. and T.

spreading, twice the sepals; *scales* conspicuous, quadrate, more or less retuse *carpels* nearly equalling the petals, slender, erect, slightly divergent above. FEMALE FLOWER :—*sepals* long-triangular to oblong, blunt, tube short; *petals* linear, blunt, $1\frac{1}{2}$ times the sepals; *scales* $\frac{2}{3}$ the sepals, strap-shaped, emarginate, reflexed; *carpels* very erect, slightly longer than the petals.

Flowers May–June. Hardy.

HABITAT.—Himalayan region; western Yunnan.

The flowers vary in colour. My male plant is a white-flowered form—sepals dark purple with a green tube, petals and filaments white, anthers purple, scales orange, carpels green—a very bright little flower. Dried specimens at Kew appear to have the same coloration, but purple throughout the flower seems to be more usual. My female plant has flowers of a deep red-purple, the carpels and scales of a deeper tint than the petals, the sepals green. Plants collected in Yunnan by FORREST had pale lemon-yellow flowers, others greenish.

Not recorded as in cultivation. The male plant came to me from Lissadell nursery as *S. quadrifidum*, where it was raised from Darjeeling seed. The female was sent to Kew from Hexham-on-Tyne, where it grows in a school garden, and is supposed to have been found wild in Cornwall or Scotland!

Series II. CRASSIPEDES.

14. *Sedum crassipes* Wallich (figs. 20, 21).

S. crassipes, Wallich Catalogue, No. 7234, 1828. Hooker fil. and Thomson in *Journ. Linn. Soc., Bot.*, 2, 99.

SYNONYMS.—*S. asiaticum* Clarke ex Hooker, "Flor. Brit. India," 2, 419. Masters in *Gard. Chron.*, 1878, ii. 267. (Not of De Candolle, "Prodromus," 3, 401, 1828.) *S. Wallichianum* Hooker, "Icon. Plant.," tab. 604. ILLUSTRATION.—Hooker, *loc. cit.*

A very distinct plant, at once recognized among the *Rhodiolas* by its linear toothed bright-green leaves and greenish-white flowers.

DESCRIPTION.—A smooth herbaceous perennial. *Rootstock* thick, elongate, branched, aerial, $\frac{1}{4}$ – $\frac{3}{8}$ inch diameter, bearing withered bases of old stems. *Stems* several from each crown, smooth, round, erect, unbranched, 6–12 inches high. *Leaves* many, alternate, bright green, glabrous, $\frac{1}{2}$ – $\frac{3}{4}$ inch long by $\frac{1}{16}$ – $\frac{1}{8}$ inch broad, flat, fleshy, linear to lanceolate, sessile, pointed at both ends, with 1 to 3 remote teeth on either side in the upper half. *Inflorescence* terminal, dense, flattish, an inch across, leafy with leaf-like bracts. *Buds* oblong, bluntly pointed, $\frac{3}{16}$ – $\frac{1}{16}$ inch long. *Flowers* $\frac{1}{2}$ inch across when wide open, 5-parted, hermaphrodite. *Sepals* green or purple, subulate, blunt, wide-spreading. *Petals* yellowish-white to greenish, linear, acute or blunt, boat-shaped, mostly wide-spreading or reflexed, $1\frac{1}{2}$ times the sepals. *Stamens* slightly exceeding the petals, spreading, filaments greenish, anthers yellow. *Scales* quadrate, orange, slightly notched. *Carpels* green, erect, slender, equalling or shorter than the stamens; in fruit erect, and $\frac{3}{8}$ inch long.

Flowers June, and often again later. Hardy.

HABITAT.—Widely spread in the Himalayas, 11,000–16,000 feet; central China; Yunnan.

This is the plant usually grown under the name of *S. asiaticum* DC. or sometimes *S. Wallichianum* Hooker; but as pointed out by MAXIMOWICZ (*Bull. Acad. Pétersb.*, 29, 126) De Candolle's plant



FIG. 20.—*S. crassipes* Wallich.

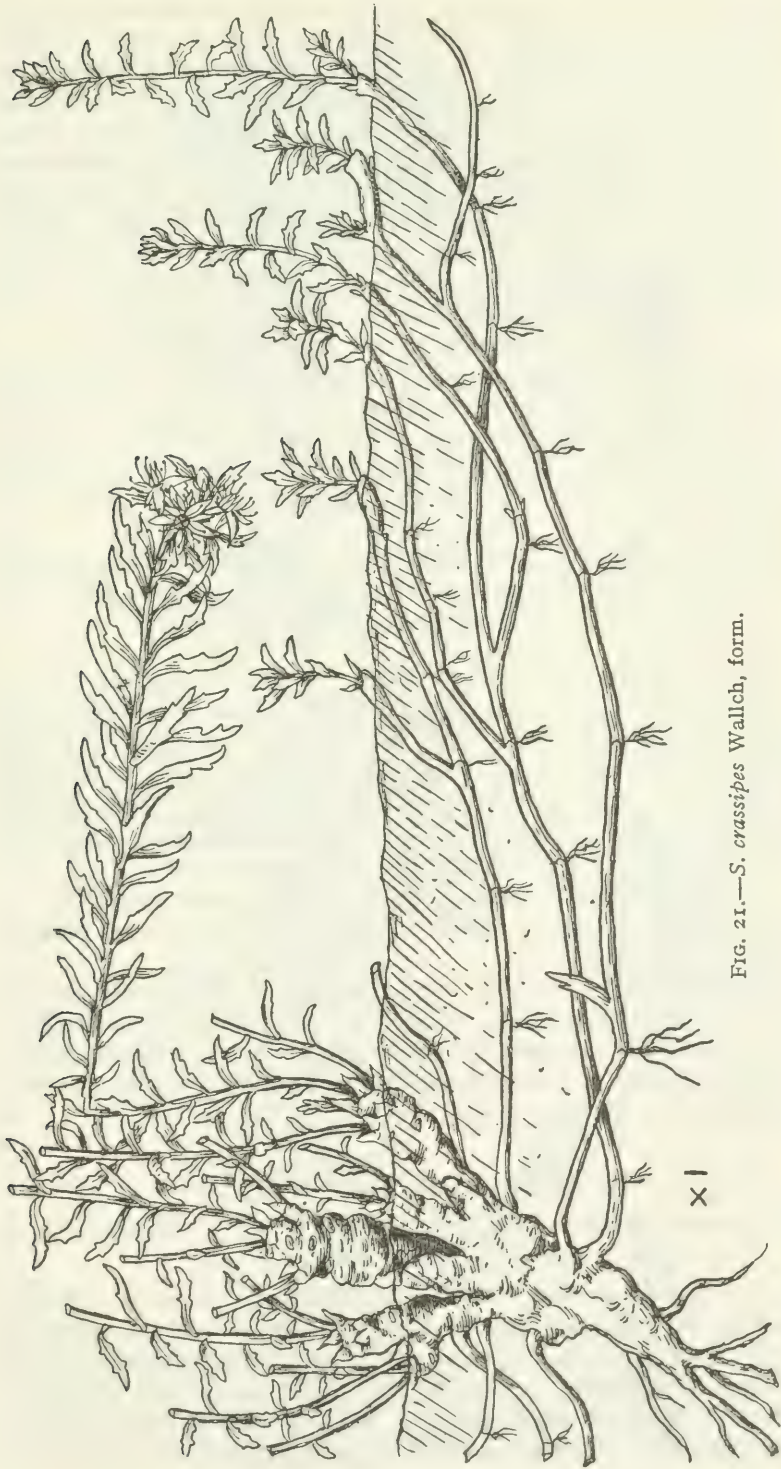


FIG. 21.—*S. crassipes* Wallich, form.

is described as having entire leaves ("foliis lineari-lingulatis integerrimis obtusis"), and is clearly different; Wallich's name *crassipes* appears to be the oldest for our plant. Hooker's *Wallichianum* is not distinct from it, being a form with leaves more divided than usual. The depth of the teeth varies, but I have not seen a living plant in which it is quite so marked as in HOOKER'S plate. The flowers vary from small and whitish (the commoner form) to larger and greenish, the last named approaching the variety described below. The flowers are almost always bisexual, but I have a male plant received from Glasnevin; in it the carpels are very slender, little more than half as long as the stamens.

Under certain conditions the plant will send out suckers, an unusual feature in the *Rhodiola* group, and indeed in the genus. One strong young plant produced a ring of stems at a distance of 6 inches from the branched rootstock, arising from slender, branching, root-like underground stems emanating from the rootstock at 1 to 2 inches below the surface (fig. 21), in this respect connecting *S. crassipes* with *S. Cretini* Hamet.

Although the plant is variable, some of the forms tending towards the variety described below, the latter appears to merit varietal rank.

The species takes its name from its thick rhizome.

Var. **cholaense** Praeger in *Journ. of Bot.*, 57, 50, 1919 (fig. 22).

More robust than the type, plant of a more greyish green, inflorescence denser and more involucrate, the bracts being very long. *Leaves* 1-1½ inch long, $\frac{1}{4}$ - $\frac{3}{16}$ inch broad, largest below the inflorescence. *Buds* $\frac{3}{8}$ inch long, equalling the pedicels. *Sepals* very narrow, nearly linear, green. *Petals* nearly twice the sepals, erect, green, $\frac{3}{8}$ inch long, linear-oblongate, blunt. *Stamens* equalling the petals, anthers greenish. *Scales* dark crimson. *Carpels* long, very erect, slender, exceeding the stamens, slightly diverging above, styles very short; erect and over $\frac{1}{2}$ inch long in fruit.

A fine form, easily separated by its stouter growth, longer leaves, and large flowers wholly green, save for the conspicuous crimson scales.

Received from Lissadell nursery and seen also at Edinburgh, but the two had the same origin—the Chola Valley, East Sikkim, where the plant was collected by COOPER (No. 923). Received also, in the form both of roots and seeds, from Darjeeling Botanic Garden, presumably of the same origin.

15. *Sedum Stephani* Chamisso (fig. 23).

S. Stephani Chamisso in "Linnaea," 6, 549, 1831. Maximowicz in *Bull. Acad. Pétersbourg*, 29, 127, 1883.

A plant intermediate between two well-known species—*S. crassipes* Wallich (*S. asiaticum* Clarke) and *S. roseum* Scopoli (*S. Rhodiola* DC.). It appears to be nearer to the former, of which it should perhaps be considered a variety; but as I have not had the opportunity of studying much material, I follow MAXIMOWICZ in giving it specific rank. The leaves come close to *S. crassipes*, but are broader;

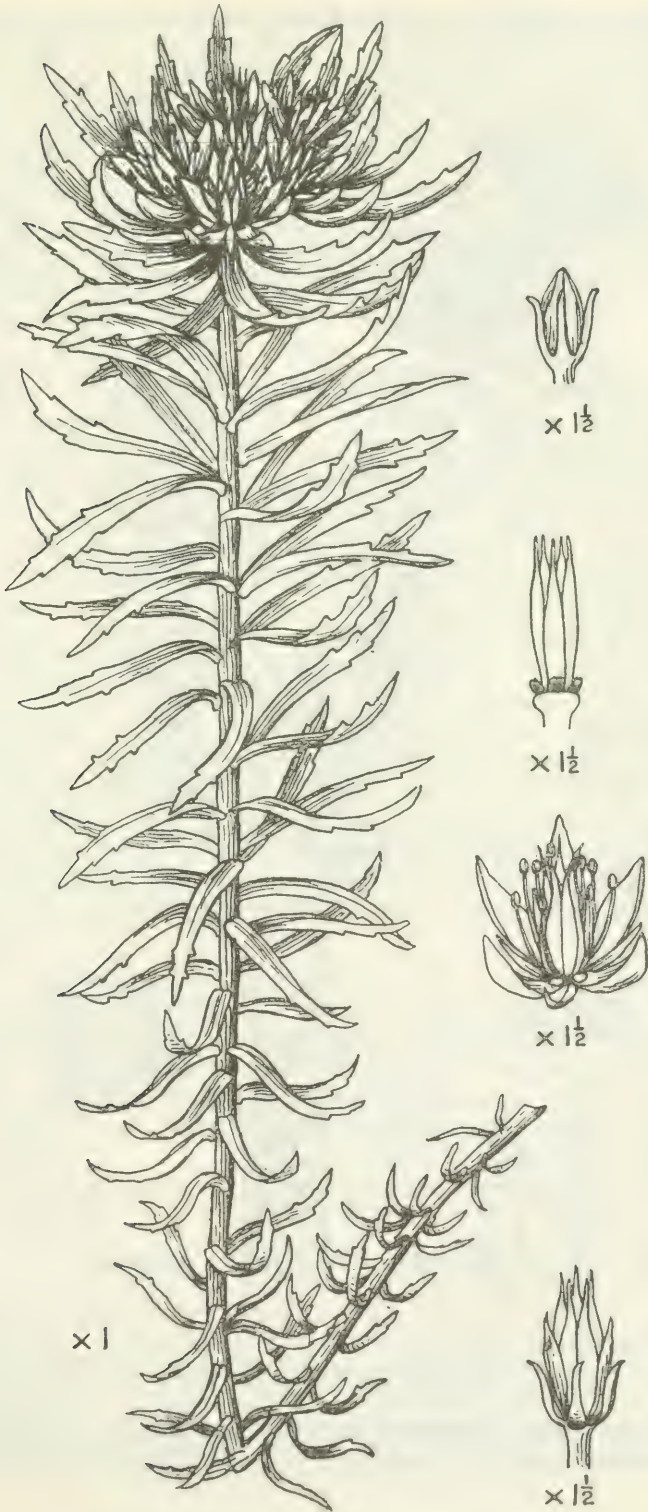


FIG. 22.—*S. crassipes* var. *cholaense* Praeger.

the plant has not the tall stems of that species, resembling in stature



FIG. 23.—*S. Stephani* Chamisso.

the smaller forms of *S. roseum*, such as var. *Tachiroi*. Like *crassipes* and *Tachiroi* it is bright green, not glaucous.

DESCRIPTION.—A glabrous herbaceous perennial. *Rootstock* thickened, but not excessively, resembling that of a slender *S. roseum*. *Stems* annual, erect, several from the axils of the not conspicuous scales which surround the growing point, 4–6 inches high, leafy throughout, smooth, round. *Leaves* alternate, loosely imbricate, sessile, linear-oblancoolate to linear-oblong, an inch long, $\frac{1}{4}$ – $\frac{1}{2}$ inch broad, irregularly and rather deeply toothed in upper half or throughout their length with teeth triangular to finger-shaped; on face bright green, flat, with depressed midrib; on back paler, rounded. *Inflorescence* dense, in my plants small and infrequent. *Buds* purple (back of sepals being coloured). *Flowers* $\frac{1}{4}$ inch long, $\frac{3}{8}$ inch across, on very short pedicels. FEMALE FLOWER:—*sepals* spreading, tapering, blunt, twice as long as broad, purple, longer than the green tube; *petals* patent, a little longer than the sepals, oblong-lanceolate, acute or obtuse, greenish-white; *stamens* absent; *scales* rounded, as long as broad, slightly retuse, orange; *carpels* green, oblong-lanceolate, equalling the petals, erect, with short diverging styles.

Flowers June. Hardy.

HABITAT.—Trans-Baikal region, eastern Siberia, Kamtschatka.

The plants which I have seen, and which are described above, were received from the Edinburgh Botanic Garden as *S. Stephani*, from F. SÜNDERMANN of Lindau as *S. rhodanthum* (a quite different N. American species, see p. 67), and from Glasnevin Botanic Garden as *S. asiaticum*. None of them is typical *Stephani*, which has 5-parted usually hermaphrodite flowers, and is intermediate between *S. roseum* var. *elongatum* and *S. crassipes*, inclining, according to MAXIMOWICZ, to the latter, though REGEL placed it as a variety of the former. It would seem, indeed, that MAXIMOWICZ would have placed it under *crassipes* but for its distinct geographical range, *S. crassipes* being confined to the Himalayas and Yunnan, and *Stephani* to N.E. Asia. The Edinburgh and Lindau plants referred to above have usually 4-parted unisexual flowers, but in other respects agree with *Stephani*. As both of these characters are notoriously inconstant among the Rhodiolas, these discrepancies are probably not important. The Glasnevin plant has flowers identical with the other two, but 5-parted, and the leaves are narrower, being indistinguishable from *crassipes*.

So far as these living plants throw light on the question, *S. Stephani* is certainly nearer to *crassipes* than it is to *roseum*. The slender carpels are very near those of *crassipes*; the petals also, which like the carpels are larger and broader than those of *roseum*. The plant flowers in June along with *crassipes* and after *roseum*. All my plants being female, I have not been able to compare the stamens or the mature fruit.

Named after FRIEDRICH STEPHAN, Moscow botanist.

16. *Sedum dumulosum* Franchet (fig. 24).

S. dumulosum Franchet, *Nouv. Arch. Mus. Hist. Nat.* (2) 6, 9.

SYNONYMS.—*S. variflorum* N. E. Brown in *Kew Bulletin*, 1914, 208. *S. Faveri* W. W. Smith in *Notes Roy. Bot. Gard. Edinb.*, 9, 125, 1916.

ILLUSTRATION.—*Nouv. Arch. Mus. Hist. Nat.* (2), 5, pl. 16, fig. 3.

A pretty plant, which cannot be confused with any other species in cultivation: the thick aerial "Rhodiola" rootstock, linear leaves

and narrowly bell-shaped white flowers with elongate recurved tips sufficiently distinguish it.

DESCRIPTION.—A glabrous herbaceous perennial *Rootstock* thick, branched, aerial, set with the dry bases of the old stems. *Stems* several or many from

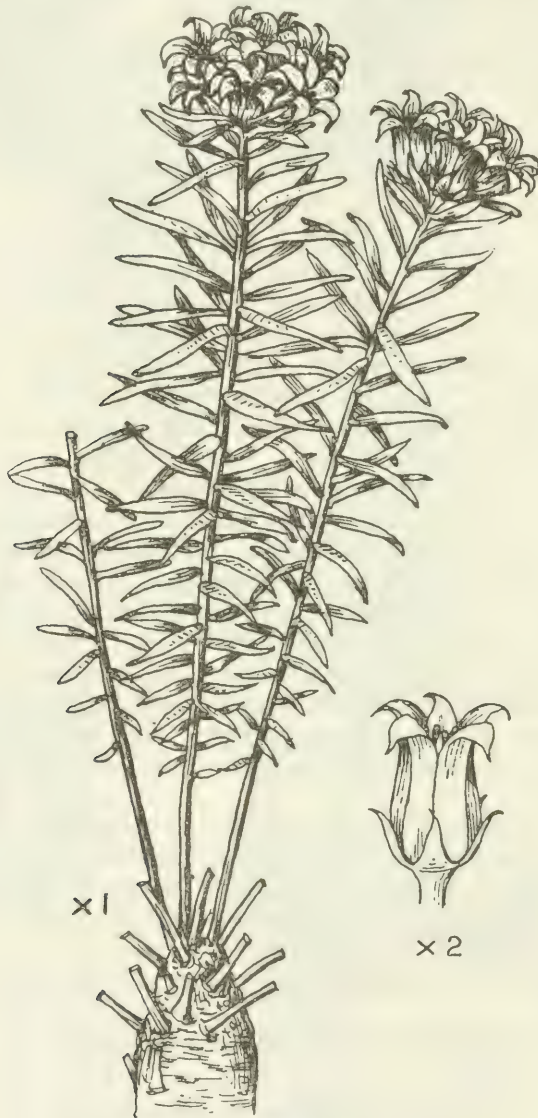


FIG. 24.—*S. dumulosum* Franchet.

the summit of the rootstock, annual, erect or arching, unbranched, 4-7 inches high, smooth, reddish, slender, very leafy. *Leaves* alternate, green, entire, glabrous, linear, rather acute, sessile, $\frac{1}{2}$ -1 inch long by $\frac{1}{16}$ - $\frac{1}{10}$ inch broad, fleshy, flattened on face with a median groove, rounded on back. *Inflorescence* very compact, terminal, of 6 to 12 flowers arranged on 1-2-flowered branches shorter than the flowers, each bearing 1 or 2 leaf-like bracts. *Flowers* white, $\frac{3}{8}$ inch long by $\frac{1}{2}$ inch across. *Buds* conical, acute. *Calyx* pale green, glabrous, segments

separate nearly to the base, slender, narrow, tapering, very acute, spreading. *Petals* white, erect, recurved above, oblong-lanceolate, acuminate, margins eroded, more than twice the sepals. *Stamens* shorter than the petals, filaments white, anthers red-purple. *Scales* small, yellow, quadrate, slightly notched. *Carpels* white, erect, about $\frac{3}{4}$ as long as the stamens.

Flowers June. Hardy.

HABITAT.—N. China.

This species and *S. Tatarinowii*, neither previously in cultivation, were sent to Kew in 1913 by Mr. F. N. MEYER of the American Legation at Peking, who collected them at 3,000 mètres at Hsiao Wutai Shan.

A variable species, but especially characterized by its white bell-shaped flowers with petals prolonged into a slender tail and margins usually fringed. *S. rariflorum* of N. E. BROWN, in cultivation at Kew, is fairly typical *dumulosum*. *S. Farreri* W. W. SMITH, raised by the late Mr. FARRER from seed collected by him in Kansu, is a robust form with long sepals and broad petals much eroded.

17. *Sedum trifidum* Wallich (figs. 25, 26).

S. trifidum, Wallich Catalogue, No. 7230, 1828. Hooker fil. and Thomson in *Journ. Linn. Soc., Bot.*, 2, 100. Clarke in Hooker, "Flor. Brit. India," 2, 420. Masters in *Gard. Chron.*, 1878, ii. 267.

ILLUSTRATION.—*Garden*, 1885, 317.

A pretty plant with the thickened rootstock of the *Rhodiolas*, but distinct from other species of that section in its broad, deeply-incised leaves grouped near the top of the stems, and its lax inflorescence of large red flowers; and whereas most of the *Rhodiola* section are early flowerers, *S. trifidum* does not bloom till September.

DESCRIPTION.—A glabrous herbaceous perennial. *Rootstock* thick, branched, sometimes elongate, but (in cultivation at least) not aerial. *Stems* several together, erect, unbranched, 6–8 inches high, slender, smooth, round, red, bare save near the top, or with a few small, entire, club-shaped leaves. *Leaves* alternate, crowded on the terminal 1 to 2 inches of stem, smooth, green, sessile, $1\frac{1}{2}$ –3 inches long, narrow and linear or tapered in the lower half, expanded above into an obovate lamina deeply and irregularly cut and toothed. *Inflorescence* a very leafy, lax, flat cyme about 2 inches across, of several minutely papillose forked branches, upper bracts linear, entire. *Buds* linear-lanceolate, blunt. *Flowers* $\frac{5}{8}$ inch across, mostly sessile, the lower shortly stalked. *Sepals* green, very fleshy, blunt, variable in length, $\frac{1}{4}$ to $\frac{1}{2}$ the petals, linear or lanceolate to short triangular (fig. 25, a, b). *Petals* purple-red, linear-lanceolate, apiculate, wide-spreading, ultimately reflexed. *Stamens* purple-red, spreading, slightly shorter than the petals. *Scales* red, cuneate, deeply notched, broader than long. *Carpels* white tinged red, nearly erect, equalling the stamens.

Flowers August–September. Hardy.

HABITAT.—Himalayas, widely distributed, 6,000–12,000 feet, on rocks and trees; Yunnan.

A distinct and pleasing plant, and one of the few *Sedums* that offers some difficulty as regards its cultivation. The best plants which I have seen were grown in deep, well-drained crevices not fully exposed to the sun. In the Himalayas on mossy tree-trunks or rocks it often grows a foot high, with large deeply pinnatifid leaves.

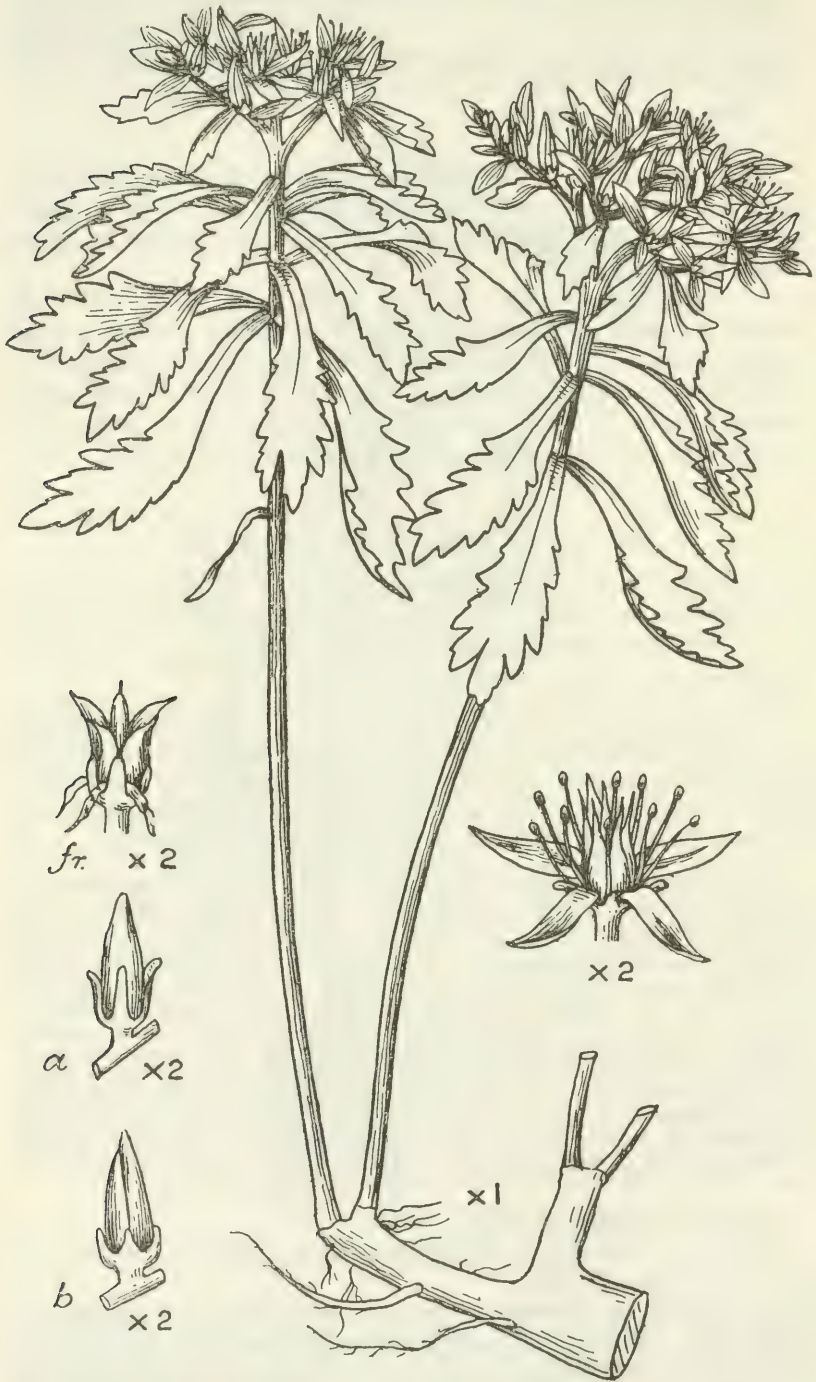


FIG. 25.—*S. trifidum* Wallich.

The leaves indeed vary greatly, as shown by fig. 26. The flowers are usually purplish red, but two consignments of collected plants received from Darjeeling had white flowers. The sepals are especially variable; in some cases they are even as long as the petals; at the other end of the series they are only one-fifth as long (fig. 25, *b*).

When MASTERS wrote his paper in 1878 he had seen only a single



FIG. 26.—Leaves of *S. trifidum*. × 1.

plant of this species—in the frames at Kew—and it is still rather rare in cultivation.

Closely allied forms not uncommon in Yunnan (and of which I have distributed plants raised from seed sent by Rev. E. E. MAIRE) are referred by HAMET* to varieties of *S. linearifolium* Royle. While they appear to me to be better placed under *trifidum*, I await further information.

18. *Sedum Semenovii* Masters (fig. 27).

S. Semenovii Masters, in *Gard. Chron.*, 1878 ii., 267.

SYNONYM.—*Umbilicus Semenovii* Regel and Herder in *Bull. Soc. Nat. Moscou*, 39, ii. 65, 1866.

A racemose inflorescence is very rare in the genus *Sedum*, and the bottle-brush-shaped mass of whitish flowers borne by the present species gives it an unusual and distinct appearance. It most resembles the American *S. rhodanthum* (which name I found attached to it in one of the leading Botanic Gardens), but the latter has broader, usually toothed leaves and rose-coloured flowers.

DESCRIPTION.—A glabrous herbaceous perennial. *Rootstock* thick, branched, deeply scarred at bases of old stems. *Stems* annual, erect, unbranched, 1-2 feet high, round, smooth, leafy throughout, several from the summit of the

* *Notes R. Bot. Gard. Edinb.*, 5, 119; 7, 399; 8, 142.



FIG. 27.—*S. Semenovii* Masters.

rootstock; barren stems none. *Leaves* crowded, 1-2 inches long, green, linear, entire, flat, and channelled above, rounded below, sessile, blunt, $\frac{1}{10}$ inch or more broad. *Inflorescence* dense, racemose, 1-3 inches long by about $\frac{3}{4}$ inch across. *Buds* ovate-oblong, blunt. *Flowers* greenish-white, $\frac{3}{8}$ inch long, lower shortly pedicelled, upper sessile. *Sepals* greenish, linear, acute, widening at the base, much exceeding the tube. *Petals* greenish-white, lanceolate, blunt, keeled, spreading but not widely, $1\frac{1}{2}$ times the sepals. *Stamens* erect, equalling the petals, filaments white, anthers reddish. *Scales* small, quadrate. *Carpels* erect, slender, greenish-white, at first equalling the petals; large and often flushed red in fruit.

Flowers June-July. Hardy.

HABITAT.—Turkestan.

Rather rare in cultivation. I have it from Berlin, Kew, Edinburgh, and from several private collections; and Mr. G. REUTHE offers the true plant. Its name commemorates P. SEMENOW, Central Asian traveller.

19. *Sedum rhodanthum* A. Gray (fig. 28).

S. rhodanthum A. Gray in *Amer. Journ. Science*, Ser. 2, 33, 405, 1862. S. Watson, "Bot. of Nevada, Utah and Colorado," 101, 1871. Masters in *Gard. Chron.*, 1878, ii. 267.

SYNONYM.—*Clementsia rhodantha* Rose in *Bulletin New York Bot. Gar.*, 3, 3, 1903. "N. Amer. Flora," 22, 29.

A species remarkable on account of its abnormal inflorescence, which forms a dense raceme, very unusual in the genus. The only *Sedum* which resembles it is *S. Semenovii* from Turkestan, in which, however, the flowers are greenish-white and the leaves linear and entire, while in *rhodanthum* the flowers are normally rose-coloured, and the leaves are narrowly oblanceolate, and usually toothed near the apex. Other differences will be seen from a comparison of figs. 27 and 28.

DESCRIPTION.—An erect glabrous herbaceous perennial. *Rootstock* thick, somewhat branched, resembling that of *S. roseum*, except that the withered straw-like bases of the old stems are persistent. *Stems* usually several from the summit of the rootstock, erect, smooth, round, unbranched, very leafy, about a foot high. *Leaves* alternate, sessile, linear-oblanceolate, acute, flat, rather fleshy, green, ascending, entire or obscurely toothed near the apex, 1 inch long by $\frac{1}{4}$ inch wide, smaller below, bearing a median furrow on the face. *Inflorescence* a dense raceme 1-3 inches long by about an inch across. *Buds* lanceolate with spreading sepals. *Flowers* short-stalked, $\frac{1}{2}$ inch long. *Sepals* green or flushed red, erect, long, tapering, acute. *Petals* erect, slightly exceeding the sepals, lanceolate, acute, longitudinally folded, rose-coloured. *Stamens* erect, equalling the sepals, the epipetalous ones inserted half-way up, filaments green, anthers red. *Scales* short, yellow, roundish, spreading. *Carpels* pink, erect, equalling the stamens, erect in fruit; styles short.

Flowers June. Hardy.

HABITAT.—Meadows and streamsides in Rocky Mountains, Arizona to Montana.

Rare in cultivation. In gardens I have seen it only at Kew, and from the nursery of Messrs. WARE at Feltham; and a good gathering of the plant came to me from Boulder, Colorado, under the name *Rhodiola integrifolia*. The name *rhodanthum* is descriptive of its red flowers (which, according to American botanists, vary into white).



*



FIG. 28.
S. rhodanthum A. Gray.

Series III. PRIMULOIDES.

Group I. LONGICAULES.

20. *Sedum primuloides* Franchet (fig. 29).

S. primuloides Franchet in *Journ. de Bot.*, 1896, 287. Praeger in *Trans. Bot. Soc. Edinb.*, 27, 107.

ILLUSTRATION.—Praeger, *loc. cit.*, Plate 3.

A very distinct species, forming a little nearly deciduous bush a few inches high with many branches, each with a close, flat, rosette of leaves, and white egg-shaped flowers which are produced rather sparingly on short leafy branches. It cannot be confounded with any other species in cultivation.

DESCRIPTION.—A small sub-deciduous glabrous sub-shrub. *Stems* spreading, much branched, forming a little bush a few inches high, branches short, stout, shaggy below with withered leaves. *Leaves* green, fleshy, flat, entire, paler below, forming dense flattish rosettes at the ends of the branches, $\frac{3}{8}$ inch long, $\frac{1}{4}$ inch or less broad, stalked, obovate, rather acute, petiole flat, often equalling or exceeding the lamina, widened to a broad clasping base, which is stained with red. *Flower-shoots* arising from the axils of the withered leaves of the previous season, ascending, about 2 inches long, slender, with scattered leaves resembling those of the rosettes, but distant and not clasping. *Inflorescence* terminal, of 1 to 3 flowers. *Flowers* sessile or sub-sessile, ovoid, $\frac{3}{8}$ inch long. *Calyx* cup-shaped, sepals divided nearly to the base, green, fleshy, rather acute, margins membranous. *Petals* white, tinged green on back, erect, incurved so that the tips are contiguous, ovate, apiculate, edges fimbriate in upper part. *Stamens* nearly equalling the petals, erect, the epipetalous ones inserted $\frac{1}{4}$ way up. *Scales* yellow, truncate, broader than long. *Carpels* large, green, erect, nearly equalling the petals, styles short.

Flowers August. Hardy.

HABITAT.—Yunnan.

A very curious *Sedum*, which when described stood far apart from any other species; but the China-Tibet region has since yielded several others more or less akin to it, most of them still known only from the original dried specimens. The present species was re-collected by Mr. GEORGE FORREST, and distributed by Messrs. Bees, Ltd., in 1912. I have endeavoured to show that it and *S. Praegerianum* are primitive forms of *Rhodiola*, in which the scales which crown the rootstock retain their original leaf-form. In its alpine habitats the plant is usually very dwarf (fig. 29, *a*), but in cultivation its stems lengthen and branch (*b*).

Group 2. BREVICAULES.

21. *Sedum Praegerianum* W. W. Smith (figs. 30, 31).

S. Praegerianum W. W. Smith in *Notes R. Bot. Gard. Edinburgh*, 8, 348, 1915. Praeger in *Trans. Bot. Soc. Edinb.*, 27, 107.

ILLUSTRATION.—Praeger, *tom. cit.*, Pl. II.

A remarkable plant, unlike any other species in cultivation. The flat rosette of stalked lanceolate leaves, and prostrate flower-



FIG. 29.—*S. primuloides* Franchet.



FIG. 30.—*S. Praegerianum* W. W. Smith.

stems radiating like the arms of a star-fish and bearing rosy ovate flowers are quite peculiar.

DESCRIPTION.—A glabrous herbaceous perennial. *Rootstock* thick, very short, erect, branching downward into thick woody roots a few inches long. *Root-leaves* forming a flat rosette about 4 inches across, entire, green, fleshy, flat, petiolate, the petiole rather longer or shorter than the lanceolate lamina, with a broad clasping base. *Flower-stems* arising from the axils of the withered root-leaves of the previous season, and appearing before the rosette of new leaves, slender, smooth, red, leafy, decumbent, unbranched, 4–6 inches long. *Stem-leaves* green, tipped red, flat, fleshy, glabrous, entire, sessile, linear-oblong,



FIG. 31.—*S. Praegerianum*, viewed from above. $\times \frac{1}{4}$.

rather blunt, $\frac{3}{8}$ inch long, reflexed. *Inflorescence* a terminal, leafy, lax cyme, bearing 5 to 10 flowers in all, composed of 2 to 3 forked or simple branches, with a flower in the primary or secondary forks, bracts leaf-like. *Buds* ovate, acute. *Flowers* ovoid, resembling those of heather, $\frac{3}{16}$ inch long, the lower ones shortly stalked. *Sepals* erect, ovate-lanceolate, acute, divided nearly to the base, green flushed red. *Petals* erect, curved so as to almost meet at the apices, lanceolate, shortly apiculate, rose-coloured, twice the sepals. *Stamens* equalling the petals, erect, filaments pink, anthers purple, the epipetalous ones inserted $\frac{1}{3}$ way up. *Scales* subquadrate, purple-brown. *Carpels* slightly shorter than the stamens, pink, very erect; styles very short, slender, erect, deep rose.

Flowers July. Hardy.

HABITAT.—Tibet.

A single plant was raised at Edinburgh in 1913 from a pinch of seed taken from a dried specimen just received into the Herbarium. The specimen in question was obtained by a native collector at Tarkarpo in the Chumbi Valley, Tibet, at 12,000 feet elevation.

The stemless rosette of leaves and radiating decumbent flower-stems give the plant an appearance very different from that of any other *Sedum* in cultivation. Its nearest relations are Tibetan and Central Asiatic species not in cultivation. Among garden plants the species which is nearest to it is *S. primuloides*, which agrees in possessing terminal rosettes of stalked, entire flat leaves, from the axils of which arise leafy flowering shoots bearing ovate flowers; but in *primuloides* the caudex is (in cultivation) elongated and much branched, the leaves very short and broad, and the flowers white.

SECTION II.—PSEUDORHODIOLA.

Section PSEUDORHODIOLA Diels in *Engler's Bot. Jahrb.*, 29, 360, 1901.

Perennial. Flowers diœcious, 4-parted, and otherwise as frequent in Rhodiola. Habit, vegetative parts and carpels as in the following section, Telephium. Hardy Chinese plants.

Founded recently by DIELS for the reception of a few interesting plants intermediate between the preceding and succeeding sections. Four species have been described—*yunnanense*, *Henryi*, *valerianoides*, and *sinicum*; R. HAMET reduces the second and third to varieties of the first, and adds a third variety, *Forresti*. The only form in cultivation is *yunnanense* Franchet var. *valerianoides* Hamet.

22. *Sedum yunnanense* Franch. var. *valerianoides*
Hamet (figs. 32-34).

S. yunnanense Franchet, *Journ. de Bot.*, 1896, 286, var. *valerianoides*
Hamet in *Notes Roy. Bot. Gard. Edinb.*, 5, 117.

SYNONYM.—*S. valerianoides* Diels, in *Engler's Bot. Jahrb.*, 29, 360, 1900.

S. yunnanense is a polymorphic species, with several varieties differing considerably in shape of leaf and inflorescence, &c. Var. *valerianoides* appears to be the only one in cultivation. It displays excellently the combination of the characters of the sections Telephium and Rhodiola, which form the feature of section Pseudorhodiola. It has the tall stem with broad ternate leaves of some of the Eastern Telephium species, and the small diœcious 4-parted flowers of Rhodiola. Though interesting botanically, the plant has no horticultural value, the flowers being very small and green.

DESCRIPTION.—A tall, glabrous herbaceous perennial. *Rhizome* thick, knotted, apparently not aerial. *Stems* solitary or a few together, 1-3 feet high, erect, smooth, round, unbranched, green or red, comparatively slender. *Leaves* ternate (occasionally in whorls of 4, opposite or alternate), sessile, flat, green, not very fleshy, ovate, acute, more or less serrate, slightly clasping, about 1½ inch long by ¾ inch broad. *Inflorescence* thyrsoïd, 2-6 inches long by 1-3 inches broad, branches mostly in threes, many times divided. MALE FLOWERS very numerous, very small, usually yellowish green, 4-parted; *buds* obovate, as broad as long; *sepals* lanceolate, blunt, separate nearly to the base; *petals* spatulate, boat-shaped, sharply deflexed, twice the sepals; *stamens* shorter than the petals, spreading, anthers buff or reddish; *scales* bright yellow; *carpels* green, very small. FEMALE FLOWER:—4-partite; *sepals* and *petals* similar, linear or subulate, green or purplish, blunt; *stamens* absent; *scales* bright yellow or red; *carpels* diverging, twice the sepals and petals, green or purplish, stigmas yellowish. HERMAPHRODITE FLOWER:—4-partite; *sepals* lanceolate, blunt, green, twice those of the male, divided nearly to the base; *petals* as in male, but twice as large and edged purple; *stamens* twice as large as in male, filaments dark purple, anthers reddish; *carpels* as in female, but ½ longer; parts often in fives, usually in fours.

Flowers July.

HABITAT.—Yunnan, evidently common.

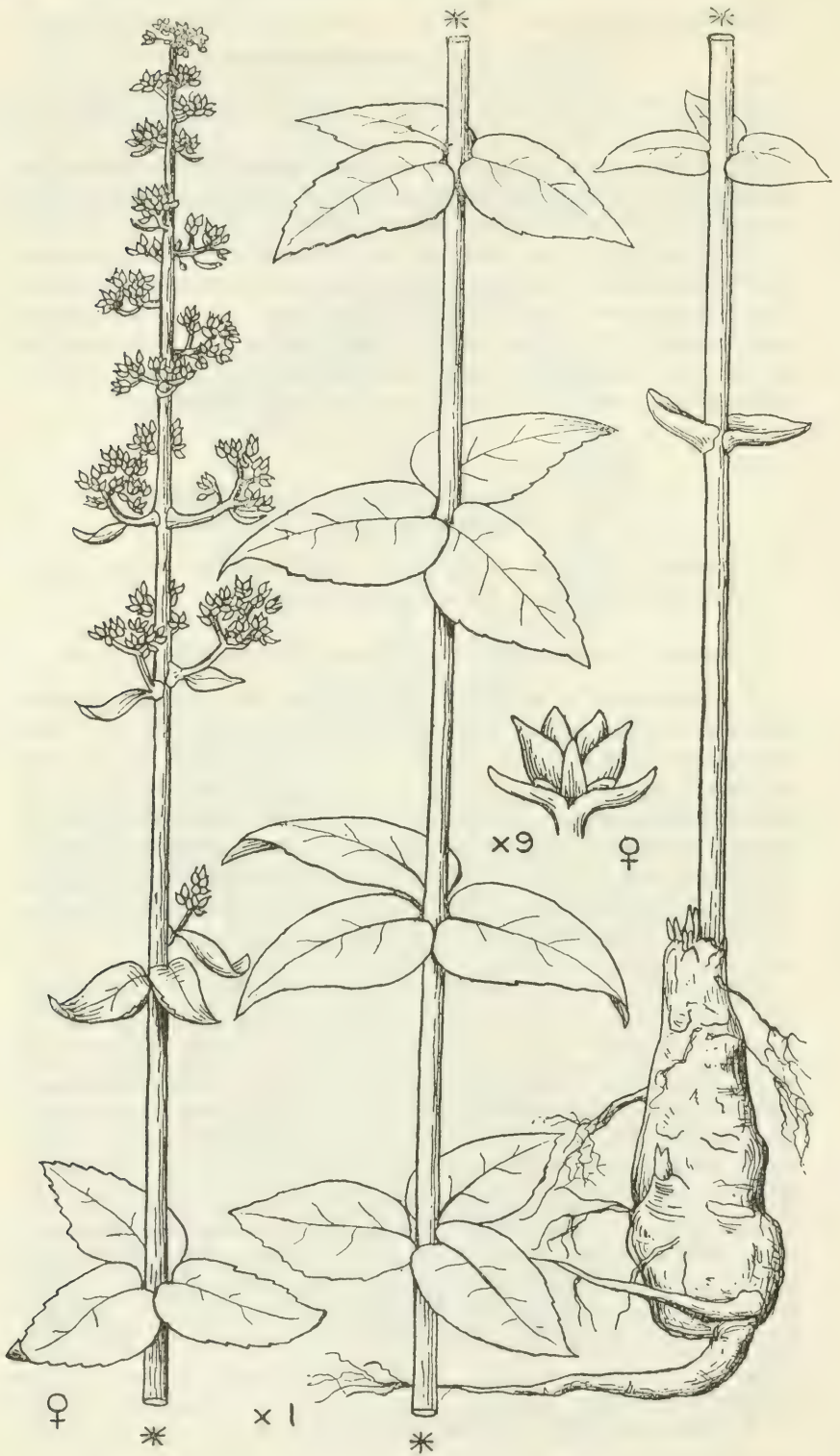


FIG. 32.—*S. yunnanense* Franch. var. *valerianoides* Hamet. Female plant.



FIG. 33.—*S. yunnanense* Franch. var. *valerianoides* Hamet. Male inflorescence.



FIG. 34.—*S. rhodanense* Franch. var. *valerianoides* Hamet. Hermaphrodite plant.

Seen at Edinburgh, where, among a number of male and female plants, were three of an interesting and undescribed hermaphrodite form, with very large flowers (comparatively) and scattered reflexed leaves, of which I give a figure and description. It may deserve varietal rank, but in the absence of better knowledge of this variable species I hesitate to create a new name. Grown also from seeds received from Yunnan from Rev. E. E. MAIRE, both male and female plants.

As in the many *Rhodiolas*, the colour of the parts of the flower is variable (see also *Notes Roy. Bot. Gard., Edinb.*, 8, 139), and the leaves vary from green to reddish.

SECTION III.—TELEPHIUM.

Section TELEPHIUM S. F. Gray, "Nat. Arrang. Brit. Plants," 2, p. 539, 1821.

Perennial. Rootstock short, with roots (fig. 35) usually thick,



FIG. 35.—Roots of *S. Telephium*.

branched, often of carrot-like tubers, summit without scales. Stems mostly annual, produced from buds arising generally in autumn from points beside or above the base of the stems of the previous year. Leaves usually broad. Flowers hermaphrodite, 5-parted, white, red, purple, or green. Hardy plants, mostly Eurasian.

A group of about twenty-five perennials, often tall. The well-known Orpine, *S. Telephium*, is typical. They range across the temperate regions of the Old World from England to Japan, being

more abundant in the East. One species, *S. telephioides* (perhaps only a variety of *S. Telephium*), is confined to N. America. At least half of the group is in cultivation, including representatives of all the types found within the section ; many of them are familiar garden plants.

Series I. ERECTICAULES.

Stems tall (1-2 feet), stout, erect, leaves large (2-4 inches long).

Group 1. EU-TELEPHIA.

Leaves alternate or opposite, rarely ternate.

<i>maximum</i> Suter.	<i>alboroseum</i> Baker.
<i>Telephium</i> Linn.	<i>pseudospectabile</i> Praeger.
<i>Taquetii</i> Praeger.	<i>spectabile</i> Boreau.

The first two of these are familiar European plants ; the rest come from the Far East, where several additional species not in cultivation also occur.

Group 2. VERTICILLATA.

Leaves 4- or 5-verticillate.

verticillatum Linn.

This is a small Chino-Japanese group, only one of which is in cultivation.

Series II. HUMILICAULES.

Stems short (about $\frac{1}{2}$ foot), weak, nor erect, leaves smaller (1 inch long or less).

Group 1. ARCUATAE.

Stems annual, arching or at least erect at the base.

<i>Ewersii</i> Ledebour.	<i>Sieboldii</i> Sweet.
<i>caucolicum</i> Praeger.	<i>Tatarinowii</i> Maximowicz.

Group 2. REPENTES.

Stems perennial, creeping.

<i>Anacamperos</i> Linn.	<i>cyaneum</i> Rudolph.
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I have adopted a grouping founded on the larger features of the plants, because the flowers in the *Telephium* group have a somewhat close resemblance, and moreover a classification founded upon them brings together plants of very different growth-form and separates others, which in all but flower have clear affinities.

Fig. 36 shows the gynœcia and leaves of the *Eu-Telephium* series in the order of relationship indicated by the flowers ; it will be evident

that the leaf affinities are quite different from the flower affinities. The only two nearly related species in the whole section which display

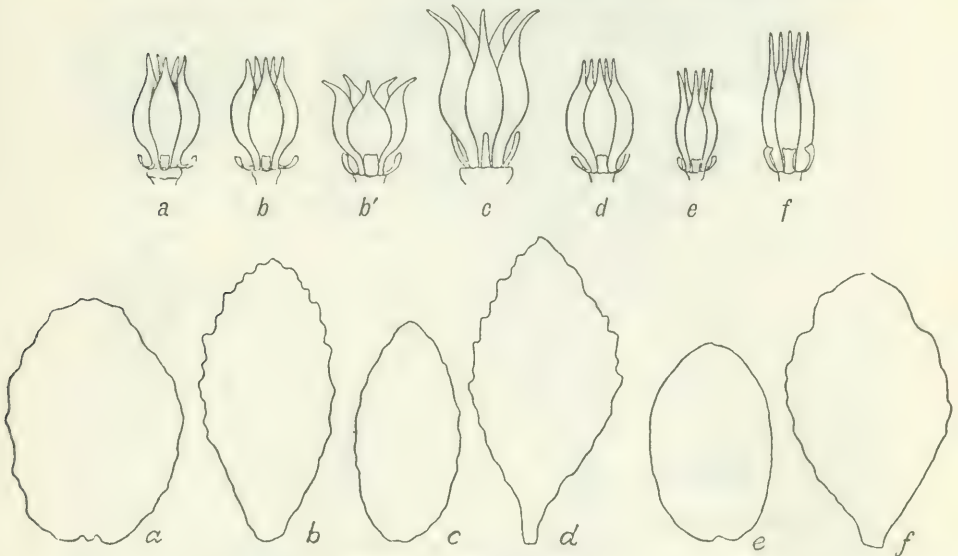


FIG. 36.—Gynœcium and leaf of species of *Telephium* section. *a*, *maximum*; *b*, *purpureum*; *b'*, *purpureum* ♀; *c*, *Taquetii*; *d*, *alboroseum*; *e*, *pseudospectabile*; *f*, *spectabile*. Gynœcia $\times 3$. Leaves $\times \frac{1}{2}$.

their affinity throughout the various parts of the plant are *S. Sieboldii* and *S. caucolicolum*.

Series I. ERECTICAULES.

Group I. EU-TELEPHIA.

23. *Sedum maximum* Suter (figs. 36, 37).

S. maximum Suter, "Flora Helvetica," 1, 270, 1802. Masters in *Gard. Chron.*, 1878, ii. 336.

SYNONYM.—*S. macrophyllum* of some gardens (a name also applied to *S. alboroseum*).

ILLUSTRATIONS.—Reichenbach, "Fl. German." 23, tab. 45. Plenck, "Icones Plant. Medicinalium," tab. 350. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 4. Zenker, "Flor. Thuringen," 5, tab. 570 (as *S. Telephium*), 12, tab. 1353.

A variable species, but without question many of its so-called varieties are due to crossing with *S. Telephium*. The plant, when typical, is known at once from *S. Telephium*, to which it is closely allied, by its greenish flowers and very broad, slightly toothed dark-green opposite leaves. Variation in the large series of garden forms which I have examined is mostly in the direction of *S. Telephium*. In my garden I grew for some years the *purpureum* form of *S. Telephium*, which seeded freely and kept constant. Later I introduced typical *S. maximum*, collected by the Baltic, near Danzig, where it also showed



FIG. 37.—*S. maximum* Suter.

no variation. Since then I have had self-sown seedlings showing every combination of the characters of the two species as regards colour of flower, size, shape and arrangement of leaf. Many of these match described varieties fairly well, so that, for horticultural purposes, it seems futile to devote space to many of the latter. Descriptions of a large number of these segregates will be found in Boreau's paper, "Monographie de quelques Sédum" in "Mémoires de la Société Académique d'Angers," 20, 1866. A good account of the forms found in France, to the number of 19, is given in Rouy and Camus, "Flore de France," 7, p. 96. Very fine coloured illustrations of many of the forms of this and other of the equally variable *S. Telephium* are published in Jordan and Fourreau, "Icones ad Floram Europæ," 1, 1866-68, as species of a segregate genus *Anacampseros*.

I have had in cultivation a large series of *maximum* forms and hybrids, received under many names from many sources, and have not succeeded in satisfying myself how far variation in character, such as alternate instead of opposite leaves, or reddish pigment in the flower is inherent in *S. maximum* or due to *Telephium* influence. As regards variation in undoubtedly pure *maximum*, its most striking manifestation is in the development of brownish-purple pigment in the leaves and stems, and the substitution of ternate for opposite leaves. These find their most marked expression in the noble var. *atropurpureum*, referred to below.

DESCRIPTION.—A large glabrous herbaceous perennial. *Rootstock* thickened. *Roots* a bunch of carrot-like tubers. *Stems* 1-3 feet, erect, smooth, round, green or red, unbranched, or branched near summit, annual. *Leaves* usually dark green, sessile, clasping, usually opposite, often ternate, sometimes alternate (different stems of the same plant often showing all three of these variations), broadly ovate, blunt, slightly and irregularly toothed, 2-3 inches long by half to two-thirds as broad. *Inflorescence* composed of terminal and also lateral dense corymbs; stems of lower corymbs long; ultimate pedicels slender, longer than the flowers. *Flowers* 5-parted, crowded, greenish-white, $\frac{3}{8}$ inch across. *Buds* ovoid, ribbed, blunt. *Sepals* green, fleshy, lanceolate to deltoid, acute, $\frac{1}{2}$ to $\frac{1}{3}$ as long as the petals, tube short. *Petals* ovate-lanceolate, rather acute, greenish-white. *Stamens* slightly exceeding the petals, filaments white, anthers yellow. *Scales* yellow, linear, notched, twice as long as broad. *Carpels* stout, erect, greenish, non-contiguous on inner face, equalling the petals.

Flowers August-September. Hardy.

HABITAT.—Widespread in Europe; Caucasus.

var. *atropurpureum* hort.

Leaves and stems deep purple. This definition covers a number of forms, varying in size, habit, and pigmentation. The most striking of them is an extremely vigorous plant, three feet or more in height, leaves usually ternate and up to 5 inches long by 3 inches broad, stem and leaves dark purple, flowers pink. It is not uncommon in gardens. A smaller form is figured by Masters ("Hardy Sedums," *l.c.*).

f. *versicolor* Van Houtte.

(*S. Rodigasi* of gardens.) A handsome variegated form, with silver-splashed leaves and pink stems, well illustrated in "Flore

des Serres," tab. 1669. Stated to be rather tender, I have not met with it in cultivation, but it is no doubt still grown.

This species is frequent in gardens, though often of doubtfully pure parentage. The name refers to its size; in some of its forms it is the largest of European Sedums.

24. *Sedum Telephium* Linn.

S. Telephium Linn. Species Plantarum 430, 1753. Masters in *Gard. Chron.*, 1878, ii. 303.

This common species, which ranges right round the northern Hemisphere—for the American *S. telephioides* does not appear to be specifically distinct—is easily known by its stout, erect, leafy stems, and dense corymbs of red-purple flowers. Its nearest allies are *S. maximum* and *S. alboroseum*, but the former has (when typical) opposite leaves and green flowers, and the latter greenish-white petals and rosy carpels. *S. spectabile* differs in its pink flowers with very long stamens. All have the characteristic *Telephium* rootstock—a bunch of carrot-shaped tubers.

LINNAEUS' name is derived from TELEPHUS, son of HERCULES.

Sub-species *S. purpureum* Link (figs. 36b, 38).

S. purpureum Link, "Enum. Plant. Berol.," 1, 437, 1821.

ILLUSTRATIONS.—Sowerby, "Engl. Bot.," ed. 3, pl. 526. Reichenbach, "Flor. German.," 23, tab. 44. Curtis, "Flor. Londin.," 2, pl. 71. De Candolle, "Plantes Grasses," tab. 92. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 6.

DESCRIPTION.—A stout glabrous herbaceous perennial. *Rootstock* thick, with carrot-like tubers. *Stems* clustered, stout, erect, round, smooth, leafy, 1-1½ foot high, mostly with axillary branches above. *Leaves* numerous, alternate, glabrous, fleshy, ascending, about 3 inches long by 1½ inch broad, smaller above, blunt, irregularly toothed in upper two-thirds, lower ones obovate-oblong wedge-shaped below, upper ones oval-oblong rounded below, all sessile. *Inflorescence* of dense terminal and lateral subglobose stalked corymbs. *Flowers* purplish red, $\frac{5}{16}$ to $\frac{7}{16}$ inch across, about as long as the pedicels. *Buds* streaked purple, with green ribs. *Sepals* green, fleshy, lanceolate, acute, separate nearly to the base. *Petals* wide-spreading, lanceolate, acute, thrice the sepals. *Stamens* spreading, nearly equalling the petals. *Scales* yellow, strap-shaped, twice as long as broad, emarginate. *Carpels* erect, purple, shorter than the stamens, furrowed on the back; styles very short.

Flowers August–September. Hardy.

HABITAT.—From England to Japan.

Sub-species *S. Fabaria* Koch (fig. 39).

S. Fabaria Koch, "Synopsis Flor. German.," ed. 1. 258, 1837.

ILLUSTRATIONS.—Sowerby, "Engl. Bot.," ed. 3, pl. 527. Reichenbach, "Flor. German.," 23, tab. 47. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 7.

DESCRIPTION.—Very like *S. purpureum*, but is a smaller and slenderer plant; leaves deeper green, narrower, and thinner, all wedge-shaped below (instead of



FIG. 38.—*S. purpureum* Link.



FIG. 39.—*S. Façaria* Koch.

upper ones rounded below), shortly and indistinctly stalked (instead of sessile) ; ovaries not furrowed on back.

Flowers August–September. Hardy.

HABITAT.—Britain to Central Europe.

When characteristic, *S. purpureum* and *S. Fabaria* are easily distinguished, but there are many plants which one hesitates to refer to one form or to the other—whether this is due to crossing or not I cannot offer an opinion. The “wild” British plants which I have grown have all been *Fabaria*, but I do not attempt to go into the question of the distribution in the British Isles of the two forms. The confusion which seems fated to hang over the Sedums is here especially marked, as, for instance, when one receives from one of the ablest of English field botanists roots of the Japanese *S. alboroseum* as a native *Telephium* form from woods in Sussex !

As in the case of its near ally *S. maximum*, a large number of varieties of *S. Telephium* have been described, particularly by French botanists, and a good account of these will be found in Rouy and Camus, “Flore de France,” vol. vii. For reasons stated in the Introduction to the present paper (p. 15) and under *S. maximum* on p. 81, no attempt is made here to enter into a discussion of these. The reader seeking information regarding them should consult Boreau, “Monographie de quelques Sédum,” *Mém. Soc. Acad. d'Angers*, vol. xx. 1866 ; Masters in *Gard. Chron.*, 1878, ii. ; Rouy and Camus, “Flore de France,” vol. vii. 1901 ; and the beautiful coloured plates in Jordan and Fourreau, “Icones ad Floram Europae,” vol. i. 1866–8. It may be said that they belong almost altogether to *S. purpureum*, not to *S. Fabaria*. Among the garden forms variation is very noticeable in the height and colour of stem ; in the arrangement, size, shape, dentition, and colour of leaves ; and in the size, shape, and colour of inflorescence and flower. *S. Telephium* seems to vary much more in directions other than towards *maximum*, than *S. maximum* does, except towards *Telephium*. Nevertheless, the presence of many intermediates is discouraging in the search for satisfactory varieties. In the case of *Telephium*, confusion is very probably produced in gardens by the natural crossing of varieties, as the species tends to produce itself from seed more freely than the majority of Sedums.

Var. *Borderi* Rouy and Camus.

Of the forms of *S. Telephium* found in gardens which I have succeeded in identifying with described varieties, the one which appears most satisfactory, as maintaining a distinct and uniform facies, is *S. purpureum* var. γ *Borderi* Rouy and Camus, “Flore de France,” 7, 103–4 (*Anacampteros Borderi* Jordan and Fourreau, “Brev. Plant. Nov.,” fasc. i. 30, and “Icones Plant. Eur.,” t. 96), which has leaves deeply and irregularly toothed and distinctly stalked (fig. 38, a). This was received from several garden sources, mostly named var. *carpathicum* (*S. carpathicum* Reuss), which is somewhat similar.

f. *roseo-variegatum*.

SYNONYM.—Var. *bittoniense* hort.

Variegated forms are so rare in *Sedum* that mention may be made of an interesting form which originated in the garden of the late Canon Ellacombe. In this the young stems and leaves are of a bright pink colour, but on approaching maturity they turn green. It is now in several gardens.

A curious unisexual (female) form of *purpureum* is at Glasnevin, derived from a garden source. In this (see fig. 36b') the sepals are normal; the petals small, only $1\frac{1}{2}$ times as long as the sepals, ovate-oblong, very concave, very blunt, whitish flecked with rose on back, almost erect; carpels $1\frac{1}{2}$ to 2 times the petals, not contiguous on the inner face, but having a central space in many cases as large as a carpel; very irregular as regards position, and varying in number from 3 to 6, deep rose-coloured above; styles very short, spreading widely (instead of erect or slightly spreading as in the type). Occasionally a single filament without an anther is present. The cause of the irregularity of position of the carpels and of the central hollow is their abnormal width: they are 2 mm. across (instead of $1\frac{1}{2}$ mm.) and are remarkably flat on both inner and outer faces.

25. *Sedum Taquetii* Praeger (figs. 36c, 40).

S. Taquetii Praeger in *Journ. of Bot.*, 56, 151, 1818.

Allied to *S. Telephium*, *S. maximum*, *S. pseudospectabile*, and *S. alboroseum*, from all of which it is separable by its larger green and purple flowers, and especially by its remarkably large carpels with divergent tips. It comes nearest to *maximum* and *alboroseum*, resembling the former (not the latter) in having its leaves opposite and sessile, and the latter in having red pigment in the carpels, but not in the petals. Its habit is that of *alboroseum*, but it lacks the pale-green colour of that species, the leaves being of a deep-green shade, as in *Telephium*, but of the shape of those of *pseudospectabile*.

DESCRIPTION.—A glabrous herbaceous perennial. *Rootstock* fleshy, with spindle-shaped tuberous roots as in *S. Telephium*. *Stems* annual, erect, 1–1½ foot high, moderately stout, smooth, round, thickened below the nodes, mostly with some ascending axillary branches in the upper third. *Leaves* opposite, equalling or longer than the internodes, sessile, elliptic, rounded at apex and base, slightly and bluntly toothed, fleshy, dark green more or less dotted with purple, about 2½ inches long by 1¼ inch broad, edges upturned in lower half so that the leaf appears to clasp the stem. *Inflorescence* of terminal and lateral rather dense rounded corymbs, 1–2 inches across, the lateral ones falling short of the terminal. *Buds* elliptic, blunt, green, $\frac{1}{4}$ – $\frac{3}{8}$ inch long, on pedicels of the same length. *Flowers* up to $\frac{3}{8}$ inch across, $\frac{3}{8}$ inch long, rather irregular in size. *Sepals* dark green, lanceolate or deltoid, blunt, fleshy, twice as long as the tube. *Petals* four times the sepals, up to $\frac{3}{8}$ inch long, linear-oblanccolate, rather blunt, pale green, whitish near the base, wide-spreading. *Stamens* equalling the petals, the epipetalous ones adnate in the lower third, filaments whitish, anthers ovate, pale red. *Scales* strap-shaped, straight, four times as long as broad, emarginate, whitish, yellow at the apex. *Carpels* long, slender, erect with spreading tips, tapered below, merging into short styles above, equalling or slightly exceeding the petals, green streaked with purple, purple on the upper part of the inner face.



FIG. 40—*S. Taquetii* Praeger.

Flowers August–September. Hardy.

HABITAT.—Korea.

For the opportunity of studying this plant I am indebted to the Director of the Botanic Gardens at Upsala, who kindly sent his only plant and allowed me to grow it for a couple of seasons. It was raised from seed collected by Abbé E. J. TAQUET in Korea and distributed by the Dendrologische Gesellschaft of Vienna.

The plant varies as regards the size of its flowers, which are, however, always larger than those of any of its allies; if grown in shade, the purple pigment is not developed, the flowers being then wholly green; but the long slender curved carpels will always identify it, fresh or dried.

Seedlings which I raised from this plant were evidently crosses with *S. Telephium*, as most of my *maximum* seedlings have been (see p. 8), and were intermediate in characters of both leaf and flower. A puzzling plant of unknown antecedents, received from Edinburgh as *S. alboroseum*, almost exactly matches these and appears to be of similar parentage, though where the *Taquetii* blood came from in that case is unknown.

Named after its collector.

26. *Sedum alboroseum* Baker (figs. 36*d*, 41).

S. alboroseum Baker in Saunders' "Refug. Bot.," tab. 33, 1868.

Maximowicz in *Bulletin Acad. Pétersbourg*, 29, 140, 1883.

SYNONYMS.—*S. erythrostickum* Masters in *Gard. Chron.*, 1878, ii. 337 (not of Miquel in *Ann. Mus. Bot. Lugd.-Bat.*, 2, 155, which appears to be a form of *S. Telephium*—see Maximowicz, *loc. cit.*).

S. japonicum of gardens (not of Siebold, see p. 254).

S. macrophyllum of gardens (a name also applied to *S. maximum*).

ILLUSTRATIONS.—Baker, *loc. cit.* Regel, "Gartenflora," tab. 709, figs. 4–5.

Not infrequent in gardens, mostly under the names of *japonicum* or *macrophyllum*, and reported by BAKER as in cultivation for many years before he described it in 1868. Leaves usually opposite, though BAKER says they are never so. The plant most resembles a large pale *Fabaria*, but the whitish petals and rosy carpels distinguish it. In bud the uppermost leaves (bracts) half enclose the inflorescence in a characteristic way, while in the *Telephium* forms these are spreading; indeed, all the leaves are more erect than in *Telephium*. Taller and slenderer than the wholly pink-flowered *S. spectabile*, of which the leaves are broader, more crowded and more spreading and the inflorescence larger and flatter. A very late flowerer (latter half of September). The name *alboroseum* is taken from the white and red flowers.

DESCRIPTION.—A tall glaucous herbaceous perennial. *Rootstock* thickened, with carrot-like tuberous roots. *Stems* annual, 1–2 feet high, smooth, round, unbranched, erect. *Leaves* rather distant, usually opposite (sometimes alternate or ternate), ascending, lower concave, upper smaller and very flat, ovate to obovate-cuneate, narrowed into a short petiole, pale glaucous green, bluntly toothed, 2–3 inches long by half as broad. *Inflorescence* dense, sparingly leafy, of terminal and often lateral corymbs. *Buds* ovoid, rather blunt, remaining



FIG. 41.—*S. alboroseum* Baker.

pale green until they open. *Flowers* $\frac{1}{2}$ inch across, equalling the pedicels. *Sepals* pale green, lanceolate, fleshy, acute, $\frac{1}{3}$ the petals, tube very short. *Petals* $\frac{1}{2}$ inch long, oblong-lanceolate, acute, wide-spreading, greenish white. *Stamens* spreading, equalling the petals, filaments white, anthers reddish, the epipetalous ones inserted $\frac{1}{2}$ way up the petal. *Scales* linear, twice as long as broad, retuse, greenish. *Carpels* erect, pink, equalling the petals, giving a pinkish colour to the flower; styles short.

Flowers September. Hardy.

HABITAT.—Japan, Manchuria, China.

f. *foliis medio-variegatis* Regel, "Gartenflora," tab. 709, fig. 6.

A form with a white blotch in the centre of the leaf, occasionally seen in gardens. Like many variegated plants it is best grown in shade. Inclines to revert to type, and stems with green leaves need to be pulled off.

f. *foliis margine-variegatis*.

Leaves with a border of greenish-white. I received this from Ottawa and from the Tully Nursery in Co. Kildare, and there is a specimen of it in the Kew Herbarium from "Hort. Justus Cordery, Oct. 14, 1904"; I find no published reference to it. It is a form of no great merit.

27. *Sedum pseudospectabile* Praeger (figs. 36e, 42).

S. pseudospectabile Praeger in *Journ. of Bot.*, 54, 40, 1917.

Closely allied to the well-known *S. spectabile* Boreau, from which it differs in its stems half as tall again, leaves green (not glaucous), rounded at the base (not cuneate), and about as long as the internodes (not twice as long), smaller inflorescence, and flowers with all the parts shorter by about one-third; it flowers nearly a month earlier.

DESCRIPTION.—An erect glabrous herbaceous perennial. *Roots* tuberous, carrot-like. *Stems* annual, few, erect, unbranched, smooth, round, green dotted red, 1-2 foot high. *Leaves* ternate or opposite (occasionally in fours), fleshy, sessile, clasping, entire or obscurely toothed, green with paler veins, lower broadly obovate, upper broadly ovate, $1\frac{1}{2}$ to 2 inches long by 1 to $1\frac{1}{4}$ broad, equalling the internodes, mostly concave, often margined and dotted with red. *Inflorescence* a terminal compact flat paniced cyme, about 2 inches long and broad, sparingly leafy. *Buds* oval, bluntly pointed. *Flowers* $\frac{5}{16}$ inch long, $\frac{1}{2}$ inch across, on pedicels shorter than the flowers. *Calyx* cup-shaped, rather glaucous green, segments ovate-lanceolate, acute, thrice the tube, tipped red. *Petals* twice the sepals, $\frac{3}{16}$ inch long, pink, ovate-lanceolate, acute, spreading but not patently. *Stamens* $1\frac{1}{2}$ times the petals, nearly erect, the epipetalous ones inserted near the base of the petals, filaments pink, anthers purple. *Scales* yellowish, curved upwards, quadrate-cuneate, $1\frac{1}{2}$ times as long as broad. *Carpels* erect, slender, pink, equalling the petals, styles slightly divergent.

Flowers August-September. Hardy.

HABITAT.—Chinwangtao, on the coast east of Peking (Prof. I. BAYLEY BALFOUR, 1910).

Received first from Edinburgh as above; when the plant flowered it proved to be identical with another received meanwhile from the University Botanic Garden at Sapporo under the name *S. spectabile*.

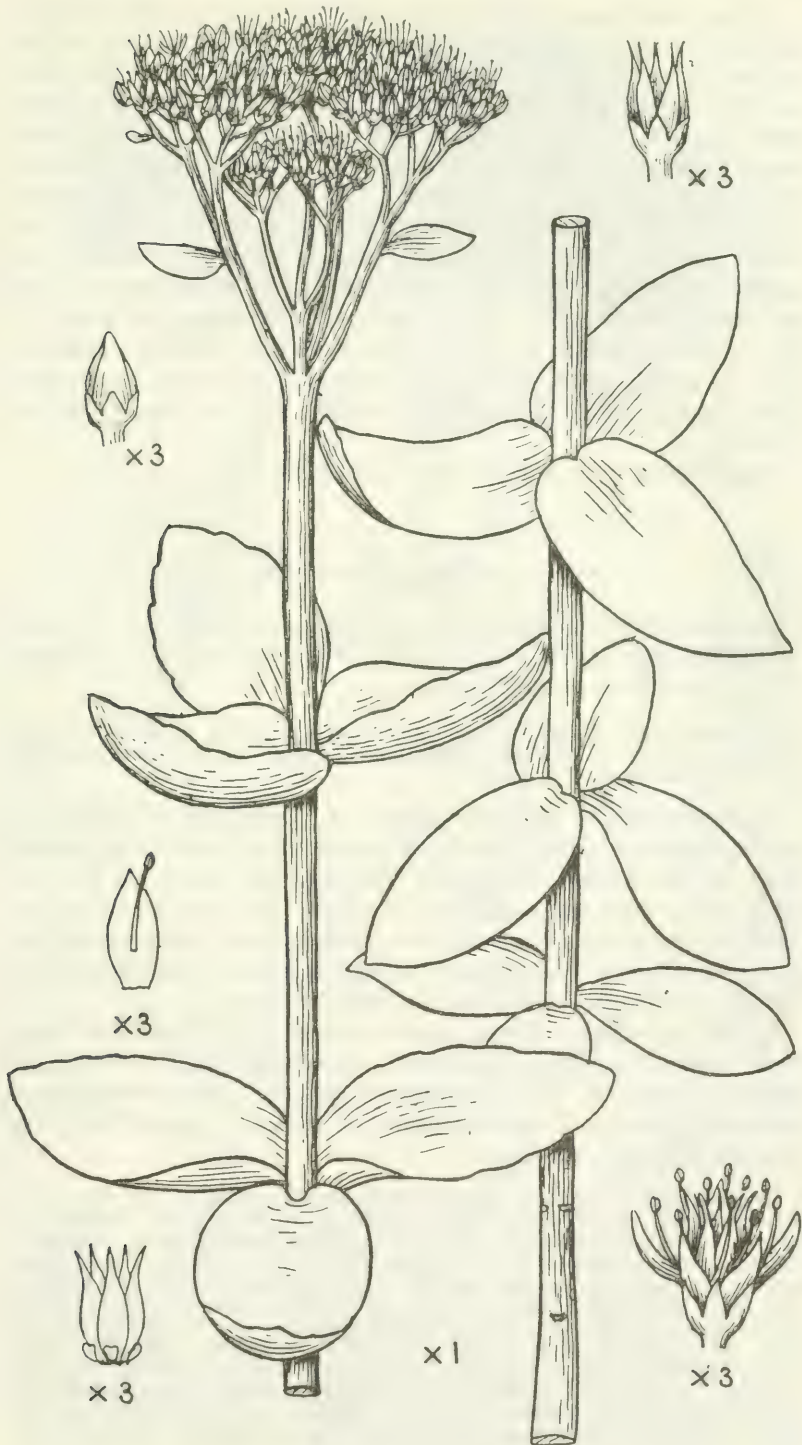


FIG. 42.—*S. pseudospectabile* Praeger.

In the early stages of growth this species recalls *S. maximum* rather than *S. spectabile*, on account of its green colour, comparatively narrow outline and sessile leaves, broad and rounded at the base; the shape and colour of the inflorescence recall *spectabile* strongly, and the flowers resemble those of *spectabile* with all the parts shortened. The different proportions of the plant give it an appearance different from *spectabile*: thus, the ratio of height to diameter of inflorescence is about 3 to 1 in *spectabile*, 6 to 1 in *pseudospectabile*; the ratio of height to width of the plant across the leaves is $2\frac{1}{2}$ to 1 in *spectabile*, 5 to 1 in the other. The length of the petals, stamens, and carpels is in *pseudospectabile* $\frac{2}{3}$ of that found in *spectabile*, while their breadth remains the same. In the *Telephium* group, the floral characters are often so similar in quite different species that the similarity of flower in the two species under consideration does not necessarily suggest merely varietal difference.

Named from its resemblance to *S. spectabile*.

28. *Sedum spectabile* Boreau (figs. 36f, 43).

S. spectabile Boreau in "Mém. Soc. Acad. Maine-et-Loire," 20, 116, 1866.

Maximowicz in *Bull. Acad. Pétersbourg*, 29, 140, 1883. Masters in *Gard. Chron.* 1878, ii. 336.

ILLUSTRATIONS.—Regel, "Gartenflora," tab. 709, figs. 1-3. Saunders, "Refug. Botan.," tab. 32. "Illustration Horticole," 8, tab. 271. Jordan and Fourreau, "Icones Plant. Europ.," 1, pl. 100.

One of the most noble of Sedums. Its very large flat panicles of pinkish flowers set among the pale glaucous foliage render it a valuable plant for the border in autumn. Common in cultivation it is not easily confounded with any other species. The very long stamens, exceeding the petals, alone will distinguish it if any doubt exists. As in several of the *Telephium* group, the arrangement of the leaves varies, but they are generally in opposite pairs or in threes.

Under the names of var. *atropurpureum*, var. "Brilliant," etc., forms with deeper-coloured flowers are offered for sale, which are generally regarded as improvements on the pink-flowered type. Like several of the *Telephium* group, it prefers a heavier soil than suits the majority of Sedums.

DESCRIPTION.—A robust glaucous herbaceous perennial, 1-1 $\frac{1}{2}$ feet high. Root of several carrot-shaped tubers. Stems erect, stout, leafy, unbranched, smooth, round. Leaves usually opposite or ternate, wide-spreading, subsessile, obovate, about 3 inches long by 2 inches broad (up to 5 by 3), fleshy, rather weakly and distantly toothed, slightly wedge-shaped below. Inflorescence a very large flat-topped dense corymb, 4-6 inches across, pedicels rather shorter than the flowers. Buds pointed, thrice as long as broad. Flowers pink, very numerous, $\frac{1}{2}$ inch across. Sepals whitish-green, lanceolate, $\frac{1}{2}$ the petals, separate nearly to the base. Petals pink, lanceolate, acute, semi-erect or patent, $\frac{1}{2}$ inch long. Stamens rather variable in length, those opposite the petals slightly exceeding them, those between the petals $\frac{1}{4}$ longer than the others; anthers purple. Scales whitish, cuneate, emarginate. Carpels erect, pink, slightly shorter than the petals, erect in fruit.



FIG. 43.—*S. spectabile* Boreau.

Flowers September–October. Hardy.

HABITAT.—Japan; Central China (DIELS); long cultivated in the latter country, but till lately not certainly known there in the wild state.

The name *spectabile* refers to its notable appearance.

Group 2. VERTICILLATA.

29. *Sedum verticillatum* Linn. (fig. 44).

S. verticillatum Linn. "Species Plant.," 430, 1753. Maximowicz in *Bulletin Acad. Pétersbourg*, 29, 139, 1883. Bongard in "Mém. Acad. Pétersbourg," ser. 6, 3, 85, 1835. Not *S. verticillatum* Hamet which = *Triactina verticillata* Hooker fil. and Thomson.

ILLUSTRATIONS.—Linnaeus, "Amoen. Academicae," ed. 2, 2, tab. 4, fig. 14. Bongard, *loc. cit.* tab. 7.

Easily recognized among the cultivated Sedums of the Telephium section by its comparatively narrow-stalked leaves in whorls of 4 or 5 and its green flowers.

DESCRIPTION.—A glabrous herbaceous perennial. *Rootstock* thick, with fleshy spindle-shaped roots. *Stems* annual, erect, smooth, green, round, simple or with a few axillary branches above, 1–2 feet high. *Leaves* whorled, the lower ones often opposite or ternate, the upper in whorls of 4 or 5, oblong-lanceolate, narrowed at both ends, stalked, obscurely and bluntly toothed, smooth, green, pale below, only slightly fleshy, minutely dotted purple, 2–3 inches long, $\frac{3}{4}$ –1 inch broad, petiole $\frac{1}{4}$ inch or more. *Inflorescence* corymbose, terminal, very dense, roundish on surface, sparingly leafy, 2–3 inches across, pedicels slender, equalling the flowers. *Buds* ovate, blunt. *Flowers* green, $\frac{1}{4}$ inch across. *Calyx* cup-shaped, green, fleshy, lobes deltoid-lanceolate, rather acute, tube very short. *Petals* pale green, wide-spreading, ovate-lanceolate, acute, 4 times the sepals. *Stamens* slightly exceeding the petals, the epipetalous ones adnate in the lower third and shorter than the others, filaments pale green, anthers buff or pale red. *Scales* nearly twice as long as broad, linear-cuneate, retuse, yellow. *Carpels* stout, green, erect, equalling the petals, styles short.

Flowers September. Hardy.

HABITAT.—Japan, Kamtschatka.

Several of the East Asiatic species of the Telephium section have leaves arranged in whorls of three to five, but the present is the only one which appears to be in cultivation. I owe my plants to the kindness of Professor MIYABE of Sapporo University Botanic Garden. My plants, when young or when the inflorescence does not develop fully, tend to produce in autumn numerous small axillary buds above, after the manner of the nearly allied *S. viviparum* Maxim.

Named from its whorled leaves.

Var. *nipponicum* Praeger in *Journ. of Bot.*, 56, 152, 1918.

S. alboroseum Baker, f., Maximowicz in *Bulletin Acad. St. Pétersbourg*, 29, 141, 1884.

A dwarf slender form of *S. verticillatum* with opposite leaves grown at Kew under the name *S. latifolium* (a synonym of *S. maximum* L.) is clearly the plant which MAXIMOWICZ alludes to (*loc. cit.*) under *S. alboroseum* and which he would have placed under *verticillatum* but for its



FIG. 44.—*S. verticillatum* Linn.

opposite leaves. A study of the growing plant shows that it is certainly a form of *verticillatum*, with which it agrees in all points save its smaller size and the arrangement of its leaves; the flowers, leaves, colour, and habit are those of *verticillatum*. Young and weak plants of *S. verticillatum* often have their leaves opposite, and in this dwarf form this immature character seems perpetuated. Doubtless a wild Japanese form, but so far known only from gardens in Japan and England.

Series II. HUMILICAULES.

Group I. ARCUATAE.

30. *Sedum Ewersii* Ledebour (fig. 45).

S. Ewersii Ledebour "Flora Altaica," 2, 191, 1830. Maximowicz in *Bull. Acad. Pétersbourg*, 29, 136. Masters in *Gard. Chron.*, 1878, ii. 591. Hooker fil. and Thomson in *Journ. Linn. Soc., Bot.*, 2, 102. Clarke in Hooker "Flor. Brit. India," 2, 421.

ILLUSTRATIONS.—Ledebour, "Icones Plant. Ross.," tab. 58. Regel, "Gartenflora," tab. 295. Wooster, "Alpine Plants," 1, pl. 30. *Trans. Russian Hort. Soc.*, 1860, tab. 21.

A well-known species, long in cultivation, distinguished among the purple-flowered Sedums by its semi-trailing habit and opposite pairs of entire clasping leaves. Unlike most of the *Telephium* section, the new stems arise, not from buds at the base of the old stem, but from the lower part of the stems themselves, so that eventually a much-branched, low twiggly mass is formed, which is bare in winter.

DESCRIPTION.—A glaucous herbaceous perennial, dying back in winter to a short spreading, much branched twiggly rootstock. *Stems* round, smooth, unbranched, the barren ones spreading, the flowering ones longer (6–12 inches) ascending or spreading. *Leaves* sub-opposite, entire or faintly toothed, fleshy, glaucous, sessile, about $\frac{3}{4}$ inch long by $\frac{1}{2}$ inch broad, those of the barren shoots and the lower ones of the flowering shoots orbicular to broadly ovate or obovate, rounded and not clasping at the base, longer than the internodes; upper leaves of the flowering shoots cordate and clasping, shorter than the internodes. *Inflorescence* a dense terminal umbellate cyme, 1–2 inches across, surface convex. *Buds* ovoid, bluntly pointed. *Flowers* purplish pink, nearly $\frac{1}{2}$ inch across, as long as the pedicels. *Sepals* linear-lanceolate, separate nearly to the base, glaucous. *Petals* ovate-lanceolate, acute, purplish pink, more than twice the sepals, wide-spreading, the nerve on back green near the tip. *Stamens* shorter than the petals, filaments pink, anthers dark purple. *Scales* whitish or yellowish, oblong, notched. *Carpels* erect, pink, shorter than the stamens, erect in fruit.

Flowers August–September. Hardy.

HABITAT.—Western Himalayas to the Altai, Soongar, and Mongolia.

Var. *homophyllum* var. nov.* (fig. 46).

Much smaller than the type. *Stems* 2–3 inches long, flowering ones but little longer than the barren ones; shoots dying back less far in proportion during winter and producing many very short, small shoots below. *Leaves* of both

* Quam typo multo minus. *Caules* 5–8 cm. longi; caules floriferi caules steriles parum superantes. *Folia* caulium sterilius et floriferorum integra, obovata, nec amplexicaulia, 13–16 mm. longa, 6–9 mm. lata, quam in typo glauciora. *Folia* emarcida persistentia. *Pedicelli* quam in typo longiores, graciliores; *carpella* paullum majora, stamina aequantia.



flowering and barren shoots entire, usually obovate, not clasping, $\frac{1}{2}$ – $\frac{5}{8}$ inch long by $\frac{1}{4}$ – $\frac{3}{8}$ inch broad, more glaucous than in the type; withered leaves persistent in winter. *Flowers* as in type, save that the pedicels are longer and slenderer, and the carpels rather larger, equalling the stamens.

A curious little plant, found in gardens under the name of *S. cyaneum*, but quite different from *S. cyaneum* Rudolph. I was at first inclined to treat it as a distinct species, but its flowers are practically identical

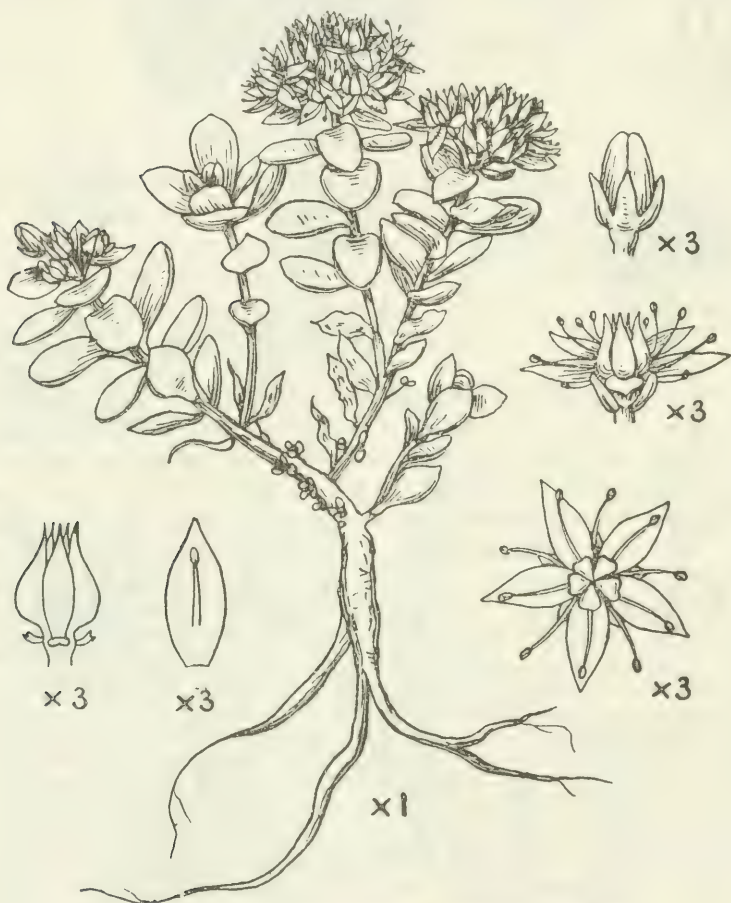


FIG. 46.—*S. Ewersii* Ledeb. var. *homophyllum* nov.

with those of *S. Ewersii*, and its leaves with those of the barren shoots of that species. It is a dwarf form of *Ewersii*, in fact, in which the characteristic elongate flowering shoots with long internodes and clasping leaves are not produced, the flowers (to use an Irish bull) being borne on the barren shoots. It differs also from typical *Ewersii* in being a very shy flowerer.

"Var. *turkestanicum*" is a garden name found in many nurserymen's lists, sometimes as a species. None of the plants which I have seen under the name were in any way distinct, or worthy of varietal rank.

S. Ewersii is a well-known garden plant, exhibiting very little variation. Var. *homophyllum* I have had from Kew, Wisley, the Chelsea Physic Garden, and Mr. E. A. BOWLES, in all cases under the name *cyaneum*. For the true *S. cyaneum*, see p. 106.

31. *Sedum caucolicum* Praeger (figs. 47*b*, 48).

S. caucolicum Praeger in *Journ. of Bot.*, 54, 41, 1917.

Nearest to the well-known *S. Sieboldii*, from which it differs in its opposite stalked (not ternate sessile) leaves, lax leafy inflorescence,

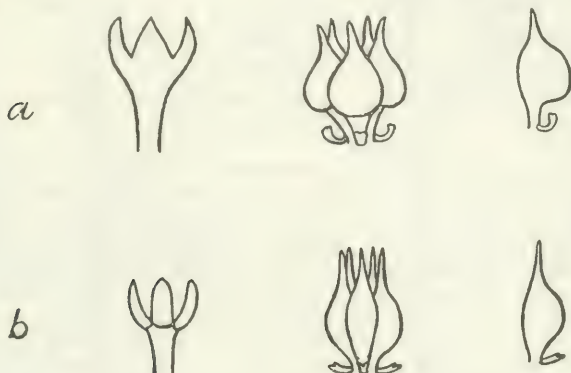


FIG. 47.—Sepals and carpels of (a) *S. Sieboldii*, (b) *S. caucolicum*.

carpels tapered below (not abruptly contracted into a short stalk), and other characters.

DESCRIPTION.—A glaucous herbaceous perennial. *Rootstock* rather thickened, emitting several stems above and several long fleshy tapered roots below, and also slender white subterranean shoots, bearing opposite small colourless scale-like leaves; these shoots come to the surface and produce stems several inches from the parent plant. *Stems* slender, procumbent or low-arching, about 6 inches long, smooth, round, dark purple. *Leaves* opposite (occasionally alternate), glaucous, paler on back, finely dotted with purple, especially on back, orbicular-spathulate, 1 inch long by $\frac{3}{4}$ inch broad, very blunt at apex, bearing about two blunt teeth on each side in the upper part, narrowed below to a distinct petiole. *Inflorescence* a terminal lax very leafy flattish umbellate cyme, the uppermost bracts rhomboid-lanceolate; pedicels very slender, exceeding the flowers. *Buds* ovate-lanceolate, blunt, ribbed, the ribs glaucous green, the furrows red. *Flowers* $\frac{1}{2}$ inch across, rosy purple. *Sepals* small, glaucous, linear-lanceolate, acute, dotted purple, divided to the base. *Petals* 4 times the sepals, lanceolate, acute, concave, wide-spreading, on face rosy purple turning white at base, on back purple along the edges, whitish dotted purple down the centre. *Stamens* equalling the petals, filaments pink, anthers red. *Scales* straight, wide-spreading, oblong, retuse, colourless. *Carpels* erect, slightly shorter than the stamens, bright rosy purple mottled white, cuneate below, styles erect nearly equalling the ovaries.

Flowers September-October. Hardy.

HABITAT.—Cliffs of southern coast of Yezo, Japan.

A pretty and interesting species, sent by Prof. MIYABE from the University Botanic Garden of Sapporo with the note "sp. aff. *S. Sieboldii* with opposite leaves and early-flowering habit." In British



FIG. 48.—*S. caucasicolum* Praeger.

gardens it commences to bloom in September, three weeks before the well-known *S. Sieboldii*.

Named from its growing on cliffs.

32. *Sedum Sieboldii* Sweet (figs. 47a, 49).

S. Sieboldii Sweet ex Hooker, *Bot. Mag.*, tab. 5358, 1863. Maximowicz in *Bulletin Acad. Pétersbourg*, 29, 136. Masters in *Gard. Chron.*, 1878, ii. 591.

ILLUSTRATION.—*Bot. Mag.*, *loc. cit.*

A handsome Japanese member of the *Telephium* group, first described from English specimens cultivated as long ago as 1839. Its arching habit, roundish sessile glaucous leaves in threes, and rosy-purple flowers, distinguish it from any other species. It is the last to flower of all the Old World *Sedums*.

DESCRIPTION.—A glaucous herbaceous perennial. *Root* a tuft of small carrot-like tubers. *Stems* many, unbranched, 6–9 inches long, low-arching, smooth, round, red. *Leaves* ternate, sessile or subsessile, nearly orbicular, slightly cuneate below, fleshy, flat or concave, glaucous, sometimes flushed red, margin sinuate or bluntly toothed in upper half, red. *Inflorescence* a compact terminal flattish umbellate cyme about 2 inches across, with many small ovate bracts; pedicels enlarged upwards, about as long as the flowers. *Flowers* nearly $\frac{1}{2}$ inch across, pink. *Buds* obovoid, purplish, with red markings and greenish ribs. *Sepals* deltoid, acute, dark green, separate nearly to the base. *Petals* thrice the sepals, pink, broadly lanceolate, acute, spreading, minutely hooded at the tip. *Stamens* spreading, the epipetalous ones equalling the petals, the others slightly longer, filaments pink, anthers purple. *Scales* oblong, truncate, curving upwards, flushed orange except when young, entire or slightly emarginate. *Carpels* short, broad, erect, pink with linear markings of a deeper tint, abruptly narrowed below into a distinct white stalk, styles short.

Flowers October. Hardy.

HABITAT.—Japan.

It is hardy, but is most frequently seen as a greenhouse or cottage-window plant. Slugs are fond of it. Its nearest ally is *S. cauticum*, which differs in its opposite stalked leaves, leafy inflorescence of darker flowers, and other minuter characters. Named in honour of P. F. VON SIEBOLD (1796–1866), author of valuable works on the flora of Japan.

f. *foliis medio-variegatis*.

A form with a large splash of yellow occupying the middle of the leaf. A favourite pot-plant. A good coloured plate will be found in "Illustration Horticole," tab. 373.

33. *Sedum Tatarinowii* Maximowicz (fig. 50).

S. Tatarinowii Maximowicz in *Bull. Acad. Pétersbourg*, 29, 134, 1883.

A pretty species, with fleshy leaves of a distinctive shape—narrowly lanceolate with large teeth—and terminal clusters of pinkish flowers.

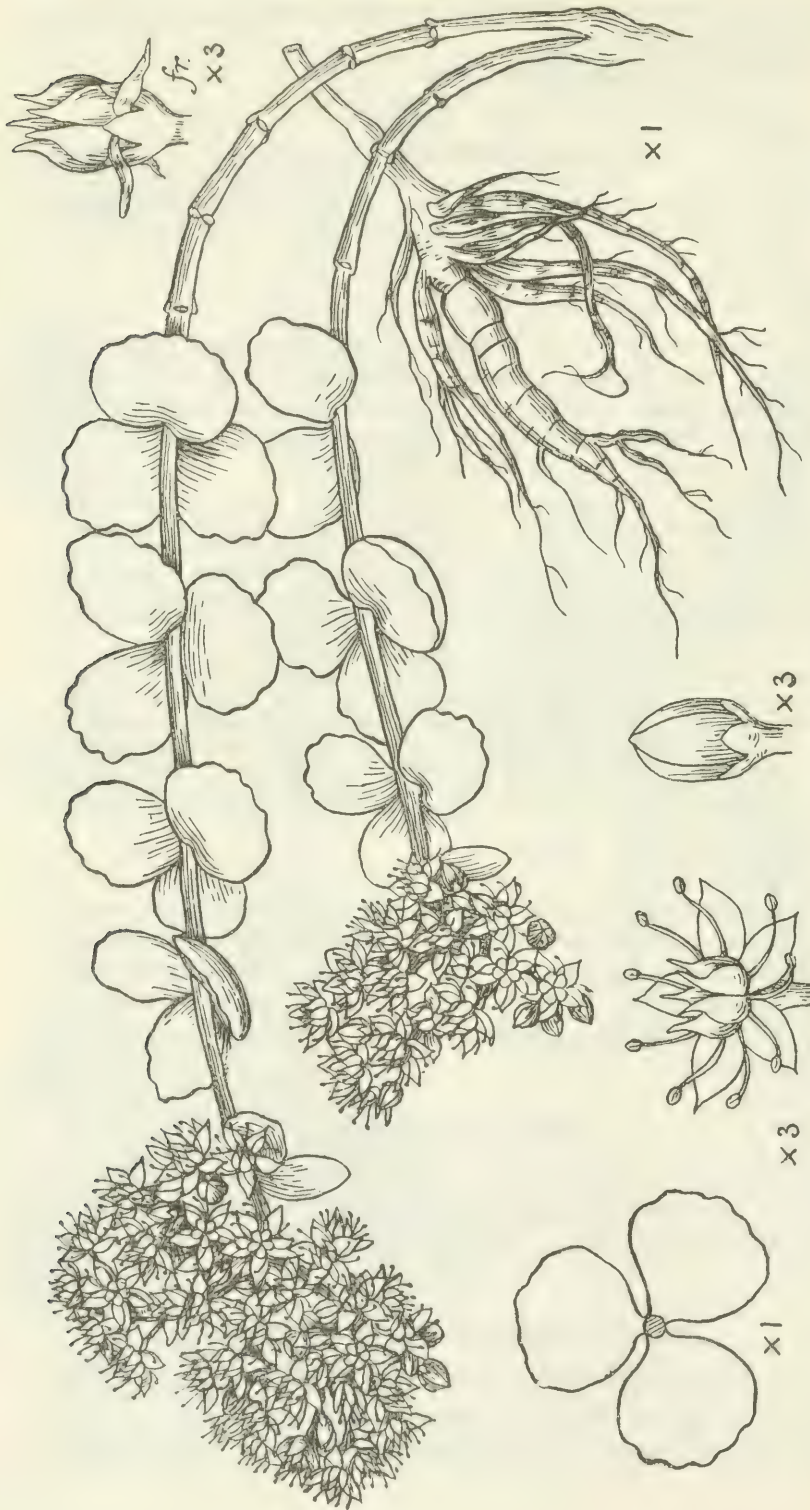


FIG. 49.—*S. Sieboldii* Sweet.



FIG. 50.—*S. tatarinowii* Maxim.

It may be recognized by its thickened rootstock with tuber-like roots—characteristic of the *Telephium* group—and its leaves and flowers as above.

DESCRIPTION.—A glabrous herbaceous perennial. *Rootstock* thickened, with small carrot-shaped tuberous roots. *Stems* annual, many, 4–6 inches long, erect or arching, round, smooth, unbranched, leafy. *Leaves* alternate, fleshy, shortly stalked, linear-lanceolate, blunt, flat on face, rather rounded on back, $\frac{1}{2}$ to 1 inch long, with a few large scattered teeth; upper leaves narrower, very fleshy. *Inflorescence* flattish, corymbose, 1 inch or more across, rather dense. *Buds* ovate, blunt, pink. *Flowers* shorter than the pedicels, $\frac{1}{2}$ inch across. *Sepals* green, fleshy, linear, rather acute. *Petals* 4 times the sepals, ovate-lanceolate, acute, wide-spreading, pinkish white. *Stamens* spreading, shorter than the petals, filaments white, anthers purple. *Scales* white, longer than broad. *Carpels* white, erect, equalling the stamens, erect in fruit; styles pink.

Flowers July–August. Hardy.

HABITAT.—North China.

A pretty plant, not in cultivation, so far as I am aware, until 1913, when Mr. F. N. MEYER, of the American Legation at Peking, sent to Kew specimens collected by him at 3,000 mètres at Hsiao Wutai Shan, Chihli, China. Named after ALEXANDER TATARINOW, author of a catalogue of Chinese drugs (1856).

Group 2. REPENTES.

34. *Sedum Anacamperos* Linn. (figs. 51, 52).

S. Anacamperos Linn., "Species Plantarum," 430, 1753. Masters in *Gard. Chron.* 1878, ii. 591.

SYNONYM.—*S. rotundifolium* Lamarck, "Flor. Française," 3, 83, tab. 8.

ILLUSTRATIONS.—De Candolle, "Plantes Grasses," tab. 33. Lamarck, *loc. cit.* "Bot. Mag.," pl. 118. Reichenbach, "Flor. German.," 23, tab. 48. Cusin and Anserque, "Herb. Flor. Française, Crassul.," tab. 8. Plenck, "Icones Plant. Medicinalium," tab. 353.

A well known and distinct garden plant, abnormal in the *Telephium* section in its creeping habit and the presence of barren shoots. Its long, sinuous, bare, decumbent stems, entire rounded leaves, and dense heads of dull purple flowers, sufficiently distinguish it.

It occurs in two forms:—(a) *TYPICA*, with orbicular to obovate glaucous leaves about $\frac{3}{4}$ inch long by $\frac{3}{8}$ inch broad and prostrate habit; and (b) *MAJUS* mihi, of stronger, more erect growth with longer greener leaves (up to 1 $\frac{1}{2}$ inch long by $\frac{1}{2}$ inch broad) and larger inflorescence.

DESCRIPTION.—A procumbent glaucous semi-evergreen perennial. *Stems* long, procumbent, occasionally rooting, sinuous, bare below, smooth, round, ascending and leafy above, the flowering shoots about 6 inches high. *Leaves* of barren shoots alternate, sessile, flat, comparatively thin, entire, obovate to orbicular, rounded above, sometimes slightly retuse or apiculate, $\frac{1}{2}$ –1 inch long by $\frac{1}{2}$ – $\frac{3}{4}$ inch broad, tapered below; those of the flowering shoots larger, ovate, cordate, with a small flat spur. *Inflorescence* cymose, very dense, surface convex. *Buds* ovate, blunt, plum-colour. *Flowers* not opening widely, $\frac{1}{4}$ inch across, dull purple, shorter than the pedicels. *Sepals* lanceolate, blunt, glaucous, separate nearly to the base. *Petals* purple on face, glaucous-purple on back, ovate-lanceolate, blunt, $\frac{3}{10}$ inch long, $\frac{1}{2}$ longer than the sepals. *Stamens* equalling the petals, filaments purple, anthers yellow or purplish. *Scales* spatulate, thrice as long as broad. *Carpels* erect, equalling the stamens, styles short.



FIG. 51.—*S. Anacamperos* f. *majus* Praeger.

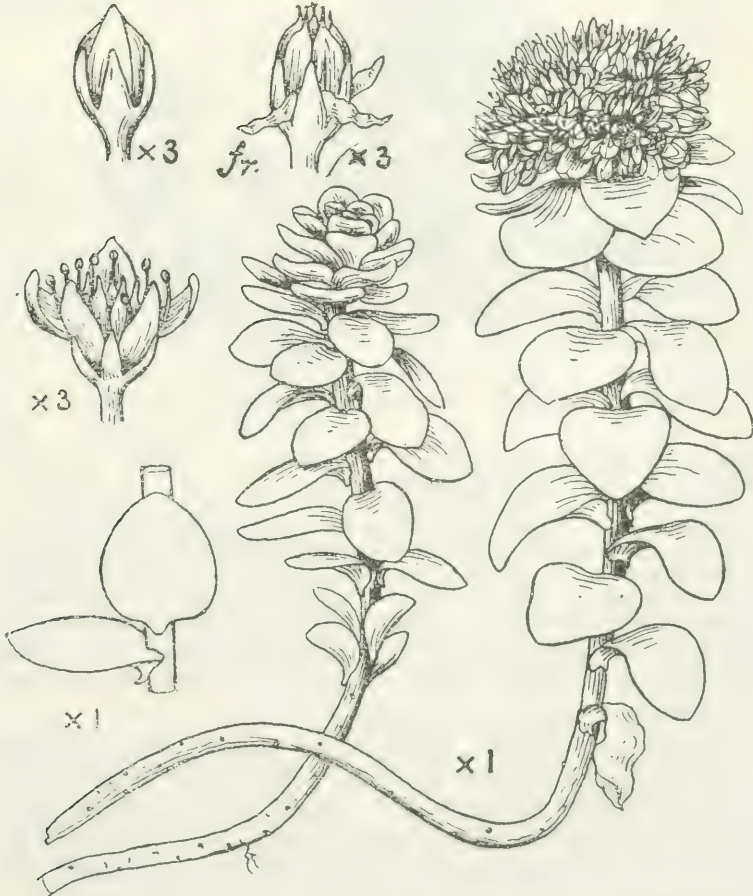


FIG. 52.—*S. Anacamperos* Linn.

Flowers July–August. Hardy.

HABITAT.—Alpine rocks from N. Spain to the Tyrol. The form *majus* has been sent to me from the Alps by Mr. E. A. BOWLES along with the type, and I have seen it in several gardens.

The name *Anacampteros* is that of a genus of Portulacaceae, and is derived from the Greek *anakampto*, “to cause return,” and *eros*, “love.”

35. *Sedum cyaneum* Rudolph (fig. 53).

S. cyaneum Rudolph in *Mém. Acad. Pétersbourg*, 4, 341, 1811. Maximowicz in *Bulletin Acad. Pétersbourg*, 29, 135.

ILLUSTRATION.—Rudolph, *loc. cit.*, t. 2. Regel, “*Gartenflora*,” tab. 972, fig. 2.

Much the smallest of the *Telephium* section, but with the characteristic facies of that group, and recognizable by its entire glaucous



FIG. 53.—*S. cyaneum* Rudolph.

obovate-oblong leaves and heads of rosy purple flowers. Somewhat resembles the var. *homophyllum* of *S. Ewersii*.

DESCRIPTION.—A small creeping deciduous glaucous perennial 2-3 inches high in flower. *Stems* slender, prostrate, creeping, branched. *Leaves* alternate or opposite, flat, fleshy, sessile, entire, blunt, $\frac{2}{3}$ – $\frac{1}{2}$ inch long, $\frac{1}{3}$ – $\frac{1}{4}$ inch broad, the lower obovate-oblong, those of the flowering shoots oblong or oblong-linear. *Inflorescence* a terminal, rather lax corymb. *Flowers* openly campanulate, rosy lilac. *Sepals* ovate-oblong, half the petals. *Petals* $\frac{1}{3}$ inch long, ovate. *Stamens* 10, the epipetalous ones adnate $\frac{1}{2}$ way up, equalling the petals, the others longer. *Scales* thick, cuneate-linear. *Carpels* shortly stalked, lanceolate, with slender styles.

HABITAT.—Siberia, Kamtschatka.

Very rare in cultivation. REGEL (*loc. cit.*) figured it from living specimens, and it was included in Regel and Kesselring's sale list. Plants received from them did not grow. I have seen it in Miss WILLMOTT'S garden at Warley, but during several years it has not flowered with her, nor did plants which she kindly gave me produce blossom. The above description is therefore taken mainly from MAXIMOWICZ (*loc. cit.*).

The figure (fig. 53), such as it is, conveys an idea of the appearance of the plant, the barren shoots being drawn from the living plant, and the inflorescence added from the plate in "Gartenflora."

Apparently the leaves are irregular in their arrangement. RUDOLPH and MAXIMOWICZ say they are alternate; so does LEDEBOUR (*Fl. Rossica*, 2, 182). REGEL figures them as opposite, but says alternate in the accompanying description. In Miss WILLMOTT'S plant they are opposite.

Named from the lilac-glaucous hue of the leaves.

SECTION IV.—GIRALDIINA.

[Section GIRALDIINA Diels in *Engler's Bot. Jahrb.*, 36, Beibl. 82, p. 48, 1905.

Founded to include two Chinese species—*S. Scallanii* Diels and another undescribed. Allied to section Telephium, but differing especially in possessing only five stamens. Neither species is in cultivation.]

SECTION V.—AIZOON.

Section AIZOON Koch, *Synopsis*, 259, 1836.

Perennial. Rootstock thickened, roots slender. Stems annual (except *S. hybridum*). Leaves flat. Flowers hermaphrodite, 5-parted, bright yellow. Hardy East Asiatic plants.

A small and compact group confined to N. and N.E. Asia. The species vary considerably in habit, from tall and erect to creeping, but the flowers, and in most cases the leaves, are very similar. Seven out of the nine species are in cultivation. The two not in cultivation are *S. Sikokianum* Maxim., resembling a slender *S. kamschaticum*, and *S. Yabeanum* Makino, the only one of the section with entire leaves; both are natives of Japan.

<i>Aizoon</i> Linn.	<i>kamschaticum</i> Fisch. and Meyer.
<i>Selskianum</i> Regel.	<i>floriferum</i> Praeger.
<i>Middendorffianum</i> Maxim.	<i>hybridum</i> Linn.
<i>Ellacombianum</i> Praeger.	

MAXIMOWICZ divided *S. hybridum* from the rest by its fruiting carpels "lanceolati basi connati erectopatuli," those of the others being "oblique ovati ad $\frac{1}{3}$ imam v. ultra connati indeque stellatopatentes." In fig. 54 the full-grown fruit of the species in cultivation has been drawn (excepting *S. Selskianum*, of which good fruit was not available), one carpel being removed to show the amount by which they are connate. It will be seen that the characters used by MAXIMOWICZ are evident, but that they are not at all striking, a well-marked gradation being observable; this gradation does not accord well with characters of flower, stem, and leaf. The group, indeed, does not

divide itself naturally into sub-groups, though many of the species stand out clearly by individual characters—*Selskianum* by its dense hairiness, *floriferum* by its much-branched stems, *hybridum* by its

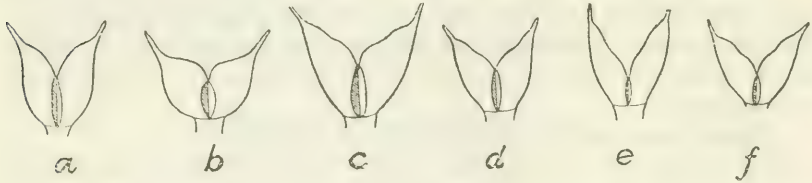


FIG. 54.—Carpels of species of *Aizoon* section (the front one removed to show degree of attachment). *a*, *S. Aizoon*; *b*, *Ellacombianum*; *c*, *kamtschaticum*; *d*, *floriferum*; *e*, *hybridum*; *f*, *Middendorffianum*. All $\times 2$.

creeping stems and barren shoots. *Aizoon* and *hybridum* vary greatly in some characters, and *Middendorffianum* has two distinct forms: this tends to render more difficult the separation of this closely allied group of species.

36. *Sedum Aizoon* Linn. (figs. 54*a*, 55, 56).

S. Aizoon Linn., "Species Plantarum," 430, 1753. Maximowicz in *Bulletin Acad. Pétersbourg*, 29, 143, 1883. Masters in *Gard. Chron.*, 1878, ii. 267.

SYNONYMS.—*S. Maximowiczii* Regel, "Gartenflora," 1866, 353, tab. 528. Masters in *Gard. Chron.*, 1878, ii. 268. *S. Woodwardii* N. E. Brown in *Kew Bulletin*, 1912, 390. *S. Selskianum* of many gardens (not of Regel and Maack, see p. 112). *S. Lageri* (a *nomen nudum*) of some gardens.

ILLUSTRATIONS.—De Candolle, "Plantes Grasses," tab. 101. Regel, "Gartenflora," tab. 528 (as *Maximowiczii*).

An old garden plant, usually grown under the name *Maximowiczii* or *Selskianum*. (Other names under which the plant came to me are *aizoideum*, *Alberti*, *asiaticum*, *euphorbioides*, *kamtschaticum*, *Lageri*, *scabrum*, and *Wallichianum*.) The only species with which it might be confounded is the true *Selskianum*, but the latter is hairy all over, and has narrower leaves and smaller flowers borne in larger numbers. *S. Aizoon* is unique among the well-marked group to which it belongs, in its thickened carrot-like tuberous roots, which resemble those which characterize the *Telephium* section; these are well shown in a young plant, as figured (fig. 56). It is generally at once recognizable by its group of stout, erect, smooth stems a foot or more high, and dense flat cymes of yellow flowers.

DESCRIPTION.—A glabrous herbaceous perennial, quite leafless in winter, without barren shoots. *Rootstock* large, thick and knotted. *Roots* elongate, fleshy and tuberous. *Stems* arising in spring from the rootstock, several or many, erect, smooth, subangular, green, usually turning brown abruptly towards the base, unbranched or with axillary branches above, 1–1½ foot high. *Leaves* linear-lanceolate to ovate-lanceolate, alternate, 2–3 inches long, usually rather blunt, sharply toothed above, narrowing at base to a short stalk, green, midrib prominent on the paler underside. *Inflorescence* a dense terminal flattish leafy cyme 1½–3 inches across, of about 5 forked branches with flowers in the forks, leaves often forming a loose involucre. *Buds* ovate-oblong, often acute. *Flowers*



FIG. 55.—*S. Aizoon* Linn.

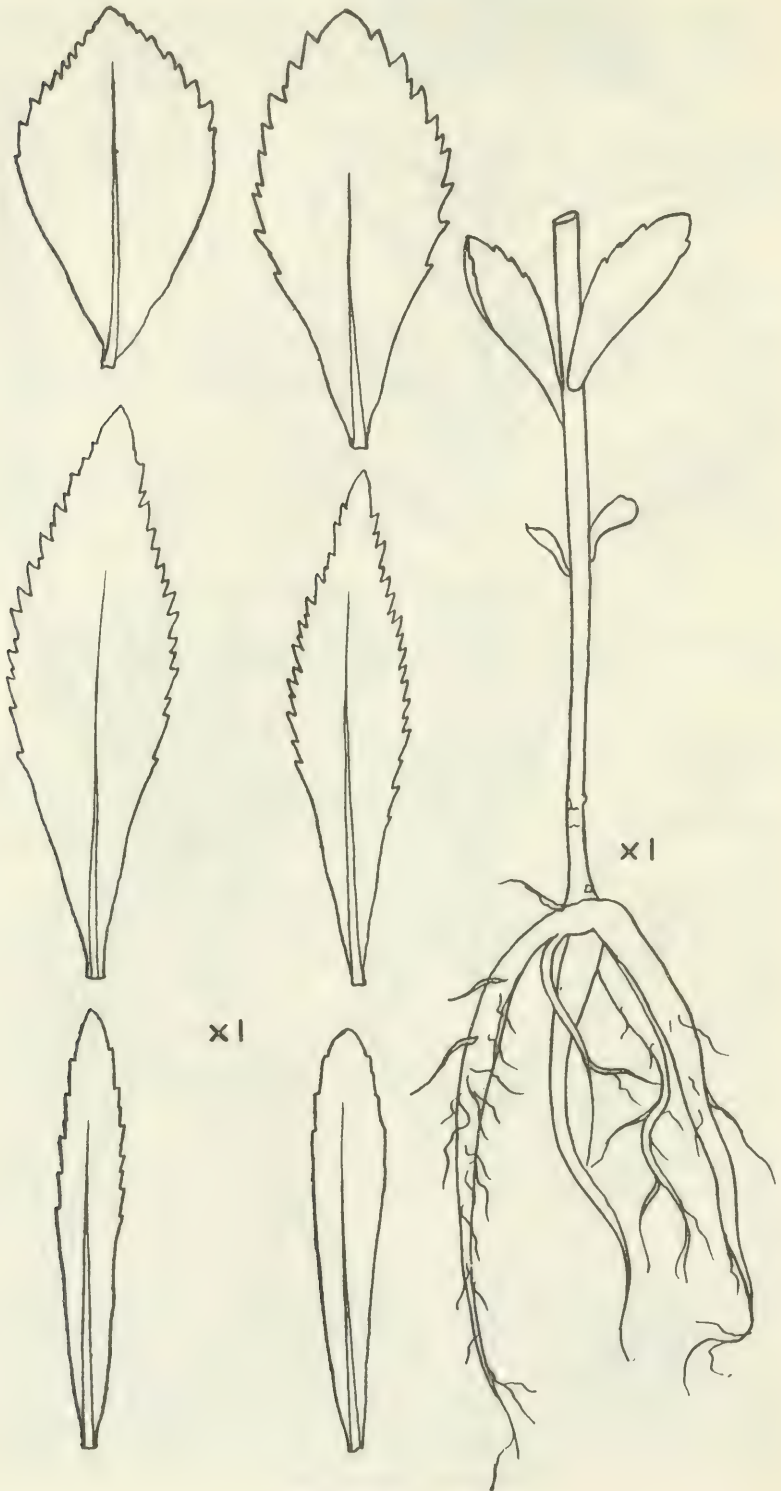


FIG. 56.—*S. Aizoon* Linn.

sessile, yellow to orange, $\frac{1}{2}$ inch across. *Sepals* green; linear, blunt, and terete in upper half; widening below to a broad base. *Petals* nearly twice the sepals, linear-lanceolate, apiculate, yellow to orange, wide-spreading. *Stamens* spreading, nearly equalling the petals, yellow, anthers ovate. *Scales* white, broader than long. *Carpels* at first erect, spreading later, yellow, often becoming orange or red, spreading widely in fruit.

Flowers July. Hardy.

HABITAT.—Siberia, Mongolia, Manchuria, China, Japan.

S. Maximowiczii Regel is, according to Maximowicz (*loc. cit.*), whose knowledge of the North Asiatic Sedums was unequalled, the form of *Aizoon* found in cultivation in Japan—very tall, large-leaved, and large-flowered. Recent Japanese writers agree in this view.

S. Woodwardii N. E. Brown is undoubtedly referable to *S. Aizoon*. The type specimen in Kew Herbarium is poor, but by the kindness of the late Mr. ROBERT WOODWARD, in whose garden the plant appeared as a seedling, I received fine specimens taken from the original root. These represented a rather broad-leaved form, lax from growing in rich soil in half shade; each of the special characters—such as the rather obtuse dentition, obliquely obovate leaves, and very lax inflorescence—on which the species was founded, has disappeared when the plant has been grown under ordinary conditions in my garden, and the plant as now growing differs in no way from ordinary *S. Aizoon*. (See *Journ. of Bot.*, 55, 215.)

Several varieties of *S. Aizoon* have been described, based on differences in stem and leaf characters, such as var. *latifolium* Maximowicz, "Flor. Amurensis," 115, and Regel, "Flor. Ussuriensis" 70, a small branched form with very large leaves; var. *saxatilis* Nakai, "Flor. Koreana," small and branched with narrow leaves; and var. *floribunda* Nakai *loc. cit.*, very tall and narrow-leaved. These may be of importance locally as geographical forms, but in the garden a continuous range is found, among which it is not possible to select any as outstanding and worthy of varietal names in a botanical sense. My collection came from some fifty different garden sources, ranging from Japan on the east to Canada on the west. Among them the chief variations observed were as follows:—

- (1) Habit.—Some very erect, some rather diffuse.
- (2) Branching.—A strong stem will often bear many axillary branches, and any stem will branch if the growing point is injured, but some forms were branched invariably.
- (3) Inflorescence.—Typically terminal, very compact, involucrate; but the cyme-branches may be lengthened, producing with the enlarged leaf-like bracts a lax flat inflorescence 6 inches across; or the terminal flower-head, in conjunction with others borne on axillary branches, may form a hemispherical inflorescence half a foot across.
- (4) Leaf-form.—Outline from linear-lanceolate to broadly ovate (see fig. 56), and dentition from obscure to bold, and from blunt to acute.
- (5) Pigmentation.—From bright green in stem and leaf, clear yellow in flower, and bright green in fruit, to dark red in stem, dark green in

leaf, deep orange in flower, and red in fruit, the highly pigmented condition being known in gardens as var. *aurantiacum*; it forms a handsome plant, and for cultural purposes deserves its distinguishing name.

Var. *scabrum* Maximowicz is scabro-papillose throughout, and common in some parts of China; but I have not observed any tendency in this direction among the cultivated forms.

Aizoon is the name of a genus of Portulacaceae. The word signifies "always alive," and its application to a species of *Sedum* is obvious.

Hybrid *S. Aizoon* × *kamtshaticum* hybr. nov. (fig. 57).

DESCRIPTION.—*Rootstock* twiggy like *kamtshaticum*, rather than woody like *Aizoon*. New shoots arising in autumn from points near the base of the old stems and remaining short and leafy during the winter, as in *kamtshaticum*, not arising in spring from points on the woody rootstock as in *Aizoon*. *Stems* decumbent or ascending at base, remainder erect, resembling *kamtshaticum* below and *Aizoon* above, 6–8 inches long. *Leaves* lanceolate, serrate, in shape and colour identical with some *Aizoon* forms, not oblanceolate as in *kamtshaticum*, less toothed than typical *Aizoon*. *Inflorescence* rather lax, very leafy, of three dichotomous branches with flowers in the forks, resembling *kamtshaticum* rather than *Aizoon*. *Flowers* rich orange-yellow, $\frac{1}{2}$ – $\frac{2}{3}$ inch across, rather larger and brighter than typical *Aizoon*; in relative length of sepal to petal agreeing with *kamtshaticum*, not with *Aizoon*. Flowers in June, along with *kamtshaticum*, a fortnight before *Aizoon*. *Fruit* aborted, seeds sterile.

Hybrids are so rare in the genus *Sedum* that this plant is of some interest. *S. Aizoon* is a very variable species, but the exactly intermediate character of the present plant as between the two suggested parents, and the infertile seeds, render its hybrid origin almost certain, since *S. Aizoon* does not vary perceptibly in the direction of *kamtshaticum*, and since both parents are normally very free in their production of seed.

Probably a natural hybrid of garden origin. Received from Wisley (no. 45/15) as *kamtshaticum*, and a plant practically identical was seen in the Cambridge Botanic Garden.

37. *Sedum Selskianum* Regel and Maack (fig. 58).

S. Selskianum Regel and Maack in "Tentamen Flor. Ussuriensis," 66, 1861. Maximowicz in *Bulletin Acad. Pétersbourg*, 29, 145, 1883. Masters in *Gard. Chron.*, 1878, ii. 268.

ILLUSTRATIONS.—Regel and Maack, *loc. cit.*, tab. 6, fig. 9–11. Regel, "Gartenflora," tab. 361. *Trans. Russian Hort. Soc.*, 1862, tab. 87.

Nearest to *S. Aizoon*, which it resembles in habit, but easily known by its very hairy stems, hairy narrower leaves, and more numerous smaller flowers.

DESCRIPTION.—A hairy herbaceous perennial. *Stems* annual, arising in autumn, erect, 1–1½ foot high, rather slender, round, purplish, shaggy with spreading or deflexed white hairs half as long as the diameter of the stem; barren stems none. *Leaves*, alternate, flat, scarcely fleshy, sessile, bluntly pointed, toothed in upper half, dark shining green, finely hairy on both faces, ciliate, midrib hairy below, about 2 inches long, the lower lanceolate-oblong narrowed at base, the upper linear-oblong rounded at base. *Inflorescence* a large, very leafy dense umbellate cyme, 2–4 inches across, of about 5 twice-branched hairy branches; uppermost bracts lanceolate, very small. *Buds* ovate, acute, with



FIG. 57.—*S. Aizoon x kamschaticum*.

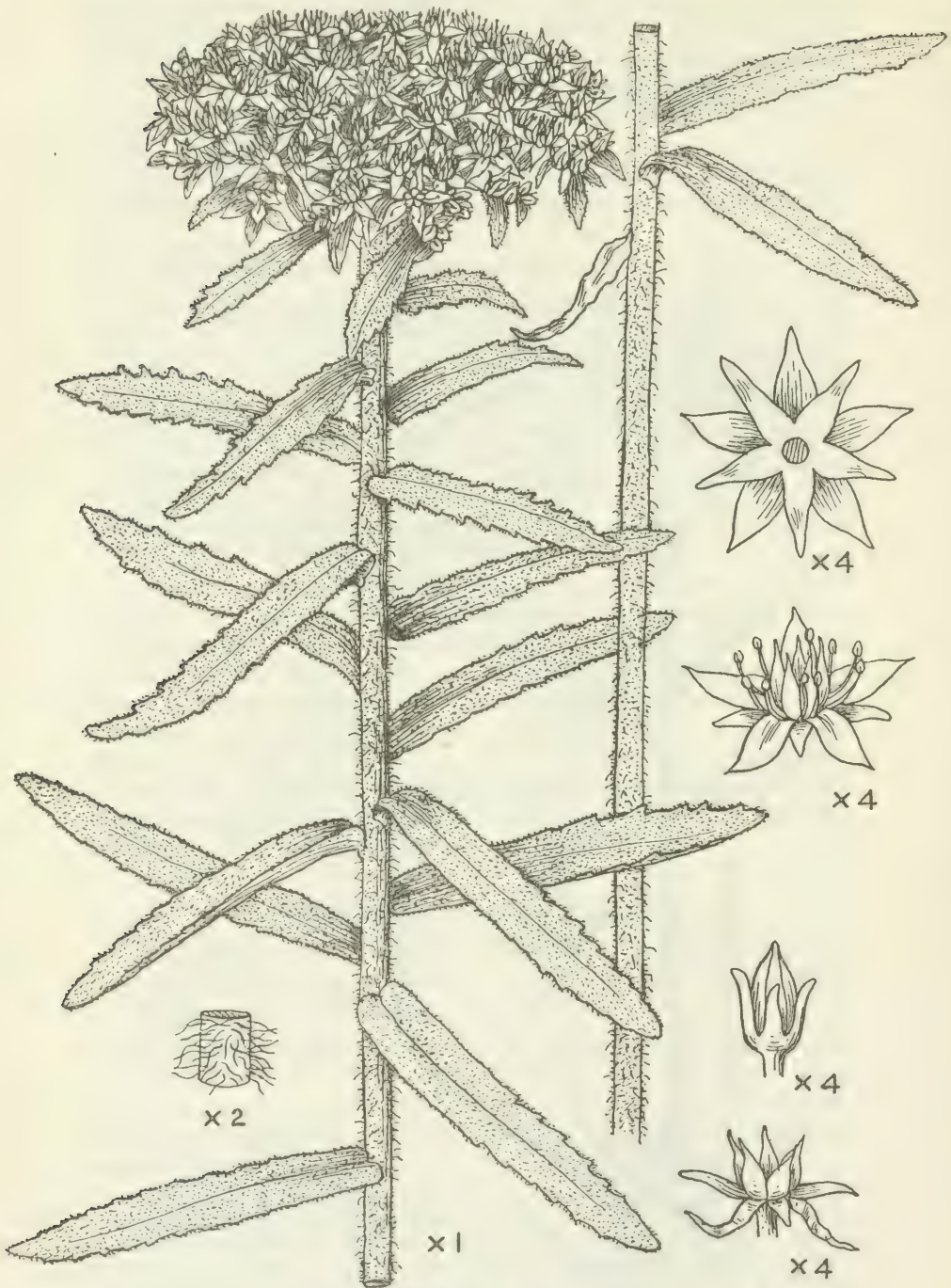


FIG. 58.—*S. Selskianum* Regel and Maack.

sepals spreading above. *Flowers* bright yellow, $\frac{3}{8}$ -inch across, pedicels very short, hairy. *Sepals* green, very fleshy, linear-lanceolate, usually glabrous, nearly erect, blunt, $\frac{2}{3}$ the petals, separate nearly to the base. *Petals* broadly lanceolate, acuminate or apiculate, wide-spreading, golden yellow. *Stamens* slightly shorter than the petals, the epipetalous ones free to the base, filaments yellow, anthers orange. *Scales* small, quadrate, yellowish. *Carpels* slender, nearly erect, equalling the stamens, tapering into the styles, contracted at the base, wide-spreading in fruit.

Flowers August. Hardy.

HABITAT.—Manchuria.

The plant is very rare in cultivation. The name is common enough in lists, and I obtained plants from a large number of different sources, but all were wrongly named, being mostly *Aizoon*, *kamtschaticum*, or *Ellacombianum*. I found the true plant at last in the Botanic Garden at Hamburg, and have to thank Dr. C. H. OSTENFELD of Copenhagen for kindly obtaining for me roots from there while direct communication was cut off owing to the war. MASTERS' remarks (*loc. cit.*, p. 268) seem to indicate that the plant was less rare in gardens forty years ago.

Named after ILARION SERGIEWITSCH SELSKY, Secretary of the Siberian branch of the Russian Geographical Society in Irkutsk.

38. *Sedum Middendorffianum* Maximowicz (figs. 54f, 59).

S. Middendorffianum Maximowicz, "Prim. Flor. Amurensis," 116, 1859. Maximowicz in *Bulletin Acad. Pétersbourg*, 29, 146, 1883. Masters in *Gard. Chron.*, 1878, ii. 267.

Allied to *Aizoon*, *Ellacombianum*, *kamtschaticum*. The type has narrower leaves than any of these, but the var. *diffusum* closely resembles in leaf some of the *hybridum* forms. From *Aizoon*, *Middendorffianum* is distinguished by its slenderer growth, narrower leaves bearing only a few teeth near the apex, smaller flowers, etc. The narrow leaves alone will distinguish it from the spatulate-leaved *Ellacombianum*. It differs from *kamtschaticum* in its unbranched stems, denser inflorescence and smaller flowers; *hybridum* stands apart in its creeping habit, many barren shoots, linear sepals and fruit not spreading horizontally; and *floriferum* differs in its branched stems and sepals linear or even broader above than below.

As pointed out by MAXIMOWICZ ("Primitiæ Flor. Amurensis," 116), there are two forms:—(1) with stems erect, crowded, comparatively short, densely leafy, leaves toothed near the apex, inflorescence compact; and (2) stems longer, decumbent, rooting at the base, leaves less crowded, very long, toothed from the middle up, inflorescence larger and more lax. As an additional character it may be added that the leaves of the second are usually broader than those of the first. Both these forms are in cultivation at Petrograd and in British gardens. Intermediates are rare, and the two differ so much in general appearance that it appears desirable to distinguish them. The original description of MAXIMOWICZ covers both plants; MASTERS applied the



FIG. 59.—a, *S. Middendorffianum* Maxim. ; b, *S. M.* var. *diffusum* Praeger.

name *minor* to the narrow-leaved form; but it appears better that the form which MAXIMOWICZ mentions first (which is also that to which MIDDENDORFF'S own specimens belong, and which is much the commoner in cultivation) should be taken as the type, and it is the plant of my description. The other form is described separately below.

DESCRIPTION.—A glabrous tufted perennial, without barren stems. The stems die down in autumn: next year's stems arise in late summer from near the base of these, remain short and leafy during the winter, shoot up, flower and die during the succeeding season. *Rootstock* thick, much branched upwards. *Stems* many, 6–12 inches, erect, round, smooth, slender, unbranched, leafy. *Leaves* numerous, alternate, spreading, narrow, concave, nearly linear, about $1\frac{1}{2}$ inch long by $\frac{1}{8}$ inch broad, sessile, fleshy, with several small teeth near the apex, entire in the lower two-thirds. *Inflorescence* a leafy flat-topped umbellate cyme, of several (usually 4) forked branches with flowers in the forks, about 1 inch across. *Bracts* leaf-like, the uppermost entire. *Buds* ovate, acute, ribbed. *Flowers* yellow, $\frac{5}{8}$ inch across, the lowest shortly pedicelled, the rest sessile. *Sepals* green, spreading in bud; obtuse, linear and terete in upper part; widening below to a broadish base. *Petals* bright yellow, $1\frac{1}{2}$ times to twice the sepals, lanceolate, acute, keeled, wide-spreading. *Stamens* $\frac{3}{4}$ the petals, filaments yellow, anthers orange. *Scales* very short, whitish. *Carpels* greenish-yellow, erect, becoming red and stellate in fruit. Whole plant turning red in fading.

Flowers July–August. Hardy.

HABITAT.—East Siberia, Northern Manchuria.

A distinct and pleasing little plant, most resembling *S. hybridum*, but with more or less erect stems densely clothed with narrower leaves, and without creeping, barren shoots.

Rare in cultivation. I have received it from the late Canon ELLACOMBE, Messrs. Backhouse of York, and Cunningham Fraser & Co. of Edinburgh, and from Petrograd.

Named in honour of A. T. VON MIDDENDORFF, whose travels in Northern Siberia in 1843–4 first made known many of the plants of that region.

Var. *diffusum* var nov.* (fig. 59, b).

DESCRIPTION.—Stems longer than in the type, more or less decumbent, tending to root at the base. *Leaves* larger, lanceolate to linear-spathulate, 1–2 inches long, by $\frac{1}{4}$ inch broad, sharply toothed in upper part, teeth up to $\frac{1}{8}$ inch deep, inflorescence lax, 2–3 inches across.

39. *Sedum Ellacombianum* Praeger (figs. 54b, 60, 61).

S. Ellacombianum Praeger in *Journ. of Bot.*, 54, 41, 1917.

A distinct species, widely spread in cultivation, but till recently undescribed, having been confused with *Aizoon*, *Selskianum*, *kamtschaticum*, and *hybridum*. It is far removed from the second and fourth of these—*Selskianum* being tall, hairy, narrow-leaved and smaller-flowered, and *hybridum* standing apart from all the rest of the *Aizoon* section in its creeping habit. *S. Ellacombianum* is nearly related to

* *Caulis* quam in typo longior plus-minus decumbens, nonnunquam basi radicans. *Folia* majora, lanceolata vel lineari-spathulata, 2.5–5 cm. longa, 6 mm. lata, in parte superiore acutidentata, dentes ad 3 mm. longi; *inflorescentia* laxa, 5–8 cm. lata.



FIG. 60.—*S. Ellacombianum* Praeger.

Aizoon and *kamtschaticum*, combining some of the characters of each of these species.

It resembles *Aizoon* closely in inflorescence, flower, and fruit, the only reliable difference in these features appearing to be that in *Ellacombianum* the fruiting carpel is deeper above owing to a bulging of the inner edge, than in *Aizoon*: in consequence it is more abruptly contracted into the beak, and its upper edge lies almost horizontally, instead of sloping inwards (compare *a*, *b*, fig. 54). It differs from *Aizoon* in the absence of a much-thickened rootstock and tuberous Telephium-like roots, in its light-green colour, in its numerous arching stems (not tall and erect), and its spatulate crenate-serrate leaves (not lanceolate or ovate-lanceolate sharply serrate) (fig. 61).

It resembles *S. kamtschaticum* in its rootstock much branched upwards, forming a tangle above the surface of the ground, the new stems arising from the lower part of the old ones (not direct from the thickened

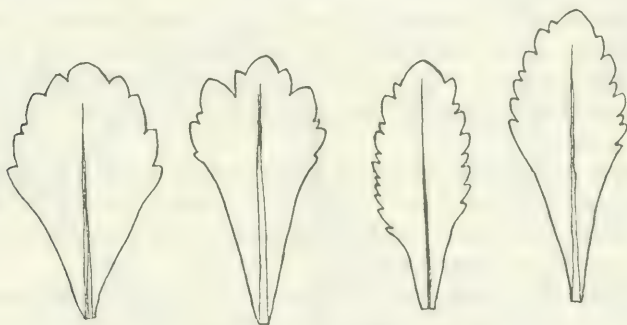


FIG. 61.—Leaves of *S. Ellacombianum*. $\times 1$.

rootstock as in *Aizoon*), and prolonged downwards into strong branching tap-roots bearing dense tufts of short fibrous rootlets. It differs from *kamtschaticum* in its stems never branched, light (not dark) green in colour, broader crenate (not serrate) leaves, dense inflorescence, smaller flowers ($\frac{5}{8}$ inch instead of $\frac{3}{4}$ inch diameter), sepals $\frac{1}{2}$ (instead of $\frac{1}{3}$) the length of the petals, and absence of red coloration in flower or fruit.

DESCRIPTION.—A smooth herbaceous perennial, forming a compact more or less hemispherical tuft about 6 inches high. *Rootstock* much branched upwards, ultimate branches slender, prolonged downwards into one or more thick tap-roots much branched below, and bearing tufts of rootlets. *Stems* annual, arising in spring, all flowering, numerous, unbranched, spreading, 4–6 inches long, smooth, round, reddish below. *Leaves* opposite, rather crowded, $1\frac{1}{2}$ inch long by $\frac{3}{4}$ inch broad, flat, fleshy, bright fresh green, rather paler on back, obovate to spatulate, tapering below to a very short petiole, crenate-serrate above with 4–6 teeth on either side and a large rounded terminal tooth. *Inflorescence* compact, leafy, flat, umbellate, about $1\frac{1}{2}$ inches across, of 3 to 5 branches with a flower in the centre; branches forked with a flower in the forks; each flower subtended by a bract, the lower ones leaf-like, the uppermost linear and very small. *Buds* ovate, acute. *Flowers* generally clear yellow, without admixture of orange or red, $\frac{5}{8}$ inch across, lower ones shortly stalked, upper sessile. *Sepals* green, blunt, linear and terete in upper $\frac{2}{3}$, lower part broadening considerably. *Petals* bright yellow, wide-spreading, lanceolate, acute, keeled, twice the sepals. *Stamens* spreading, yellow, slightly shorter than the petals, the epipetalous ones nearly free, anthers often tinged reddish. *Scales* whitish, about as long as broad.

Carpels erect, yellow, equalling the stamens, narrowed rather abruptly into the long slender styles, wide-spreading in fruit, when they are green or red.

Flowers July–August. Hardy.

HABITAT.—Japan.

This species is very poorly represented in herbaria. The only information I have been able to glean as to its habitat is derived from a specimen (the only representative of the species in the British Museum) from HANCE'S Herbarium, collected as *kamtschaticum* at Hakodate, Japan, by MAXIMOWICZ in 1861; so that the plant belongs to N.E. Asia, as would be expected from its affinities. To judge from its wide distribution in gardens it is evidently long in cultivation. I have seen it in, or received it from, England, Scotland, Ireland, France, Germany, Sweden, Russia, Japan, and Canada, under the names of *Aizoon*, *Selskianum*, *hybridum*, *kamtschaticum*, *spurium*, *serotinum*, etc. Plants from all these countries—from some twenty different sources in all—have been grown in my garden. They show that the plant is remarkably constant in character, though belonging to a group, several species of which display much variation. The only divergence from the type that I have observed is in a plant at Glasnevin, in which the flower-branches are longer, making the inflorescence larger and laxer—3 to 4 inches across.

The only specimen in the Kew Herbarium is labelled "Sedum —, Kew Gardens, Sept. 18, 1901. Legit N. E. Brown," which shows that that botanist, who paid much attention to the Kew Sedums, had noticed its peculiar characters.

Dedicated to the memory of Canon H. N. ELLACOMBE, who first urged me to undertake a revision of the cultivated Sedums.

40. *Sedum kamtschaticum* Fisch. and Meyer (figs. 54c, 62).

- S. *kamtschaticum* Fischer and Meyer, "Index Seminum Hort. Petropol.," 7, 54, 1841. Maximowicz in *Bulletin Acad. Pétersbourg*, 29, 145, 1883. Masters in *Gard. Chron.*, 1878, ii. 463.

SYNONYMS.—*S. Brownii* (or *Braunii*) and *S. Lehmanni* (all *nomina nuda*) of some gardens.

ILLUSTRATION.—Wooster, "Alpine Plants," 2, pl. 22, 1874.

A handsome plant, with dark-green foliage and large orange flowers; often confused with some of its allies of the *Aizoon* section, but easily distinguished. From *S. hybridum*, which it most resembles in general appearance, it is separated by the absence of barren stems and of creeping habit, laxer inflorescence, larger flowers, sepals broadening below (not linear), and stellate (not semi-erect) fruit. *S. Middendorffianum* differs in its unbranched stems, narrower leaves, denser inflorescence, and smaller flowers; *S. Ellacombianum* in its light-green colour, broader leaves, unbranched stems, denser inflorescence, and smaller flowers; *S. floriferum* in its linear sepals, smaller flowers, etc.

DESCRIPTION.—A glabrous perennial without barren shoots. *Rootstock* thick and woody, much branched upward, branches twiggy. *Stems* arising in



FIG. 62.—*S. kamschaticum* Fisch. and Meyer.

late summer from near the base of the flowering stems, remaining short and leafy throughout the winter, shooting up, flowering, and dying in the following season; ascending, 6-9 inches long, round, unbranched at first, but producing axillary flowering branches when the main stem has flowered. *Leaves* alternate or opposite, sessile, $1\frac{1}{2}$ to 2 inches long, obovate to spatulate, toothed in upper third, entire and tapering in lower two-thirds, dark green, shining, margin minutely papillose. *Inflorescence* of lax terminal umbellate cymes, bracts small, lanceolate, entire. *Buds* ovoid, acute, with orange ribs. Flowers orange-yellow, $\frac{3}{8}$ inch across. *Sepals* green, broad below, narrowed half way up to a linear blunt end. *Petals* orange-yellow, lanceolate, apiculate, keeled, twice the sepals or rather more. *Stamens* nearly as long as the petals, filaments yellow, anthers orange. *Scales* whitish, broader than long. *Carpels* yellow, slightly exceeding the stamens, erect in flower, wide-spreading in fruit, changing as the flower fades through orange and crimson to brown.

Flowers June to September. Hardy.

HABITAT.—North-eastern Asia, as far south as Corea and Central China.

Common in cultivation, and generally correctly named. Much more constant in character than most of the section, and little excuse exists for its sale under such names as *Brownii*, *Braunii*, *Lehmanni*, *lividum*, *Maximowiczii*, *pallidum*, and *portulacoides*. Its name *kamtschaticum* commemorates the region from which it was first described.

f. *variegatum*.

With a broad irregular marginal band of white on the leaves. A handsome rock-garden plant, the variegated foliage combined with the orange flowers producing a showy effect.

41. *Sedum floriferum* Praeger (figs. 54d, 63, 64).

S. floriferum Praeger in *Journ. of Bot.*, 56, 149, 1918.

Allied to *S. kamtschaticum* and *S. hybridum*, and in many respects intermediate. It shows close affinity to the latter in its sepals, which are linear or oblanceolate, not wide at the base as in most of the section, and in the size and appearance of its flowers; its leaves also are nearest to those of *hybridum*. But instead of being evergreen with perennial creeping stems as in that species, it has the growth-form of *kamtschaticum*, the stems arising in autumn, remaining short during the winter (fig. 63, a), and flowering and dying in the following season; the carpels also are those of *kamtschaticum*, though one-third smaller, as in *hybridum*. From both *hybridum* and *kamtschaticum* it differs in the tendency of its stems to produce many short axillary floriferous branches, which give the plant a bushy and very distinct appearance.

DESCRIPTION.—A glabrous sub-evergreen perennial. *Rootstock* woody, knotted, roots thickened. *Stems* many, annual, arising in autumn, ascending or decumbent, red, somewhat scabrid, about 6 inches long, leafy, branched in upper half or two-thirds, branches axillary, leafy, short, wide-spreading, often numerous, bearing cymes similar to the terminal one. *Leaves* sessile, spatulate-oblanceolate, dark green, up to $1\frac{1}{2}$ inch long by $\frac{3}{8}$ broad, tapered and entire below, toothed in upper third, crowded, blunt; those of the branches similar but much smaller. *Inflorescence* of terminal and lateral flattish, rather dense cymes 1-2 inches across, each usually of three forked branches with flowers in the

forks, lower bracts resembling the leaves, upper ones small entire. Buds ovate-lanceolate, bluntly pointed, ribbed. Flowers $\frac{1}{2}$ inch across, yellow, the lowest



FIG. 63.—*S. floriferum* Praeger.

shortly stalked, rest sessile. Sepals green, unequal, wide-spreading, very fleshy, linear to oblanceolate, blunt, separate almost to the base. Petals yellow, wide-

spreading, lanceolate, acute, twice the sepals, with a short mucro behind the tip. *Stamens* slightly shorter than the petals, spreading, filaments greenish, anthers reddish-yellow, the epipetalous ones attached $\frac{1}{5}$ way up to the petals. *Scales* small, quadrate, entire, greenish, translucent. *Carpels* erect at first, later spreading, greenish-yellow, equalling or shorter than the stamens, slender, compressed laterally; styles long, slender, erect, capitate.

Flowers late July and early August, after *S. kamtschaticum* and before *S. hybridum*. Hardy.

The stems begin their axillary branching as early as May, whereas in *kamtschaticum*, if branches are produced, they mostly arise subsequent to the primary flowering in June, and proceed from the lower, not the upper, leaf-axils. In strong plants of *S. floriferum* the axillary branches may be as many as twenty in number; in less strong plants



FIG. 64.—Immature shoot of *S. floriferum*. $\times 1$.

they are often sub-umbellate, being grouped round the apex of the stem; in weak plants they may be absent (fig. 64). The flowers have the size and rather greenish-yellow colour of those of *hybridum*, not the golden-yellow and large size of *kamtschaticum*. The plant comes true from seed.

The peculiar branching of the stem which is characteristic of this species is also found, to a less extent, in *S. Yabeanum* Makino, a recently published Japanese species of the Aizoon section, not in cultivation, which is described as having "stems often provided with a few sterile branches at the middle portion." (*Bot. Mag.*, Tokyo, 17, 10.)

HABITAT.—N.E. China. Seed was sent by Mr. LIARDET from Wei-hai-Wei in 1911, to Kew, where the plant has been grown since without a name.

To this species may be referred a curious specimen in the British Museum. It is labelled "Chifu. aest. 1872 (F. B. Forbes)," and is

from HANCE's herbarium. It has a straight fasciate stem and numerous axillary branches, some of which bear flowers. The stem is more scabrid than in the living plant, but otherwise the specimen agrees satisfactorily with *S. floriferum*. Chifu lies only fifty miles from Wei-hai-Wei.

Named from the abundance of its flowers.

42. *Sedum hybridum* Linn. (figs. 54e, 65).

S. hybridum Linn., "Species Plantarum," 431, 1753. Maximowicz in *Bull. Acad. Pétersbourg*, 29, 147, 1883. Masters in *Gard. Chron.*, 1878, ii. 463.

ILLUSTRATIONS.—Reichenbach, "Flor. German.," 23, tab. 64. *Nov. Comm. Soc. Scient., Göttingen*, 6, tab. 5, 1776.

Among the broad-leaved, yellow-flowered, hardy Sedums this variable species may be always recognized by its numerous barren stems and creeping habit. Its linear sepals also separate it from all its allies except *S. floriferum*. Its style of growth recalls the pink-flowered *S. spurium* rather than any of the Aizoon group, but, unlike that species, it possesses the thick woody rootstock which is characteristic of its section. It varies considerably in size; in colour (from light green to dark green flushed with red); in size of flower (from $\frac{5}{8}$ inch to $\frac{7}{8}$ inch in diameter), the largest-flowered forms having very broad sepals ($\frac{1}{8}$ inch wide) and petals ($\frac{3}{8}$ inch wide) and broad leaves (see fig. 65, upper half); and in shape of leaf, the width ranging from one-fourth to three-fourths of the breadth. The narrow-leaved forms closely resemble the broad-leaved form of *S. Middendorffianum*, but the creeping habit, linear sepals, &c., distinguish the former. The average plant most resembles *S. kamschaticum*, but in addition to the characters of habit, sepals, and fruit already mentioned, its unbranched flower-stems and smaller leaves and flowers give it a different appearance; the orange and red tints which so frequently adorn *kamschaticum* are absent, and instead a greenish hue pervades the buds and fading flowers, and the fruit is green.

DESCRIPTION.—An evergreen perennial, forming a loose mat, with barren and flowering shoots. *Rootstock* becoming thick and woody. *Stems* creeping and branching, round, bare; branches ascending, leafy, about 6 inches long. *Leaves* alternate, glabrous, about 1 inch long by $\frac{1}{4}$ to $\frac{1}{2}$ inch wide, oblanceolate to spatulate, coarsely toothed in upper half, entire and tapering in lower half, scarcely stalked, green, teeth often tipped red. *Inflorescence* a terminal, much branched, leafy, umbellate, flattish cyme about 2 inches across; bracts resembling the leaves, uppermost very small, entire. *Flowers* yellow, $\frac{1}{2}$ inch across. *Buds* oblong, pointed, with greenish ribs and spreading sepals. *Sepals* green, unequal, linear to oblong, subterete, distant, blunt, persistent in fruit, calyx-tube very short. *Petals* yellow, twice the sepals, wide-spreading, lanceolate, concave, with a short mucro behind the hooded tip. *Stamens* $\frac{2}{3}$ the petals, filaments yellow, anthers orange. *Scales* small, whitish. *Carpels* greenish-yellow, with long subulate styles, compressed, green or red, erect in flower and semi-erect in fruit, connate only at the very base.

Flowers sparingly in May, more abundantly in August and September. Hardy.



FIG. 65.—*S. hybridum* Linn.

HABITAT.—East and Central Siberia ; Mongolia.

It is unusual among Sedums in having a double flowering period ; the spring bloom is borne by a few of the strongest shoots of the autumn, and a more abundant bloom appears in late summer. Described as being scabrous, but this character is not apparent in my plants to any appreciable degree.

Frequent in cultivation, but often under erroneous names, such as *Aizoon* and *dentatum*. The name chosen by LINNÆUS for the species conveys the false impression that it is a hybrid.

SECTION VI.—MEXICANA.

MEXICANA (*sectio nova*).

Perennial. Roots fibrous. Rootstock thickening horizontally, or contracted. Stems tufted, erect (at least at first), usually biennial, dying to the root after flowering, the succeeding set usually arising while the preceding set is flowering, so that the plants are evergreen. Flowers hermaphrodite, 5-parted, mostly white, very rarely red or yellow.

Tender Mexican plants.

Series I. SEDASTRUM Rose (*pro genere*).

Stems (6–12 inches high) arising from Sempervivum-like basal rosettes of leaves, which may continue for a year or more before they shoot up to flower. Carpels hollowed behind the scales.

A rather distinct group of soft, fleshy, often downy, Mexican plants, which Rose has considered sufficiently distinct to form a genus, but the only feature which they possess not found in any other Sedums is the peculiar depression in the lower part of the outer face of the carpel, into which the hypogonous scale is pressed. A somewhat similar hollowing out to receive the scales is found in the *petals* of *S. indicum* Hamet.

glabrum nov. comb.

ebracteatum Moç. and Sessé.

pachucense nov. comb.

rubricaulis nov. comb.

Hemsleanum Rose.

chapalense S. Watson.

43. *Sedum glabrum* nov. comb. (fig. 66).

SYNONYM.—*Sedastrum glabrum* Rose in "N. Amer. Flora," 22, 58, 1905.

A well-marked member of the *Sedastrum* group, differing from all the rest in being completely glabrous throughout. The red markings on its white petals are also characteristic, and very rare in the genus *Sedum*.

DESCRIPTION.—Totally glabrous, pale green, very fleshy. *Rootstock* soft, very fleshy, spreading horizontally. *Barren stems* extremely short. *Flowering stems* erect, round, smooth, leafy, about 8 inches long (Rose). *Leaves* alternate, those of barren stems forming a lax rosette, oblong-obovate (ovate—Rose), not narrowed at base, obtusely pointed at apex, flat or concave on face, much rounded on back, $1\frac{1}{2}$ inch long, nearly $\frac{1}{2}$ inch broad, $\frac{1}{4}$ inch thick ; those of the

flower-stems similar but smaller. *Inflorescence* terminal, slightly branched, few-flowered, with small leaf-like bracts below the sessile flowers. *Flowers* flattish, $\frac{3}{8}$ inch across. *Sepals* unequal, ovate, blunt, very fleshy, $\frac{1}{3}$ to $\frac{1}{2}$ the petals, pale green. *Petals* broadly ovate, obtuse, patent above, wavy, white with a purple midrib and a cluster of vein-like purple markings on either side of it, $\frac{1}{4}$ way up from the base. *Stamens* equalling the petals, adnate in the lower third, filaments

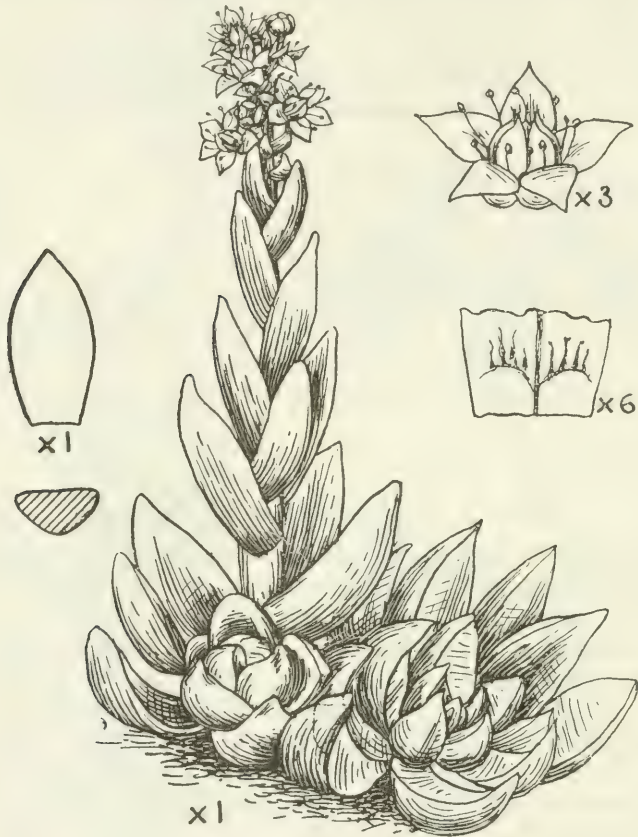


FIG. 66.—*S. glabrum* nov. comb.

greenish, anthers reddish. *Scales* minute, ovate, greenish, set in a slight hollow in the carpels. *Carpels* stout, ovate, strongly mammillate, streaked and dotted with purple, at first erect, later slightly spreading, tapering into short, straight, erect styles.

Flowers August. Not hardy.

HABITAT.—Saltillo, Mexico.

Received from Washington. The plant as figured here was not yet fully grown.

44. *Sedum pachucense* nov. comb. (fig. 67).

SYNONYM.—*Sedastrum pachucense* C. H. Thompson in *Trans. Acad. Sciences, St. Louis*, 20, 21–22, pl. X., 1911.

ILLUSTRATION.—*l.c.* (photo.).

A well-marked *Sedastrum*, with dense, small *Sempervivum*-like leaf-rosettes and tallish few-flowered stems. It comes very near

S. Hemsleanum Rose, but its rosette-leaves are long, oblanceolate to spatulate (not orbicular), and its stem-leaves linear-oblong and

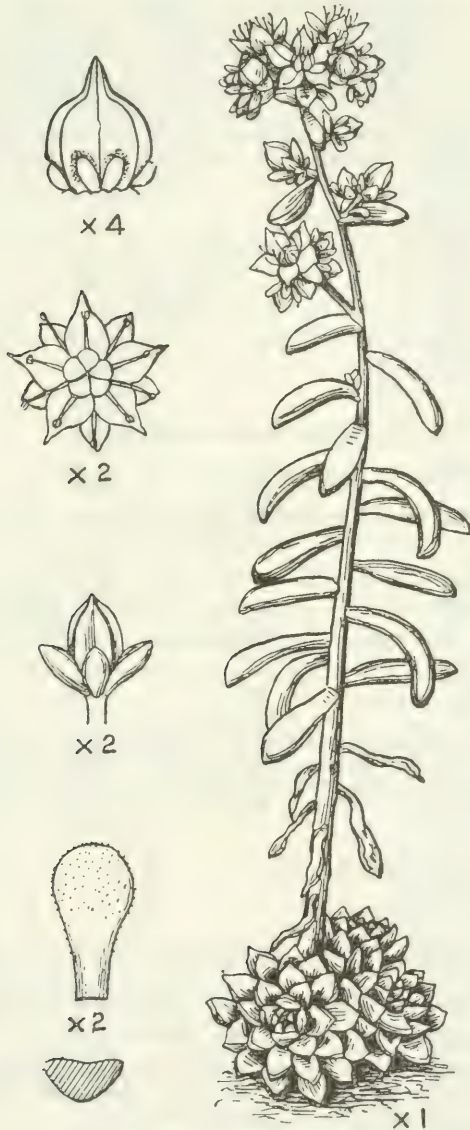


FIG. 67.—*S. pachucense* nov. comb.

glabrous (not linear or lanceolate, puberulent), sepals lanceolate (not broadly ovate), styles short (not long, slender).

DESCRIPTION.—A very fleshy, evergreen perennial. *Barren stems* extremely short, bearing *Sempervivum*-like leaf rosettes. *Flowering stems* fleshy, weak, smooth, green with short longitudinal purple lines, 6–8 inches long. *Leaves* of rosettes alternate, sessile, oblong-spathulate, rather acute, flattish on face, rounded below, very fleshy, bright green, hairy chiefly on the edges, $\frac{1}{2}$ –1 inch

long; leaves of flowering branches sessile, linear-oblong, blunt, reflexed, almost smooth, shining, $\frac{3}{4}$ inch long. *Inflorescence* lax, of a terminal, and short lateral cymes. *Flowers* nearly sessile, white, $\frac{3}{8}$ inch across. *Buds* ovate, blunt, with strong green ribs. *Sepals* leaf-like, very fleshy, blunt or bluntly apiculate, lanceolate, slightly unequal, wide-spreading. *Petals* ovate, acute, wide-spreading, $\frac{1}{2}$ longer than the sepals, slightly greenish white, furrowed down the middle. *Stamens* erect, nearly equalling the petals, the epipetalous ones attached near the base, filaments white, anthers pale purple. *Scales* yellow, linear, twice as long as broad, curved upwards, set in a shallow oval dark-green hollow of the carpel with a raised lip, giving the appearance of an oval dark-green scale with a yellow median portion. *Carpels* papillose, turgid, very erect, slightly spreading later, shorter than the stamens, green, sometimes dotted purple on the edges, styles erect, very short.

Flowers January. Not hardy.

HABITAT.—Mexico: Pachuca, Hidalgo, and apparently elsewhere.

Plants kindly sent me by Dr. Rose, labelled as *S. Hemsleanum* Rose, collected in Mexico by C. A. Purpus in 1905, clearly belong to the recently described *S. pachucense*; at that time the two species had not been separated.

45. *Sedum Hemsleanum* Rose.

S. Hemsleanum Rose in *Bull. New York Bot. Gard.* 3, 41, 1903.

SYNONYM.—*Sedastrum Hemsleyanum* Rose in "N. Amer. Flora," 22, 58, 1905.
ILLUSTRATION.—*Trans. Acad. Sci. St. Louis*, 20, pl. 11, 1911 (photo).

Very near the last species, under which the differences between the two are indicated. As mentioned under *S. pachucense*, plants received from Washington as *Hemsleanum* proved to belong to the former species; but according to Thomson (*l.c.*) both species are in cultivation at St. Louis.

DESCRIPTION.—"Perennial, caulescent, 1–3 dm. high, branching, puberulent. *Inflorescence* an elongated panicle; flowers sessile, arranged along one side of the axes; calyx-lobes broadly ovate, obtuse, 1.5 mm. long; petals white, 4 mm. long, ovate, acuminate; carpels 5, tipped with long, slender styles."—Rose, *loc. cit.*

Flowers winter. Not hardy.

HABITAT.—Mexico.

46. *Sedum ebracteatum* Moç. and Sessé (fig. 68).

S. ebracteatum Moç. and Sessé ex De Candolle "Mémoire Crassul.," 37, 1828; Hemsley, "Biol. Centr. Amer.," 1, 394.

SYNONYM.—*Sedastrum ebracteatum* Rose in "N. Amer. Flora," 22, 59.

ILLUSTRATION.—De Candolle, *l.c.*, pl. 6, B. Saunders' "Refug. Botan.," pl. 221.

The most familiar member of the *Sedastrum* group, which Dr. Rose raises to the rank of a genus, and which is characterized by its basal dense leaf-rosettes, flowering-branches dying back to the base after flowering, and ovate carpels hollowed behind the scales. The present species is a lax, weak, tall, fleshy plant, with very pubescent stems and pubescent very broad leaves. It comes nearest *S. rubri-caule* Rose, which is stated to differ in its much less pubescent and purplish (not green or only slightly purplish) stem, &c. (but plants

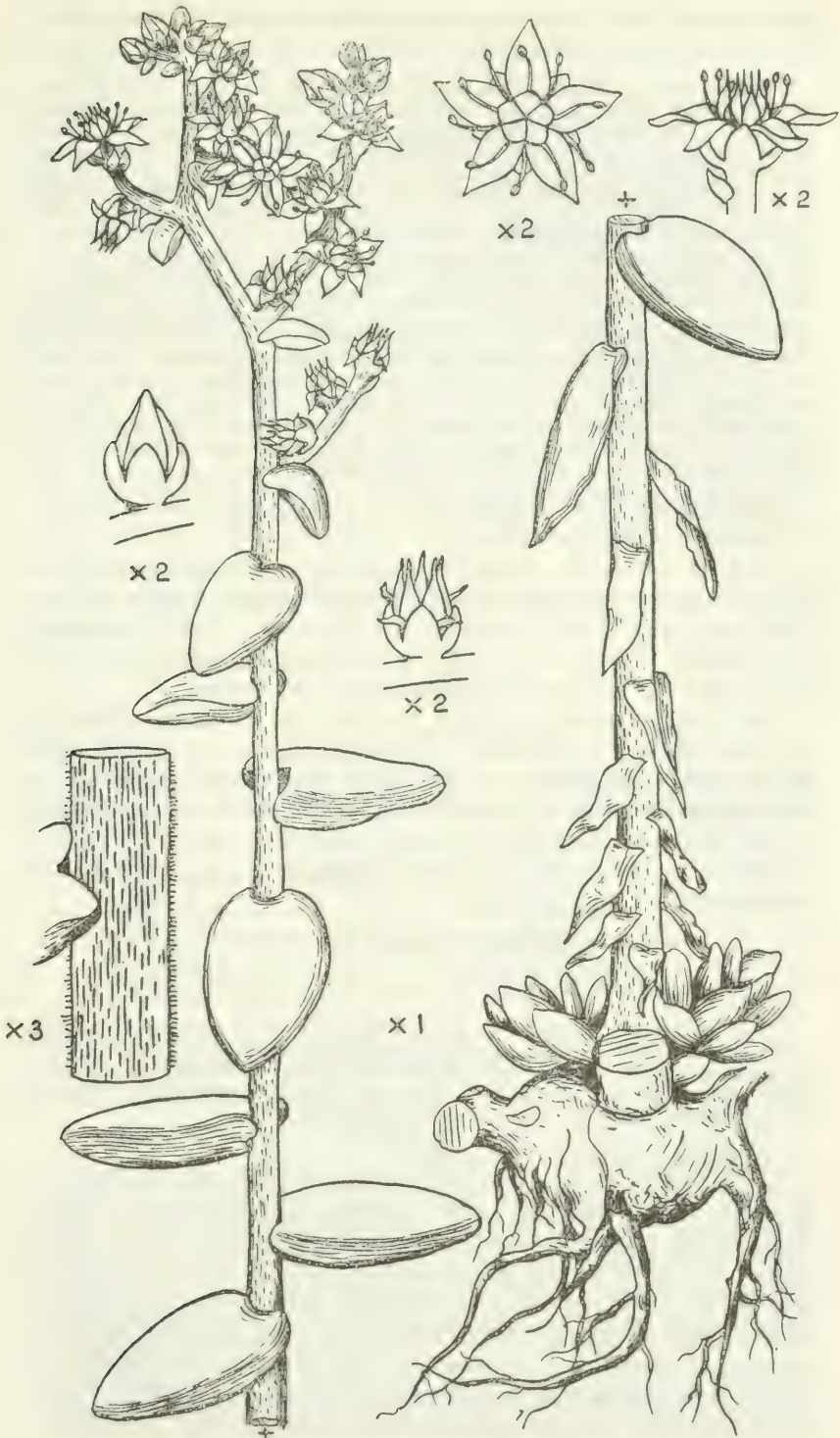


FIG. 68.—*S. ebracteatum* Moç. and Sessé.

sent to Kew from Washington named *rubricaula* were indistinguishable in flower from *ebracteatum*).

DESCRIPTION.—A bright green, fleshy, soft, downy perennial, forming basal rosettes which shoot up, flower, and die in the following season. *Rootstock* horizontal, very fleshy, greenish, knotted with the round, flat scars of former stems above, bearing shortish, fleshy roots below. *Stems* of the barren shoots extremely short, bearing a loose rosette of leaves an inch across; those of the flowering shoots a foot high, erect, stout, round, finely hairy, unbranched, green, or marked especially above with many short purple longitudinal lines, leafy. *Leaves* alternate, soft, very fleshy, downy on both sides, ovate, very broad at base, bluntly pointed at apex, flat on face, rounded on back, bright green; those of the barren shoots crowded in a rosette, those of the flowering shoots patent or deflexed, clasping, exceeding the internodes, an inch long. *Inflorescence* terminal, very lax, 2–3 inches long and broad, of 3 to 5 alternate axillary few-flowered almost bractless branches. *Flowers* sessile, whitish, $\frac{1}{2}$ inch across. *Buds* ovate, very blunt. *Sepals* equal or nearly so, downy, very fleshy, ovate, divided half way down, rather acute, wide-spreading, more or less dotted with purple. *Petals* white with a greenish nerve, ovate, acute, patent, twice the sepals. *Stamens* erect, nearly equalling the petals, filaments white, anthers yellow. *Scales* ovate, blunt, fleshy, greenish, translucent. *Carpels* stout, erect, equalling the stamens, hollowed out behind the scales, styles short, whitish.

Flowers October. Not hardy.

HABITAT.—Hidalgo, Mexico.

Long in cultivation, though very rarely seen. Saunders figured it in 1871 from specimens in his glass-houses, and gave plants to Kew. I owe my plant to the kindness of Dr. Rose and of the Director at Kew, where the species is still in cultivation; received also from La Mortola, and seen in the Botanic Garden at Dresden.

In "North American Flora" (*loc. cit.*) the sepals are described as "very unequal and leaf-like." This character is not mentioned or shown in the descriptions or figures of De Candolle, Hemsley, or "Refugium Botanicum," and in the living and dried specimens which I have examined the sepals are small, ovate, and regular.

The name refers to the poor development of bracts on the inflorescence.

47. *Sedum rubricaula* nov. comb.

Sedastrum rubricaula Rose in "N. Amer. Flora," 22, 59, 1905.

DESCRIPTION.—"Stems about 30 cm. high, somewhat pubescent, greenish below, purplish above. Basal rosettes dense; leaves ovate, thick, rather obtuse; stem-leaves acutish, bright green; flowers on ultimate branches 3 or 4, sessile; calyx green, cleft to near the middle; petals broadly ovate, white; stamens erect; anthers yellowish; carpels erect."—Rose, *loc. cit.*

HABITAT.—Mexico. Not hardy.

Described by ROSE from specimens which flowered in Washington in 1903. I do not know the plant; specimens sent to Kew from Washington which flowered in 1917 proved indistinguishable from *S. ebracteatum*, and there is little in the description to separate it from that species. The stems of *rubricaula* are stated to be more hairy and more suffused with purple than in its ally, and the leaves ovate instead of obovate or spatulate; but according to the original description the leaves of *S. ebracteatum* are ovate, and HEMSLEY describes them as oval-oblong. So far as I have had an opportunity of studying

S. ebracteatum, it varies as regards hairiness and colour of stem and shape of leaf sufficiently to include *S. rubricaulis*.

The name refers to the red colour of the stems.

48. *Sedum chapalense* S. Watson.

S. chapalense S. Watson, *Proc. Amer. Acad.*, **22**, 411, 1887.

SYNONYM.—*Sedastrum chapalense* Rose in "N. Amer. Flora," **22**, 59, 1905.

Distinguished from the other *Sedastrums* in cultivation by its small size (about 4 inches high), glabrous stems (though the leaves are slightly pubescent), and thin stem-leaves. Plants sent from Washington by Dr. Rose unfortunately died before flowering, so I have not had an opportunity of studying the plant.

DESCRIPTION.—*Stems* stout, about 4 inches high, much branched above, glabrous, yellowish-green. *Leaves* slightly pubescent, those of the barren shoots rosulate, obovate, or ovate, rather acute, $\frac{1}{2}$ inch long, stem-leaves rather thin. *Flowers* sessile, arranged along one side of the branches, 5-parted. *Calyx* slightly pubescent, lobes unequal, oblong-ovate, rather acute. *Petals* oblong-ovate, acute, $\frac{1}{3}$ inch long, white. *Stamens* 10. *Scales* small. *Carpels* equalling the petals.

HABITAT.—Mexico. Not hardy.

The above description is taken from those of S. Watson and Rose (*loc. cit.*).

Named after the type locality, Chapala.

Series II. ALAMOSANA.

Small (3–6 inches high). Leaf-rosettes absent, or small and lax. Stems annual or lasting up to eighteen months. Carpels not hollowed behind the scales.

alamosanum S. Watson.

mellitulum Rose.

Cockerellii Britton.

Wrightii A. Gray.

potosinum Rose.

lenophylloides Rose.

bellum Rose.

versadense Thompson.

diversifolium Roë.

49. *Sedum alamosanum* S. Watson (fig. 69).

S. alamosanum S. Watson in *Proc. Amer. Acad.*, **25**, 148, 1890.
"N. Amer. Flora," **22**, 62, 1905.

A handsome little Mexican species, near to *S. mellitulum*, with which it has been confounded. The very dense-leaved glaucous young shoots, few-flowered inflorescence, bright-red buds, reddish-white flowers, and early vernal blooming, sufficiently distinguish it from *S. mellitulum*, which is laxer and greener in growth, with longer leaves, a compact, flattish inflorescence, greenish-white buds, and quite white flowers which open in autumn.

DESCRIPTION.—A small glaucous perennial. *Stems* tufted, erect, afterwards diffuse, often slightly branched, 3–5 inches long. *Leaves* crowded, $\frac{1}{4}$ inch long, linear-oblong, blunt, ascending, very glaucous, ultimately reddish, covered, save

on face, with minute pimples. *Cymes* terminal, small, few-flowered. *Buds* bright red. *Flowers* $\frac{3}{8}$ inch across, shorter than the pedicels. *Sepals* spreading,

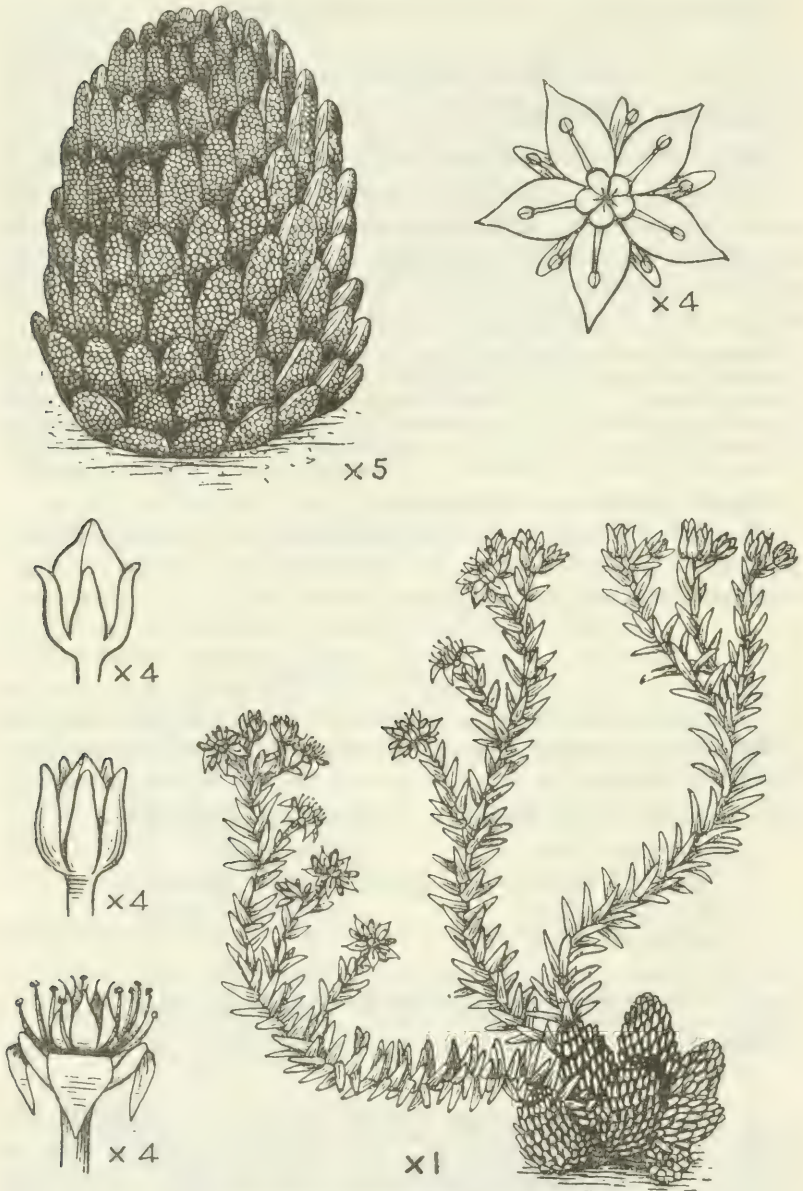


FIG. 69.—*S. alamosanum* S. Watson.

lanceolate, blunt, papillose like the leaves, very fleshy, equalling the petals. *Petals* broadly lanceolate or elliptic, acute, wide-spreading, ultimately sharply reflexed in upper half, reddish-white with a silvery sheen. *Stamens* $\frac{3}{8}$ the petals, spreading, filaments white, anthers purple. *Scales* rather large, thrice as long as broad, whitish, linear, truncate, emarginate. *Carpels* short, reddish-white, erect.

Flowers February-March (gentle heat), March-April (cold frame).
Not hardy.

HABITAT.—Mountains of North-Western Mexico.

The stems of *alamosanum* arise in autumn or winter, grow erect and unbranched till the following autumn, when they become straggling and branch slightly at various points, each branch bearing in the following spring a few flowers at its summit; the stems die after flowering. In these respects they are closely paralleled by those of the green-leaved and yellow-flowered *S. diversifolium*. The corolla, when fully expanded, is flat, and with the equally long and similarly coloured calyx, gives the effect of a ten-petalled pale-reddish flower.

Received from the Botanic Gardens of Washington and New York, also from the Edinburgh and Cambridge gardens in Great Britain.

Named after the Alamos Mountains, Sonora, Mexico, where it was first collected.

50. *Sedum mellitulum* Rose (fig. 70).

S. mellitulum Rose in *Contrib. U.S. Nat. Herb.*, 13, 299, 1911.

ILLUSTRATION.—*Loc. cit.*, pl. 57 (photo).

A neat little plant, easily known by its tuft of erect stems a few inches high, clothed with linear leaves and terminating in a flattish cyme of white flowers. For some years confused in America with *S. alamosanum*, but that has shorter, more glaucous leaves and few-flowered cymes with bright-red buds and pale-reddish flowers; it flowers, moreover, in early spring, while *S. mellitulum* blooms in autumn.

DESCRIPTION.—A small, slender glabrous tufted perennial, without barren shoots. Stems lengthening in spring from short autumn shoots and dying after fruiting, slender, terete, reddish, rough with minute papillæ, 3-4 inches high, sometimes slightly branched. Leaves alternate, green, ultimately reddish, linear-subulate, blunt, terete, slightly spurred, $\frac{1}{4}$ - $\frac{1}{3}$ inch long, set at right angles to the stem; young leaves glaucous, densely papillose. Inflorescence flattish, 1-2 inches across, of 2-3 wide-spreading simple or forked branches with flowers in the forks. Buds ovate, pointed, ribbed, enclosed and exceeded by the cup-shaped calyx. Flowers nearly $\frac{1}{2}$ inch across; pedicels slender, shorter than the flowers. Sepals green, resembling the leaves, wide-spreading, slightly spurred, separate to the base. Petals clear white, ovate, acute, greenish on back, equalling or slightly exceeding the sepals. Stamens nearly equalling the petals, wide-spreading, filaments white, anthers crimson. Scales short, cuneate, retuse, tipped orange. Carpels white, erect, slightly shorter than the stamens, styles divergent.

Flowers September-October. Not hardy.

HABITAT.—Sierra Madre, Mexico.

A pretty plant, as its name implies (*mellitulus*=little darling). It appears to prefer half shade to full sunlight, and dries up easily.

51. *Sedum Cockerellii* Britton (fig. 71).

S. Cockerellii Britton in *Bulletin New York Bot. Gard.*, 3, 41, 1903.

"N. Amer. Flora," 22, 67. Cockerell in *Gard. Chronicle*, 25 Jan. 1919.

A small, pale-green plant, recognizable among the white-flowered Mexican species by its flat, spatulate pointed root-leaves, narrowly lanceolate stem-leaves, linear sepals, and lanceolate petals.

DESCRIPTION.—A small glabrous evergreen perennial. *Roots* fibrous. *Stems* annual, smooth, round, arising in autumn, bearing a small tuft of leaves during the winter. *Flower-stems* erect or ascending, from 2 inches (my plants) to 8 inches (Britton description) high, leafy, simple or branched. *Leaves* alternate, glabrous, flat, fleshy, sessile, shortly spurred; the basal ones spatulate, bluntly pointed, tapered below, $\frac{1}{2}$ inch by $\frac{1}{4}$ inch or more; the upper linear-lanceolate, rather acute, $\frac{1}{2}$ inch by $\frac{1}{3}$ inch (in my plants), $\frac{3}{8}$ inch to 1 inch by $\frac{1}{4}$ inch (Britton).



FIG. 70.—*S. mellitulum* Rose.

Inflorescence a terminal 2-3-branched cyme, 1 inch (to 2 inches) across. *Buds* ovate-lanceolate, ribbed. *Flowers* white, $\frac{1}{2}$ inch across. *Sepals* green, leaf-like, long, linear, rather acute, slightly unequal, slightly spurred, separate nearly to the base. *Petals* wide-spreading in the upper part, narrowly lanceolate (to linear oblanceolate—Britton), acute, a little longer than the sepals, $\frac{1}{4}$ inch long, white, grooved. *Stamens* spreading, slightly shorter than the petals, filaments pink, anthers purple. *Carpels* slender, erect, shorter than the stamens, pink.

Flowers August. Not hardy.

HABITAT.—Mountains of New Mexico.

My specimens, which were received from the Smithsonian Institution, did not grow freely, nor did some of them which were cultivated

at Glasnevin; the description made from these small plants has been supplemented therefore by notes from the description in "North

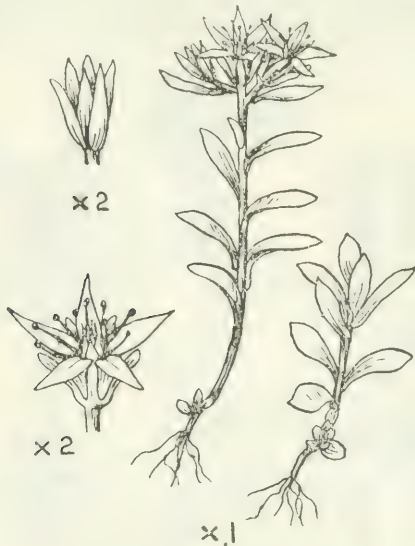


FIG. 71.—*S. Cockerellii* Britton.

American Flora." Some further information is contained in Prof. COCKERELL'S note (*loc. cit.*).

The name is in honour of T. D. A. COCKERELL, the first collector of the plant.

52. *Sedum Wrightii* A. Gray (fig. 72).

S. Wrightii A. Gray, "Plantae Wrightianae," 1, 76, 1852. Rose in "N. Amer. Flora," 22, 72.

A pretty little *Sedum*, not closely resembling any other species in cultivation. Partly on account of the way the little, thick obovate leaves readily drop off and root, a close tuft of tiny bright-green rosettes is formed around the fleshy rootstock, from among which leafy flower-stems rise, often decumbent under their own weight, bearing small white, rather bell-shaped, flowers, the lower part of the petals being erect, the upper part spreading, broad, apiculate, hiding the blunt oblong sepals. The carpels are purple on the inner face.

DESCRIPTION.—A small glabrous evergreen perennial. *Rootstock* fleshy, large, decked during winter with many minute leaf-rosettes, some of which elongate in summer into smooth, round, leafy flowering stems, erect (at least at first), 3-4 inches high (in cultivated plants; 8-20 inches according to Rose), simple or branched. *Leaves* alternate, crowded, sessile, extremely fleshy, flat above, very convex beneath, obovate to rhomboidal, tapering at base, rounded or bluntly pointed at apex, minutely papillose especially when young, bright green, becoming smaller, narrower, and dotted with red above, about $\frac{3}{8}$ inch long by $\frac{1}{4}$ inch broad at base of flowering stem, half that size on barren shoots and at top of flowering stem. *Inflorescence* terminal, compact, flattish, of 2 or 3 usually simple branches, an inch across. *Buds* oblong-ovate, the corolla almost hidden by the long erect sepals. *Flowers* almost sessile, $\frac{3}{8}$ inch across.

Sepals large, very fleshy, oblong, blunt, rather unequal, green dotted with red, resembling the upper leaves, equalling the erect part of the corolla. *Petals* erect below, wide-spreading above, oblong-obovate, obtuse, apiculate, white, with a greenish keel on upper part of back and a groove on face. *Stamens* shorter than the petals, spreading, filaments white, anthers purple. *Scales* spreading, cuneate,



FIG. 72.—*S. Wrightii* A. Gray.

as broad as long, yellow. *Carpels* white, purple on the inner face, erect, with diverging styles, shorter than the stamens.

Flowers September-October (cold frame). Not hardy.

HABITAT.—South-western North America.

Received from the Smithsonian Institution by the kindness of Dr. ROSE. The plants were collected in Mexico by Dr. PALMER.

Named after CHARLES WRIGHT, the first collector of the plant.

53. *Sedum potosinum* Rose (fig. 73).

S. potosinum Rose in *Contrib. U.S. Nat. Herb.*, 13, 300, 1911.

A distinct, but not very interesting, smallish plant, which may be recognized by its rather creeping habit, pale glaucous-green tint, often with a pinkish flush, blunt, linear, nearly terete leaves, and white flowers. It does not resemble at all closely any other tender *Sedum* in cultivation.

DESCRIPTION.—A smallish, rather weak and brittle, evergreen perennial of a pale glaucous, often pinkish, colour. *Stems* rooting below, ascending, smooth, round, pink, branched, 3-6 inches high. *Leaves* of barren shoots crowded,

ascending, blunt, linear, terete, $\frac{3}{8}$ inch to $\frac{1}{2}$ inch long, pale often pinkish glaucous green, with a short blunt spur; those of the flowering shoots larger, about $\frac{1}{2}$ inch by $\frac{1}{8}$ inch, linear-lanceolate, rather flattened. *Inflorescence* cymose, of 2 or 3 small, lax, leafy scorpioid branches, one of them usually longer than the other two. *Buds* slender, pointed. *Flowers* $\frac{1}{8}$ inch across, sub-sessile. *Sepals* pale-green or pink, fleshy, linear-lanceolate, blunt, separate almost to the

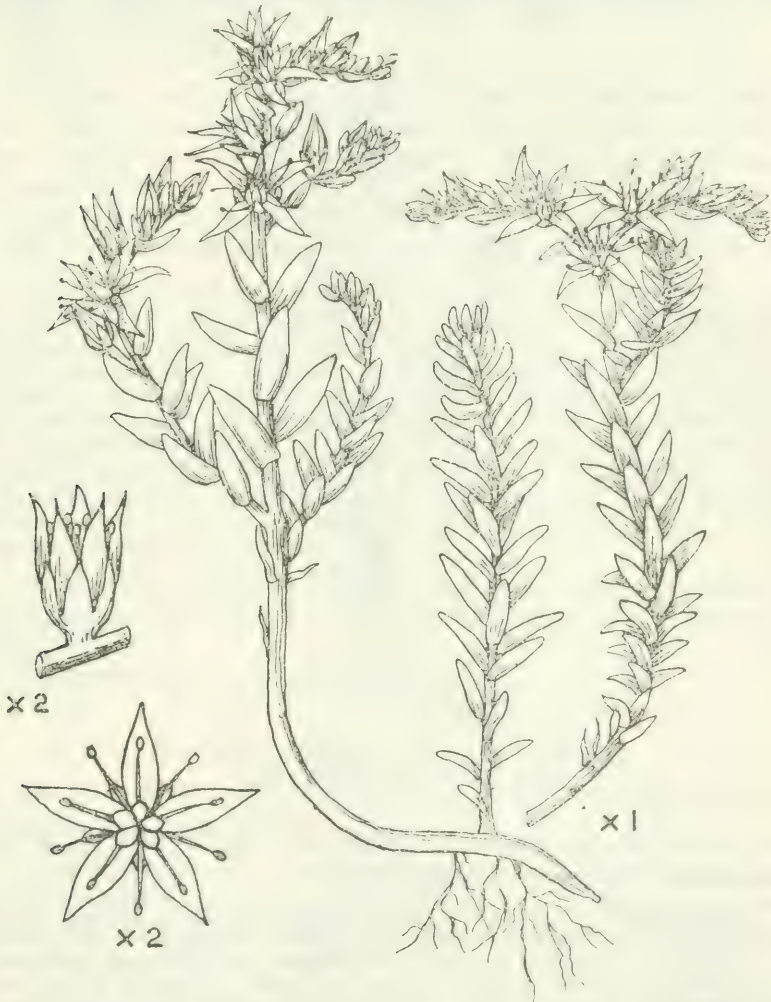


FIG. 73.—*S. potosinum* Rose.

base. *Petals* white, wide-spreading, linear-lanceolate, acute, flushed red on back, twice the sepals. *Stamens* $\frac{3}{4}$ the petals, filaments white, anthers purple. *Scales* small, white. *Carpels* erect, equalling the stamens, white, styles pink.

Flowers July (gentle heat); August (cold frame). Not hardy.

HABITAT.—Mexico.

Received from Washington, New York, and Edinburgh; also from Haage and Schmidt, of Erfurt.

The name is derived from San Luis Potosi, where the plant grows.

54. *Sedum lenophylloides* Rose (fig. 74).

S. lenophylloides Rose in *Contrib. from U.S. Nat. Herb.*, **13**, 298, 1911.

A distinct little Mexican plant, known by its finely scabrid surface, strict erect stems, with broadly lanceolate leaves usually trough-



FIG. 74.—*S. lenophylloides* Rose.

shaped on face, greenish-white petals, and large orange scales. It is not very close to any other species.

DESCRIPTION.—A slightly scabrid perennial. *Rootstock* woody. *Stems* erect, strict, slender, leafy, 2–12 inches high, somewhat branched. *Leaves* patent, rather crowded, alternate at least above, sessile, entire, broadly lanceolate, tapered at base, bluntly pointed at apex, very fleshy, concave or flat on face, much rounded on back, about $\frac{1}{2}$ inch long, $\frac{3}{8}$ inch broad, $\frac{1}{16}$ inch thick, green when young, purple when old. *Inflorescence* a short terminal panicle. *Sepals* ovate, green. *Petals* lanceolate, greenish white. *Stamens* 10. *Scales* large, orange. *Carpels* at first erect, later more or less spreading, styles long, slender.

Flowers September. Not hardy.

HABITAT.—Monterey, Mexico.

My plants have not done well, but the figure conveys an idea of its habit and leaves. The description is completed from Rose's diagnosis.

The name refers to its resemblance, particularly in leaf, to *Lenophyllum*, a small genus of Mexican Crassulaceae.

55. *Sedum bellum* Rose (fig. 75).

S. bellum Rose MS.

SYNONYM.—*S. farinosum* Rose in *Contrib. U.S. Nat. Herb.*, 13, 297, 1911, pl. 54 (not *S. farinosum* Lowe, *Trans. Camb. Phil. Soc.*, 4, 31, 1831, and "Fl. Madeira," 1, 325, 1868, which is a Madeiran species allied to *S. album*, and not, I believe, in cultivation).

ILLUSTRATION.—Rose, *loc. cit.* (photo).

A distinct and attractive little plant, not to be confounded with any other Mexican species. The neat, glaucous, spathulate foliage and large inflorescences of white flowers give it a very pleasing appearance.

Sent under the name *S. farinosum* from Washington and New York, and subsequently from the former under the name of *S. bellum*.

DESCRIPTION.—A mealy-glaucous perennial. *Stems* nearly biennial, few, leafy 3-6 inches, unbranched or slightly branched, arising in spring and flowering in the following spring. *Leaves* sessile, glaucous, entire, spathulate, flat on face, convex on back, covered with minute mealy papillæ when young, set at right angles to the stem, up to 1 inch long, decreasing in size upwards and passing into bracts which continue to the summits of the branches. *Inflorescence* a flattish leafy cyme, large for the size of the plant. *Buds* ovate, rather acute. *Flowers* $\frac{1}{2}$ inch across, shorter than the pedicels. *Sepals* green, fleshy, separate to the base, ovate-lanceolate, bluntish, rather unequal, slightly spurred. *Petals* spreading, white, ovate, acute, slightly wavy, twice the sepals, with a deep median furrow above. *Stamens* spreading, shorter than the petals, filaments white, anthers purple. *Scales* small, yellowish, emarginate. *Carpels* white, spreading, equalling the stamens.

Flowers March-April (gentle heat), May (cold frame). Not hardy

HABITAT.—San Ramon mining camp, 80 miles west of Durango City, Mexico.

The name refers to its pleasing appearance.

56. *Sedum versadense* Thompson (fig. 76).

S. versadense Thompson in *Trans. Acad. Sci. St. Louis*, 20, 23, 1911.

ILLUSTRATION.—*Loc. cit.* pl. 12 (photo).

A very pretty and distinct evergreen species, easily recognized by its spathulate downy leaves tipped with red at the apex and on the edges, and pale rose-coloured flowers arranged in a terminal cyme of 2 or 3 drooping branches.

DESCRIPTION.—A tufted, downy evergreen perennial, the shoots arising in autumn, growing to a height of 4-6 inches during the following season, and flowering in the spring after that. *Stems* decumbent at the base, ascending, densely hairy, glabrous in upper part, unbranched, leafy. *Leaves* very downy, very fleshy, spathulate-cuneate, slightly spurred, with a deflexed bluntly-pointed apex and slightly raised edges, flattish above, much rounded below, green, flushed red at apex and on edges, up to 1 inch by $\frac{1}{2}$ inch. Upper leaves of flowering shoots smaller, narrower, more distant, subacute, glabrous, merging into obovate acute glabrous bracts, one of which subtends each flower. *Inflorescence* glabrous, of 2-3 drooping secund branches 1-1 $\frac{1}{2}$ inch long. *Buds* rosy, ovate. *Flowers* $\frac{3}{4}$ inch across, the lower ones stalked. *Sepals* unequal, oblong-lanceolate or oblanceolate-apiculate, not spurred, divided almost to the base, ascending, the tips standing up between the petals. *Petals* oblong-lanceolate, white, flushed rose in the upper portion, rose on back, deflexed, keeled, slightly exceeding the sepals. *Stamens* $\frac{1}{2}$ - $\frac{3}{4}$ the petals, filaments white, anthers bright

rose-red, wide-spreading. Scales small, spreading, rounded, almost colourless. Carpels equalling the stamens, white, the short styles slightly spreading.



FIG. 75.—*S. bellum* Rose.

Flowers May (gentle heat); July–September (cold frame). Very sensitive to frost.

HABITAT.—Versada, Oaxaca, Mexico.

My plants came from the Missouri Botanic Garden (whence it was first described) and from Washington (unnamed), and Edinburgh (unnamed).

The glabrous flowering shoot, a couple of inches in length, arises

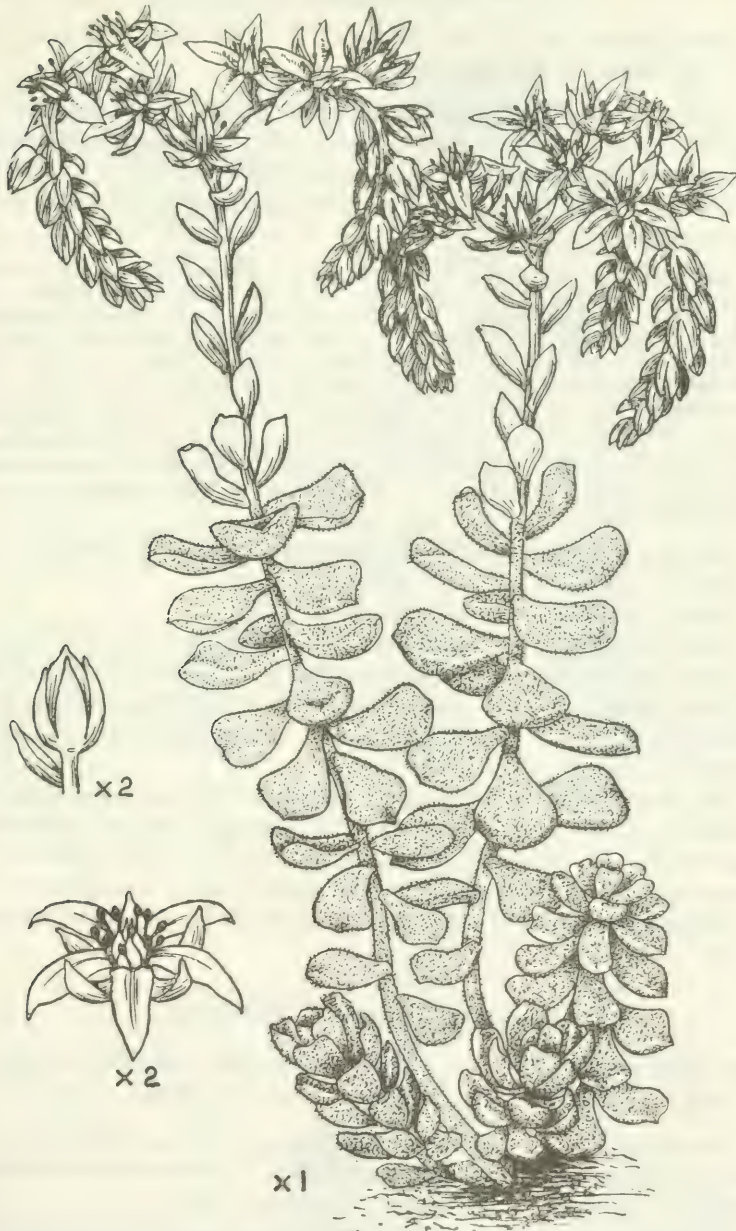


FIG. 76.—*S. versadense* Thompson.

from the summit of the hairy shoot of the previous year, the leaves becoming abruptly small and quite glabrous.

The species takes its name from the locality where it was discovered.

57. *Sedum diversifolium* Rose (fig. 77).

S. diversifolium Rose in *Bulletin New York Bot. Garden*, 3, 44, 1903.
 "N. Amer. Flora," 22, 73.

A delicate, very succulent, fresh green little plant, recognized by its tufted habit, annual stem crowded with shining pellucid leaves very convex on both sides, and few sessile yellow flowers. The leaves fall off very easily and at once form new plants from buds at the point of detachment.

DESCRIPTION.—A glabrous tufted perennial. *Stems* annual, weak, at first erect, unbranched, later decumbent with a few branches, round, smooth, 4-8 inches long. *Leaves* alternate, those of the young shoots densely imbricate, slightly glaucous, flat, fleshy, papillose, obovate, sessile, $\frac{1}{10}$ inch long; those of the flowering shoots caducous, bright green, crowded, patent, $\frac{1}{4}$ - $\frac{1}{2}$ inch long, very fleshy, very convex on both sides, narrower and smaller near summit. *Inflorescence* of a terminal flower with one or two on either side. *Buds* ovate, rather acute. *Flowers* $\frac{3}{8}$ inch across, pedicels short. *Sepals* unequal, ascending, resembling the leaves. *Petals* clear yellow, wide-spreading, broadly lanceolate, acute, twice the sepals. *Stamens* spreading, yellow, $\frac{2}{3}$ the petals. *Scales* whitish, rectangular, longer than broad. *Carpels* yellow, slightly spreading, shorter than the stamens.

Flowers February-March (gentle heat); May (cold frame). Not hardy.

HABITAT.—State of Mexico, Mexico.

In his description of the species, Dr. ROSE says that the flowers are pale yellow, inconspicuous, and solitary. In the plants he sent me, and others received from New York, which have flowered at Glasnevin, they are clear yellow, fairly conspicuous, and usually in threes.

The young shoots arise in winter, before the old ones have flowered, so that the stems have a life of about 18 months; but the specimens observed by Dr. ROSE at Washington and New York bloomed in December. In the young stages they recall those of *S. longipes*.

Named on account of the difference between the young and mature leaves.

SECTION VII.—SEDA GENUINA.

Section SEDA GENUINA Koch, "Synopsis Deutsch. und Schweiz. Flora," 259, 1836; EUSEDUM, Boissier, "Flor. Orientalis," 2, 775.

Perennial. Stems perennial, creeping or erect and sub-shrubby, bearing barren and annual flowering shoots. Flowers hermaphrodite, usually 5- (rarely 4- to 9-) parted. Hardy or tender.

This section contains several well-marked groups of closely related species with a defined geographical range, such as the Involucrata (*spurium*, *stoloniferum*, *proponticum*, *Stevenianum*) from the Caucasus region, the Spathulifolia (*spathulifolium*, *yosemitense*, *rubroglaucum*, *Hallii*, *oreganum*, *divergens*) from Western North America, the Rupestris (*rupestre*, *reflexum*, *altissimum*, *anopetalum*, *stenopetalum*, *pruinatum*, *amplexicaule*) from Europe, with one in America; also a

number of plants, largely European and Mexican, with few or no close allies, displaying a wide range of characters. The most

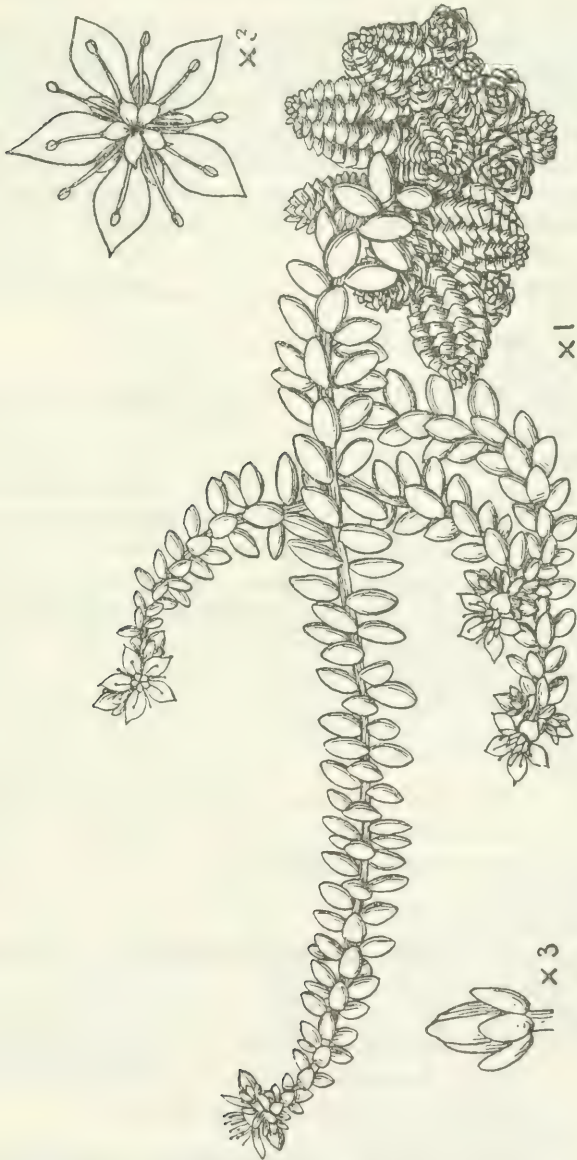


FIG. 77.—*S. diversifolium* Rose.

convenient subdivision of this large and heterogeneous section is founded on flower-colour, growth-form, and leaf-shape.

Among Old World Sedums, *S. populifolium*, with its twiggy, erect growth, differs much from the typical *Seda Genuina*; but in Mexico many species occur of habit linking up *populifolium* with the others, and pointing to its inclusion with them among the *Seda Genuina*.

The anomalies displayed by the Mexican representatives of the section have already been discussed on p. 24. It seems best to widen the definition of KOCH to include the sub-shrubs so characteristic of the Mexican *Sedum*-flora.

Included in the *Seda Genuina* are also the yellow-flowered Japonica series of Maximowicz from China and Japan (of which *SS. Celiae* Hamet, *japonicum* Siebold, *lineare* Thunberg, *multicaule* Wallich, *sarmentosum* Bunge, *Chauveaudi* Hamet, *trullipetalum* H. f. and T., *varicolor* Praeger, *Zentaro-Tashiroi* Makino, are in cultivation), the ovoid-leaved *S. nudum* and *S. lancerottense* from the Atlantic Islands, and the peculiar white-flowered *S. Chaneti* from China.

GENERAL ARRANGEMENT OF THE SEDA GENUINA.

A. Flowers white.

(a) Sub-shrubs.

populifolium, *retusum*, *Adolphi*, *frutescens*, *allantoides*, *Bourgaei*, *guadalajaranum*, *griseum*.

(b) Herbs.

(1) Leaves flat: *ternatum*, *Nevii*, *adenotrichum*, *Chaneti*, *alsinefolium*, *magellense*, *monregalense*, *moranense*, *Liebmannianum*, *compactum*.

(2) Leaves terete or sub-terete: *dasyphyllum*, *brevifolium*, *anglicum*, *album*, *gypticolum*, *hirsutum*, *Lydium*, *gracile*, *Alberti*.

B. Flowers red or purple.

(a) Sub-shrub.

oxypetalum.

(b) Herbs.

(1) Leaves flat: *spurium*, *stoloniferum*, *proponticum*, *Stevenianum*, *rhodocarpum*, *longipes*.

(2) Leaves terete: *pulchellum*.

C. Flowers yellow.

(a) Sub-shrubs.

nutans, *praealtum*, *dendroideum*, *confusum*, *amecamecanum*, *pachyphyllum*, *Treleasei*.

(b) Herbs.

(1) Leaves opposite or whorled: *rubroglaucum*, *divergens*, *Stahlii*, *Zentaro-Tashiroi*, *Chauveaudi*, *sarmentosum*, *lineare*, *mexicanum*.

(2) Leaves alternate.

(i.) Leaves spatulate, flat: *Palmeri*, *compressum*, *varicolor*, *spathulifolium*, *yosemitense*, *Hallii*, *oreganum*.

(ii.) Leaves not broadest above (ovate to linear): *humifusum*, *cupressoides*, *acre*, *Stribrnyi*, *oaxacanum*, *nudum*, *lancerottense*, *japonicum*, *alpestre*, *Douglasii*, *multicaule*, *trullipetalum*, *Celiae*, *multiceps*, *sexangulare*, *rupestre*, *reflexum*, *altissimum*, *anopetalum*, *steno-petalum*, *pruinatum*, *amplexicaule*.

A. FLOWERS WHITE.

(a) *Sub-shrubs.*

Except for the Siberian *S. populifolium*, which stands quite apart as regards growth-form from all other Eurasian Sedums, the species grouped here are Mexican; of these, *Bourgaei*, *guadalajaranum* and *griseum* are closely allied to each other.

The following white-flowered sub-shrubby species are in cultivation.

<i>populifolium</i> Pallas	<i>allantoides</i> Rose
<i>retusum</i> Hemsley	<i>Bourgaei</i> Hemsley
<i>Adolphi</i> Hamet	<i>guadalajaranum</i> S. Wats.
<i>frutescens</i> Rose	<i>griseum</i> Praeger

58. *Sedum populifolium* Pallas (fig. 78).

S. populifolium Pallas, Reise, 3, 730, tab. O, fig. 1, 1776. Masters in *Gard. Chron.*, 1878, ii. 463.

ILLUSTRATIONS.—Pallas, *loc. cit.* De Candolle, "Plantes Grasses," tab. 110. *Bot. Mag.*, tab. 211. *Revue Horticole*, 1857, 150, fig. 6.

A most distinct species, standing quite apart in its slender, bushy growth and long-stemmed poplar-like leaves, which fall in autumn.

DESCRIPTION.—A deciduous, glabrous sub-shrub, 1-1½ foot high. *Roots* fibrous. *Stem* erect, slender, woody, much branched, with thin, smooth, dark purple bark. *Leaves* alternate, green, flat, fleshy, stalked; petiole slender, ¼ inch long; lamina ovate, cordate, acute, ¾ inch long, coarsely and irregularly toothed throughout. *Inflorescences* lax, of terminal, much branched, corymbose cymes. *Buds* ovoid, blunt, tipped pink. *Flowers* pale pink or white, ¼ to ⅓ inch across, smelling of hawthorn. *Sepals* green, deltoid, ⅓ the petals. *Petals* spreading, lanceolate, acute. *Stamens* slightly exceeding the petals, filaments pinkish, anthers red-purple. *Scales* white, quadrate, rather longer than broad. *Carpels* white, erect, shorter than the stamens.

Flowers August.

HABITAT.—Siberia.

Long known in gardens, and deservedly a favourite. It is one of the very few Sedums which have scented flowers, possessing as it does a strong odour of hawthorn. No varieties are recorded. The flowers vary in colour from white to pale pink, and a form received from the Lissadell Nursery, Co. Sligo, has the leaves much less toothed than usual (fig. 78, separate leaf). Appropriately named *populifolium*—poplar-leaved.

59. *Sedum retusum* Hemsley (fig. 79).

S. retusum Hemsley, "Diagnoses Plant. Nov.," 3, 51, 1880. Hemsley, "Biol. Centr. Amer., Bot.," 1, 398. "N. Amer. Flora," 22, 68.

A distinct, erect sub-shrub a foot or so high, easily known by its spatulate leaves deeply notched at the top (but occasionally the notch is absent) and its white flowers with a red eye. *S. oxypetalum* sometimes bears similar notched leaves, but it is a much larger plant with star-like dull-red flowers, while those of *S. retusum* are rather bell-shaped and have blunt petals.

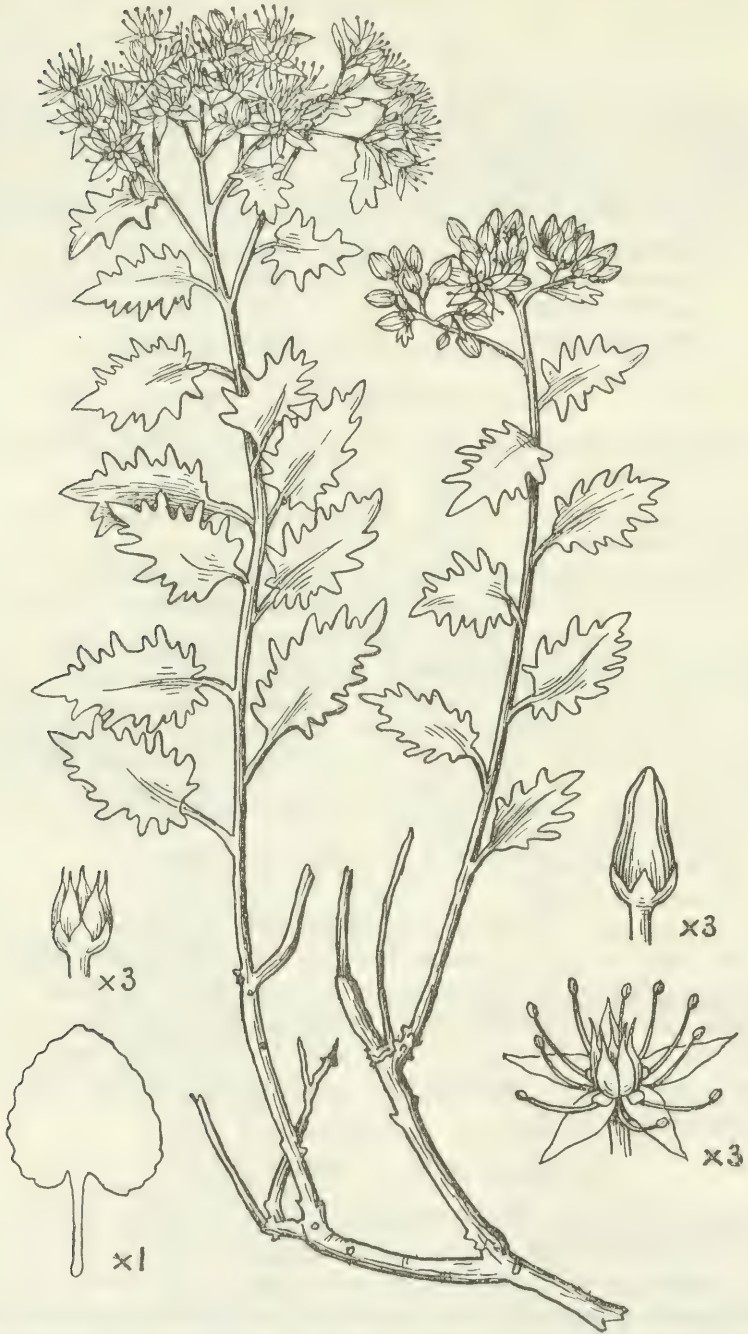


FIG. 78.—*S. populifolium* Pallas.



FIG. 79.—*S. retusum* Hemsley.

DESCRIPTION.—A glabrous evergreen sub-shrub about a foot high, much branched, branches ascending. *Stem* smooth, round, bare and grey below, leafy and rough above. *Leaves* alternate, green, paler beneath, fleshy, spatulate, with a conspicuous blunt notch at apex, tapering to a short petiole, slightly spurred, $\frac{3}{4}$ to 1 inch long by $\frac{1}{4}$ to $\frac{3}{8}$ inch broad. *Inflorescence* terminal, 1–2 inches across, very leafy, of 2–4 simple or forked scorpioid branches with short-stalked flowers in the forks, bracts spatulate, not notched. *Buds* lanceolate, blunt. *Flowers* $\frac{3}{8}$ inch across, sessile except the lowest, 5-parted, not opening widely. *Sepals* very unequal, green, fleshy, oblong-spatulate, blunt, resembling the uppermost bracts, slightly spurred. *Petals* spreading, white with a red base, oblong-lanceolate, blunt, shortly apiculate, $1\frac{1}{2}$ times the sepals, with a green keel on the upper half. *Stamens* spreading, shorter than the petals, filaments red below, white above, anthers red. *Scales* wedge-shaped, orange, longer than broad. *Carpels* erect, red, shorter than the stamens, tapering into long white styles.

Flowers June–July (gentle heat), August–September (cold frame and in the open). Has proved hardy at Dublin; nearly hardy at Waltham Cross (E. A. Bowles).

HABITAT.—San Luis Potosi, Mexico.

Received from Washington and New York, and also (under the name of *anopetalum*) from Rev. R. H. WILMOT; and Mr. E. A. BOWLES has had it for some years at Waltham Cross. It was also formerly in cultivation at Kew, as shown by an excellent coloured drawing (labelled *S. oxypetalum*) by Mrs. BERNARD, with notes by J. D. HOOKER and W. WATSON, preserved in the Kew Herbarium.

Apparently irregular as regards the number of its carpels. HEMSLEY says 6 and ROSE 8. In my plants, received from three different sources (though possibly all had a common origin), they are 5.

The name has reference to the notch which occupies the apex of the leaf.

60. *Sedum Adolphi* Hamet (fig. 80).

S. Adolphi Hamet in *Notizblatt Bot. Gart. Berlin*, 5, 277, 1912.

A stout, very fleshy, Mexican evergreen perennial resembling in habit and leaf *S. Treleasei* Rose, but easily distinguished by its thinner, firmer leaves, which are yellowish with a reddish flush (not densely glaucous-pruinose), and its larger white (not yellow) flowers, borne on long pedicels. Less nearly related to *S. allantoides* Rose and *S. pachyphyllum* Rose, both of which have very blunt terete (not flattened) leaves.

DESCRIPTION.—A loosely bushy, very fleshy, glabrous evergreen perennial. *Roots* fibrous. *Stems* with wide-spreading branches, ascending or sprawling, or tortuous when old, smooth, round, about $\frac{1}{4}$ inch thick, leafy; flowering branches lateral, arising from one of the uppermost leaf-axils, more slender than the barren branches, 3–5 inches long, leafy. *Leaves* alternate, those of barren shoots rather crowded, set at right angles to the stem, curving upwards, very fleshy, firm, broadly lanceolate or oblanceolate, bluntly pointed or subacute at apex, narrowing below, sessile, flat on face, about $1\frac{1}{2}$ inch long, $\frac{5}{8}$ inch broad, $\frac{1}{4}$ inch thick, glabrous, yellowish green with reddish margins; those of the flowering shoots similar but smaller, about $\frac{3}{4}$ inch long by $\frac{1}{2}$ inch broad. *Inflorescence* compact, hemispherical, about 2 inches across, of several very short branches bearing long pedicels. *Flowers* $\frac{3}{4}$ inch across, white, starry, on slender, pinkish pedicels $\frac{1}{2}$ inch to $\frac{5}{8}$ inch long. *Buds* slender, bulged $\frac{2}{3}$ way up, where the stamens are situated. *Calyx* small, about $\frac{1}{4}$ inch long, divided about half-



FIG. 80.—*S. Adolphi* Hamet.

way down into unequal teeth, reddish green. *Petals* free, ovate-lanceolate, acuminate, $\frac{3}{4}$ inch long, white, wide-spreading, with a small mucro behind and exceeding the tip. *Stamens* nearly equalling the petals, filaments slightly tapering, white, anthers pale yellow. *Scales* small, quadrate, bluntly retuse, minutely emarginate, reddish. *Carpels* erect, slightly exceeding the stamens, white, with long slender styles.

Flowers March–April. Not hardy.

HABITAT.—Mexico.

With some little hesitation I place the plants from which the above description is taken under Hamet's *S. Adolphi*. The latter was collected in Mexico by PURPUS, and grown (from seed) in Berlin. It is not stated whether the description was drawn from living or dried material. My plant was received from New York Botanic Garden under the name *S. tortuosum* (but that species, as described by HEMSLEY from a single poor specimen in the Kew Herbarium, is clearly different). A plant grown in the Succulent House at Kew without a name, which was received some years ago from Washington and has not flowered since, is identical with my plant so far as leaf and stem characters go. The plant also came to me, in apparently a smaller form, from Missouri Botanic Garden, without a name. No locality is associated with any of these three plants, but they are indubitably, from their affinities, Mexican. The New York plant, which has now flowered at Glasnevin two years in succession, differs from HAMET's description of *S. Adolphi* in the larger size of all its parts (for instance, leaves of barren stems about 40 by 15 mm. instead of 28 by 13 mm., petals 9 mm. long instead of 6 mm.), and in other lesser points, but there are no essential differences, and it is apparently a large form of the species. HAMET, in his description, makes no reference to the *colour* of the leaves and flowers, which distinguish it at a glance from its nearest ally, *S. Treleasei*, and indeed from any other Mexican *Sedum*.

61. *Sedum frutescens* Rose.

S. frutescens Rose in *Contrib. U.S. Nat. Herb.*, 13, 298, 1911.

A shrubby plant with the tree-like growth of *S. oxypetalum* H. B. and K., but easily separated by its much narrower leaves and white flowers.

DESCRIPTION.—“Leaves linear, flattened, 2 to 6 cm. long, bright green, acute, closely set upon the branches, rounded and free at base; inflorescence a small few-branched cymes; peduncle 1 cm. or less long; branches 3 to 4 cm. long; petals white, 5 to 6 mm. long, acuminate; carpels widely spreading.”—Rose, *loc. cit.*

HABITAT.—Mexico. Not hardy.

Cuttings were kindly sent by Dr. ROSE, but the plant proved hard to grow and died out before flowering; therefore ROSE's description is quoted. A distinct and interesting species.

The name refers to the shrubby nature of the plant.

62. *Sedum allantoides* Rose (fig. 81).

S. allantoides Rose in *Contrib. U.S. Nat. Herb.*, 12, 440, 1909.

ILLUSTRATIONS.—*Loc. cit.*, pl. 79 (photo). Möller's *Deutsche Gärtner-Zeitung*, 1911, fig. 14 (photo).

A characteristic Mexican type, coming near, in foliage and habit, to *S. pachyphyllum*, which it resembles in its large, blunt, terete, club-shaped leaves. Those of *allantoides* are wholly blue-glaucous, while the leaves of *pachyphyllum* are greener and tipped with red. The shoots of *pachyphyllum*, moreover, are dense and rounded at the tip, owing to the presence of many young leaves, while in *allantoides* young leaves are usually few and small. In flower, as will be seen by the illustrations (figs. 81, 123), the two species are very different.

DESCRIPTION.—An evergreen, smooth, glaucous perennial. *Stem* branching below, woody, bare and declining at base, branches leafy, erect, 1 foot high. *Leaves* alternate, very glaucous, terete, sessile, very blunt, curved upwards, thickest near the tip, inserted at right angles to the stem. *Inflorescence* lax, paniculate, with cymose branches, 4–5 inches long by 3 inches across. *Buds* acute, strongly ribbed. *Flowers* $\frac{3}{8}$ inch diameter, shorter than the pedicels. *Sepals* wide-spreading, fleshy, green-glaucous, lanceolate, acute, $\frac{1}{4}$ inch long, tube very short. *Petals* wide-spreading, greenish white, lanceolate, acute, keeled on back, grooved on face, $1\frac{1}{2}$ times the sepals. *Stamens* spreading, shorter than the petals, filaments white, anthers pinkish. *Scales* yellowish, nearly entire, cuneate, as broad as long. *Carpels* white, erect.

Flowers June–July (gentle heat). Not hardy.

HABITAT.—Hills in Oaxaca, Mexico, at over 2,000 mètres.

Received from Washington; the Kew and Edinburgh Botanic Gardens had it from the same source several years earlier, and, according to MÖLLER'S *Zeitung* (*supra*) it is in cultivation at Darmstadt.

The sepals are variable, being in some plants broader, shorter, and more fleshy than in others (see fig. 81).

The name is derived from the Greek *allantos*, a sausage, from the shape of the leaves.

63. *Sedum Bourgaei* Hemsley (fig. 82).

S. Bourgaei Hemsley, "Diagnoses Plant. Nov.," 1, 11, 1878. "N. Amer. Flora," 22, 64, 1905.

ILLUSTRATION.—Hemsley, "Biol. Centr. Amer., Bot.," pl. 20.

A graceful, comparatively tall (1 foot or so), slender plant, allied to *S. guadalajaranum* S. Wats. and *S. griseum* Praeger. Distinguished from both by its stronger growth, leaves green and flattened (not glaucous and sub-terete), bright-red branches and conspicuous long dark-purple scales (not short and yellowish or reddish); from the former also by its fibrous (not thickened tuberous) roots, and from the latter by its lax inflorescence.

DESCRIPTION.—A sub-shrubby evergreen perennial. *Stem* slender, smooth, red, erect or ascending, frequently branched, 6–12 inches high, woody and bare below, with many flowering and some barren shoots. *Leaves* alternate, green, sessile, linear, blunt, fleshy, flattened, $\frac{1}{4}$ – $\frac{3}{8}$ inch long by $\frac{1}{16}$ broad by

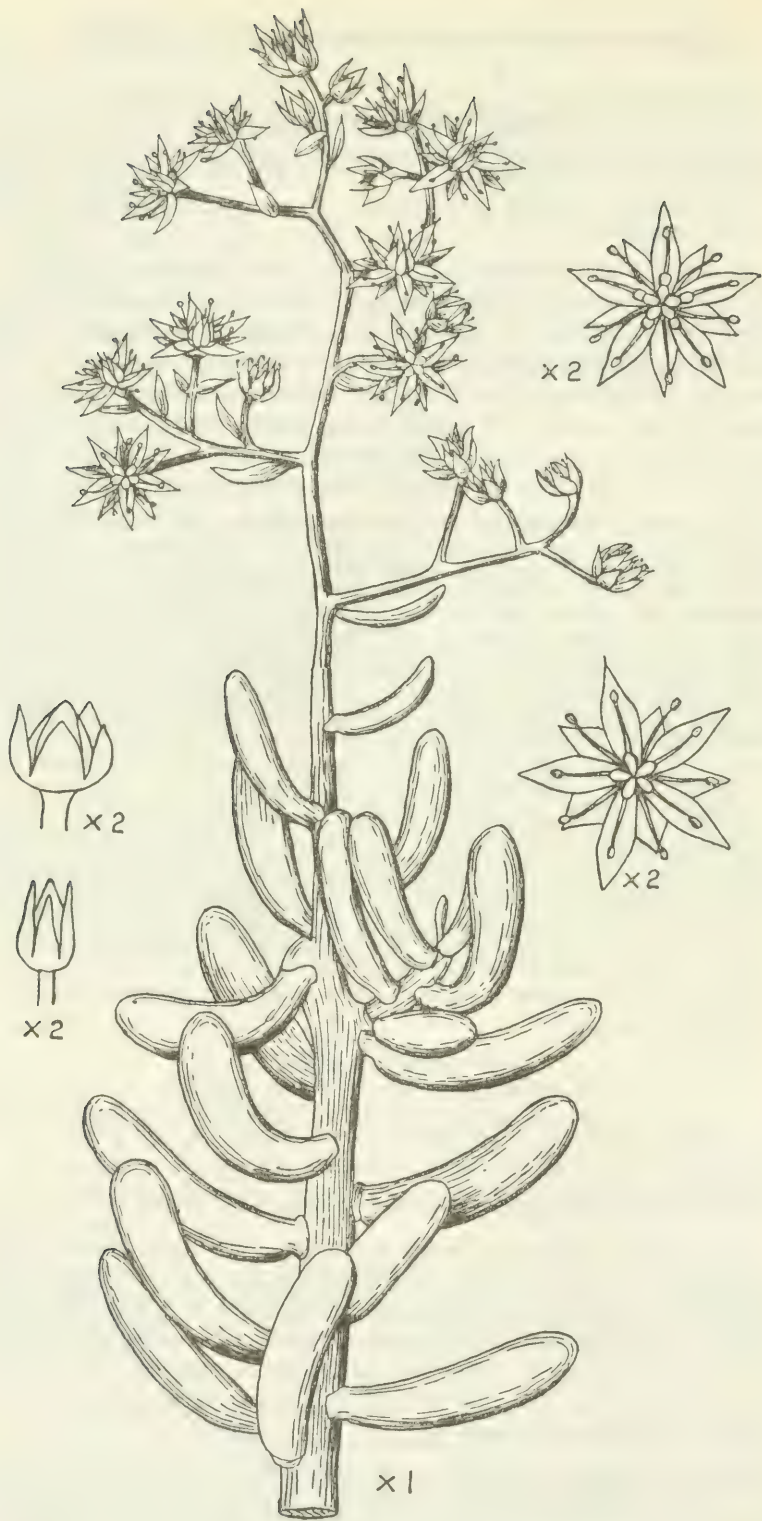


FIG. 81.—*S. allantoides* Rose.



FIG. 82.—*S. Bourgaei* Hemsley.

$\frac{1}{3}$ thick, enlarged but scarcely spurred at base. *Inflorescence* terminal, lax, of about 4 leafy, curved, patent branches, each 1-2 inches long. *Buds* conical, blunt, with wide-spreading sepals. *Flowers* shortly stalked, nearly $\frac{1}{2}$ inch across. *Sepals* resembling the leaves, very unequal, green, fleshy, blunt, separate to the base, where they are slightly enlarged. *Petals* white, often tipped red, patent, ovate-lanceolate, attenuate, keeled, twice the sepals. *Stamens* $\frac{2}{3}$ the petals, filaments white, anthers reddish. *Scales* linear, thrice as long as broad, dark purple, conspicuous when the flower is viewed from above. *Carpels* slender, erect, white, equalling the stamens, with long styles tipped red.

Flowers June-July (gentle heat) ; August-November (cold frame). Nearly hardy at Dublin. Hardy at Rostrevor.

HABITAT.—Central Mexico.

Named in honour of EUGÈNE BOURGÉAU, indefatigable collector and traveller, who first gathered it.

64. *Sedum guadalajaranum* S. Watson (fig. 83).

S. guadalajaranum S. Watson, *Proc. Amer. Acad.*, **22**, 411, 1887.

"N. Amer. Flora," **22**, 64, 1905.

A very slender, sub-shrubby, evergreen species, coming near *S. Bourgaei* Hemsley and *S. griseum* Praeger. It differs from both in its thickened rootstock and tuberous roots and very thin wiry stems ; from the former also (to which it comes nearest) in its smaller size, shorter glaucous sub-terete (not green flattened) leaves, shorter, more oblong, less attenuate petals with reddish colour at the base, shorter, less attenuate, green (not white) carpels, and scales short and pale red, not long and dark purple. *S. griseum* is a much stouter little plant, with tapering (not linear) leaves and a dense (not lax) inflorescence.

DESCRIPTION.—A rather glaucous, very slender, wiry, sub-shrubby evergreen perennial, less than a foot high. *Rootstock* horizontal, thickened, with tuberous roots. *Stem* erect, slender, wiry, round, reddish, branching, bare of leaves below, glandular-rough above. *Leaves* rather glaucous, narrowly linear, blunt, sub-terete, slightly flattened above, broadest at the base, slightly spurred, $\frac{1}{2}$ inch long. *Inflorescence* terminal, of 2-3 lax branches with a flower in the fork. *Buds* acute, surrounded by the erect sepals. *Flowers* $\frac{2}{3}$ inch across, sessile. *Sepals* unequal, resembling the leaves, wide-spreading in flower, linear, blunt, scarcely spurred, slightly broader at the base. *Petals* patent, slightly exceeding the sepals, ovate-lanceolate, attenuate, greenish-white, reddish at base, with a reddish keel and red apiculus. *Stamens* nearly equalling the petals, filaments white, anthers dark red. *Scales* reddish, rather longer than broad. *Carpels* slender, erect, light green, with short styles, wide-spreading and red in fruit.

Flowers June (gentle heat) ; July-August (cold frame). Not hardy.

HABITAT.—Rio Blanco, Jalisco, Mexico.

Received from the New York Botanic Garden.

65. *Sedum griseum* Praeger (fig. 84).

S. griseum Praeger in *Journ. of Bot.*, **54**, 43, 1917.

Allied to *S. guadalajaranum* and *S. Bourgaei*, having like them a sub-shrubby habit, very narrow leaves, and white flowers, but it is stouter and more compact than either. *S. guadalajaranum* is separated at once by its thickened rootstock with tuberous roots,

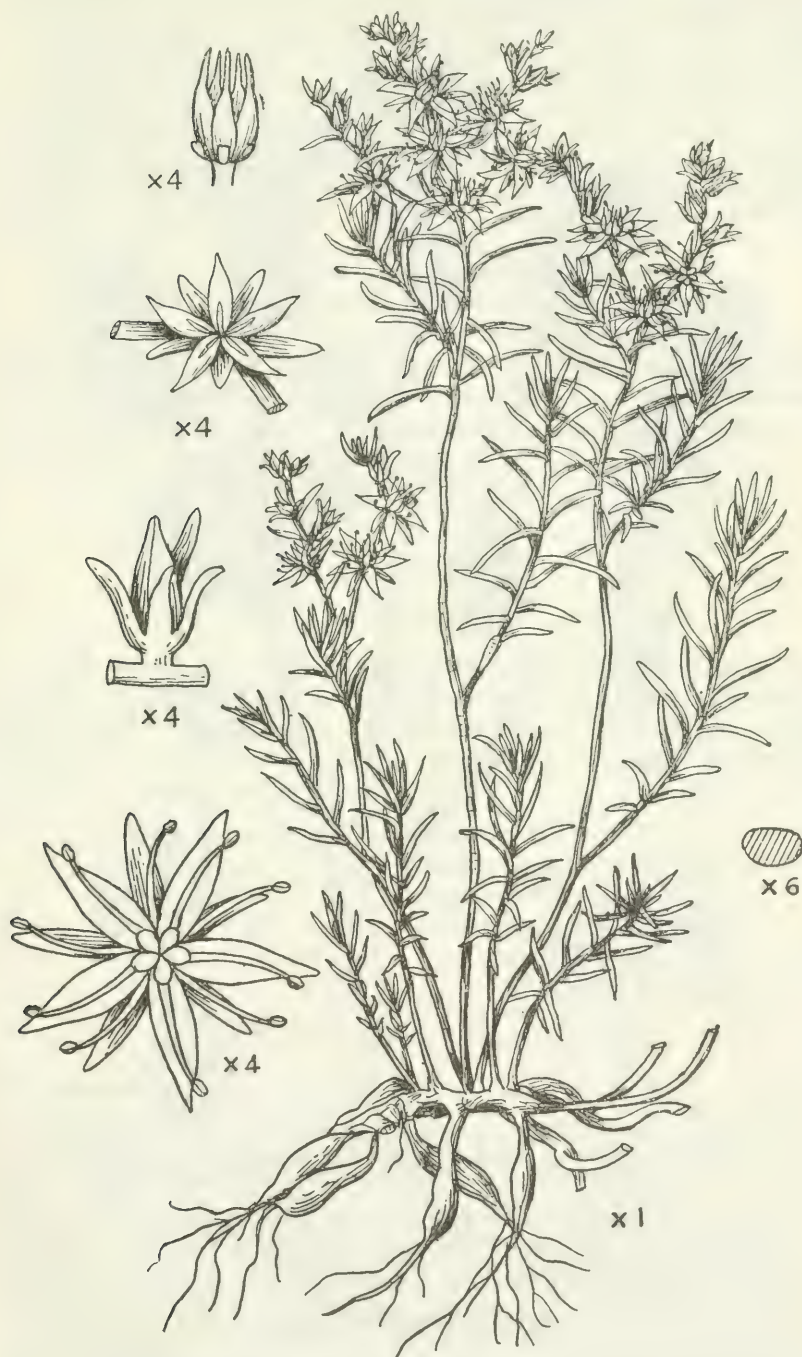


FIG. 83.—*S. guadalajaranum* S. Watson.

as well as by its much slenderer wiry stems, &c. *S. Bourgaei* differs



FIG. 84.—*S. griseum* Praeger.

in its longer, more erect, red (not greyish) branches, green (not glaucous) linear (not linear-fusiform) leaves, which are flat above (not sub-terete).

DESCRIPTION.—A small, erect, glaucous evergreen sub-shrub, 6–8 inches high. *Roots* fibrous. *Stem* smooth, round, dull red mottled and dotted with grey, bare below, much branched, branches spreading. *Leaves* alternate, crowded, sessile, linear-fusiform, sub-terete, patent or reflexed, glaucous, blunt, $\frac{1}{2}$ inch long. *Inflorescence* compact, convex, 1 inch across, very leafy. *Buds* tapering, slender, blunt, often curved. *Flowers* $\frac{1}{2}$ inch across, pedicels very short. *Sepals* slightly unequal, green, very fleshy, oblong-tapering, blunt, slightly prolonged below point of insertion. *Petals* quite free, lanceolate, acute, patent or recurved, white with a slight greenish keel, more than twice the sepals. *Stamens* nearly equalling the petals, filaments white, anthers red. *Scales* minute, quadrate, yellowish, with a blunt notch. *Carpels* green, erect, shorter than the stamens, with long slender styles.

Flowers January–February (gentle heat). Not hardy.

HABITAT.—No doubt, Mexico.

Received from New York Botanic Garden labelled *S. Bourgaei* No. 2. Also from Haage und Schmidt, of Erfurt, under the name *S. farinosum*, a misnomer; *S. farinosum* Lowe is a small Madeiran plant related to *S. album*; *S. farinosum* Rose is a flat-leaved Mexican plant, with no affinity to the present species (see p. 141).

Named from the grey colour of the plant.

(b) Herbs.

(1) Leaves flat.

Ten species fall in here, coming from many different parts of the world. *S. ternatum* and *S. Nevii* from the United States, are allied, as are also *S. moranense* and *S. Liebmannianum*, from Mexico. The Chinese *S. Chaneti* stands quite apart. The remainder are small plants not closely related.

<i>ternatum</i> Michaux	<i>magellense</i> Tenore
<i>Nevii</i> A. Gray	<i>monregalense</i> Balbis
<i>adenotrichum</i> Wallich	<i>moranense</i> H.B.K.
<i>Chaneti</i> Léveillé	<i>Liebmannianum</i> Hemsley
<i>alsinefolium</i> Allioni	<i>compactum</i> Rose

66. *Sedum ternatum* Michaux (fig. 85).

S. ternatum Michaux, "Flor. Bor. Amer.," 1, 277, 1803.

SYNONYM.—*S. portulacoides* Willdenow, "Enum. Hort. Berol.," 484.

ILLUSTRATIONS.—*Bot. Mag.*, pl. 1977. *Bot. Register*, tab. 142. *Garden*, 45, 409. Britton and Brown, "Illustr. Flor. Northern U.S.," 2, 167.

A distinct little plant which, in the arrangement and characters of flowers, shows its affinity to its ally *S. Nevii*, which inhabits much the same area of North America. It is well distinguished among the hardy Sedums by its broad, entire leaves arranged in threes (from which character it takes its name), and largest near the top of the barren shoots, and white flowers with the parts in fours—the latter an almost unique feature in the genus, if we except the section *Rhodiola*.

DESCRIPTION.—A low, glabrous, evergreen perennial, forming a pale-green tuft, with barren and flowering shoots. *Roots* fibrous. *Stems* ascending, rooting below, 3-6 inches high, arising mostly in summer, remaining leafy through the winter, and flowering and dying the following season. *Leaves* sessile, ternate, obovate, tapered below, rounded or blunt-pointed at apex, flat, fleshy, entire, $\frac{1}{2}$ to 1 inch by $\frac{1}{4}$ to $\frac{1}{2}$ inch; those of the barren shoots largest above, forming a loose rosette at the apex; the upper leaves of the flowering shoots small, alternate. *Inflorescence* a 3- to 4-branched cyme, branches patent, each flower subtended by an obovate, rather acute, stalked bract. *Buds* ovate, 4-angled. *Flowers* 4-parted, $\frac{1}{2}$ inch across, sessile. *Sepals* oblanceolate, blunt,



FIG. 85.—*S. ternatum* Michaux.

fleshy, separate to the base, pale green. *Petals* white, narrowly lanceolate, acute, $1\frac{1}{2}$ times the sepals. *Stamens* spreading, equalling the sepals, filaments white, anthers purple. *Scales* yellow, scarcely emarginate, rather longer than broad. *Carpels* oblong, white, erect, spreading later, stellate-patent in fruit; styles $\frac{1}{2}$ the carpels.

Flowers May-June.

HABITAT.—United States east of the Mississippi.

Of easy cultivation, preferring a less dry and exposed position than that in which many Sedums feel at home. Not infrequent in cultivation, and usually correctly named. No varieties are on record, and the only one which I have seen is a very dwarf form which was in Canon ELLACOMBE's garden without a history. It differs sufficiently from the type as to deserve a name.

Var. **minus**, var. nov.* (fig. 86).

Much smaller in all its parts; stem 2-3 inches long, leaves $\frac{3}{8}$ inch to $\frac{1}{2}$ inch long; flowers $\frac{3}{8}$ inch diameter. The plant retains its relatively small size under varying conditions.



FIG. 86.—*S. ternatum* var. *minus* nov.

Origin not known, but it is probably an indigenous American form.

67. **Sedum Nevii** A. Gray (fig. 87).

S. Nevii A. Gray, "Manual Botany Northern U.S.," ed. 5, 172, 1867.
Masters in *Gard. Chron.*, 1878, ii. 376. "N. Amer. Flora," 22, 72.

ILLUSTRATIONS.—Meehan, "Native Fl. and Ferns of U.S.," ser. I, 1, pl. 22.
Britton and Brown, "Illustr. Flora Northern U.S.," 2, 168.

A distinct little American plant, preferring, like its compatriot *S. ternatum*, a more sheltered and damper spot than is required by most Sedums. It is well distinguished by the pale-green rosettes of its barren shoots and its white five-parted flowers. Not uncommon in cultivation, and constant in character. I find no variation in

* Quam typo multo minus, caule 5-8 cm. (nec 8-15 cm.) longo, foliis 10-13 mm. (nec 25 mm.) longis, floribus 10 mm. (nec 13 mm.) diametro.

about ten plants which I have had from as many different sources. One well-marked variety is discussed below.

DESCRIPTION.—A small, tufted, pale-green rather glaucous perennial. *Stems* short, barren shoots forming rather dense rosettes $\frac{3}{4}$ inch across, flowering shoots ascending, 3-4 inches high. *Leaves* alternate, spatulate, entire, upper edges straight and intersecting at a right angle, long-tapered below, about $\frac{1}{4}$ inch by $\frac{1}{8}$ inch, those of the flowering shoots spatulate-oblong. *Inflorescence* of three or more patent branches, with a flower in the fork. *Buds* ovate, acute, con-



FIG. 87.—*S. Nevii* A. Gray.

spicuously ribbed. *Flowers* usually 5- (sometimes 4- or 6-) parted, $\frac{1}{2}$ inch across. *Sepals* green, fleshy, linear-lanceolate, blunt, slightly longer or shorter than the petals. *Petals* linear-lanceolate, acute, white, keeled. *Stamens* slightly shorter than the petals, filaments white, anthers purple. *Scales* small, white, quadrate. *Carpels* white, at first erect, later spreading, stellate in fruit; styles very short.

Flowers June.

HABITAT.—Eastern United States, Illinois to Alabama.

It is named after its discoverer, Rev. Dr. NEVIUS.

Var. **Beyrichianum** Praeger in *Journ. of Bot.*, 55, 211, 1917 (fig. 88).

S. Beyrichianum. Masters in *Gard. Chron.*, 1878, ii. 376.

Plant more diffuse and rather greener. Barren shoots longer, with more distant leaves and a very lax terminal rosette; leaves narrower. Floral parts as in type.

I have discussed Masters' *Sedum Beyrichianum* (*loc. cit.*) and given my reasons for setting it down as a variety of *S. Nevii*. That it is a

native American form is shown by a characteristic specimen of it in the British Museum, labelled *Nevii*, from Peaks of Otter, Virginia,



FIG. 88.—*S. Nevii* var. *Beyrichianum* Praeger.

collected by A. H. CURTISS in 1872; this is even more diffuse and more slender than the cultivated *Beyrichianum*.

It has apparently been in cultivation for a long time. My specimens came from Glasnevin, REGEL and KESSELRING of Petrograd, and Mr. MURRAY HORNIBROOK of Abbeyleix, Queen's County.

68. *Sedum adenotrichum* Wallich (fig. 89).

S. adenotrichum Wallich, "Catalogue" No. 7231. Hooker fil. and Thoms. in *Journ. Linn. Soc., Bot.*, 2, 101 (excluding var. β).
C. B. Clarke in Hooker, "Flor. Brit. India," 2, 420.

SYNONYM.—*S. anoicum* Praeger in *Journ. of Bot.*, 57, 52, 1919.

ILLUSTRATION.—Saunders, "Refug. Botan.," tab. 296.

Of the type of the well-known *Sedum spathulifolium* Hooker and of *S. yosemitense* Britton (especially as regards its growth-form), and of some of the species which BRITTON places in a separate genus *Gormaniana*, the leaves being much like those of *Sedum* (*Gormaniana*) *oreganum* Nuttall; but the three species named are all yellow-flowered. In the present plant the rosettes of smooth, spatulate, light-green

leaves, runner-like branches, loose glandular-hairy inflorescences and



FIG. 89.—*S. adenotrichum* Wallich.

long-stalked white flowers readily distinguish it from any other species.

DESCRIPTION.—A small, creeping, light-green evergreen perennial, forming a loose mat an inch high when not in flower. *Roots* fibrous. *Stems* slender, the barren shoots short (1–3 inches), glabrous, diffuse, leafy, the apex bearing a loose rosette of rather larger leaves, and tending to root, and producing in turn similar short axillary spreading branches below and a terminal flower-stem above. *Flower-stem* erect or inclined, slender, 3–4 inches long, sparingly leafy, glandular-hairy. *Leaves* alternate, those of the rosettes glabrous, fleshy, quite flat on face with a faint median groove, flattish on back, semicircular at apex, cuneate or attenuate-cuneate below, sessile, shining, $\frac{3}{8}$ to 1 inch long, $\frac{1}{4}$ to $\frac{3}{8}$ inch broad; those of the barren shoots below the rosettes glabrous, similar in outline, smaller and often much thickened, some even sub-terete in section (see figure); those of the flower-stems similar to the last, but glandular-hairy, more distant, and diminishing upwards into minute bracts. *Inflorescence* a very lax, glandular, hairy panicle of about 6–12 flowers on long pedicels ($\frac{1}{2}$ to $\frac{1}{2}$ inch) which are decurved before flowering; bracts few, minute. *Buds* broadly ovate, very blunt, $\frac{3}{16}$ inch long. *Flowers* white, $\frac{3}{8}$ inch or a little more in diameter. *Sepals* very fleshy, flat and smooth on face, glandular-hairy and much curved longitudinally and transversely on back, ovate-oblong, rather acute, less than $\frac{1}{2}$ inch long, free almost to the base, green dotted red. *Petals* oblong-ovate or oblong-obovate, semi-erect and rather broad at base, patent in upper two-thirds, blunt, with a minute well-marked apiculus behind the apex, $\frac{1}{4}$ inch long, $\frac{1}{8}$ inch broad, hairy along the midrib on the back. *Stamens* spreading, white, filaments tapering, a little shorter than the petals. *Scales* whitish, twice as long as broad, truncate and retuse at apex. *Carpels* erect, oblong, yellowish-white, narrowing abruptly into short erect styles.

Flowers April–May.

HABITAT.—Himalayas.

This well-marked little species was sent to me with other Sedums from his garden by Mr. MURRAY HORNIBROOK, of Abbeyleix, Queen's County. He could supply no definite history, and as its presumed home was British Columbia I failed to identify it and described it as new (*loc. cit.*, p. 163).

Its name *adenotrichum* signifies gland-haired.

69. *Sedum Chaneti* Léveillé (figs. 90, 91 upper part).

S. Chaneti Léveillé in Fedde, "Repertorium," 5, 99, 1908.

Synonym.—*S. pyramidale* Præger in *Journ. of Bot.* 54, 42, 1917.

A remarkable species, very different from any other in cultivation. In the barren stage it may be known by its loose rosette of glaucous, very fleshy, linear, spine-tipped leaves about an inch in length; when in flower, its dense pyramid of bloom is quite distinctive. The stalked carpels of its white flowers are also unusual.

DESCRIPTION.—A glaucous perennial, very fleshy and brittle. *Barren stems* very short, emitting short horizontal axillary branches, sparingly leafy, which produce small leafy rosettes and roots at their extremities. *Flower-stems* thick, erect, tapering, leafy, 6–12 inches high, with very many short-branched axillary branches throughout. *Leaves* of barren stems forming loose rosettes, usually linear, straight, entire, sessile, glaucous, slightly rounded on face, much rounded on back, 1 inch long, $\frac{3}{16}$ inch wide, $\frac{2}{16}$ inch thick, very blunt, tipped with a delicate spine $\frac{1}{16}$ inch long, often with a smaller spine beside it (fig. 91, *a, d, e, f*); at certain stages (? normally in winter or in dry periods) forming small, dense, imbricate sub-globular spiny rosettes, recalling the winter rosettes of *Cotyledons pinosa* L., which develop at first into flat, fleshy, cuneate-spathulate spine-tipped leaves, the edges of which in the superior portion of the leaf are quite thin (see fig. 91, *b, c, d*); later into linear sub-terete leaves as above; lower leaves of the flowering stems resembling the linear leaves of the barren stems, merging into oblong

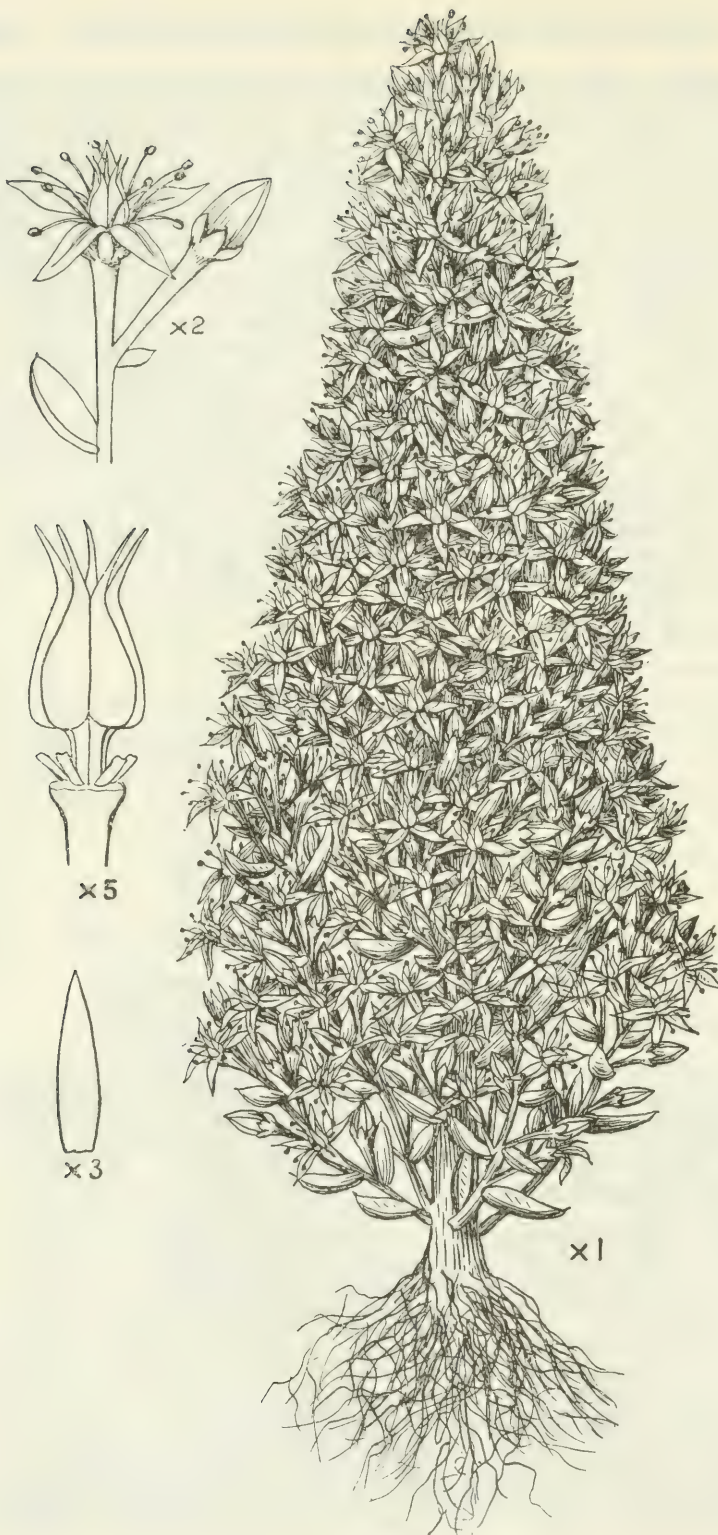


FIG. 90.—*S. Chaneti* Léveillé.

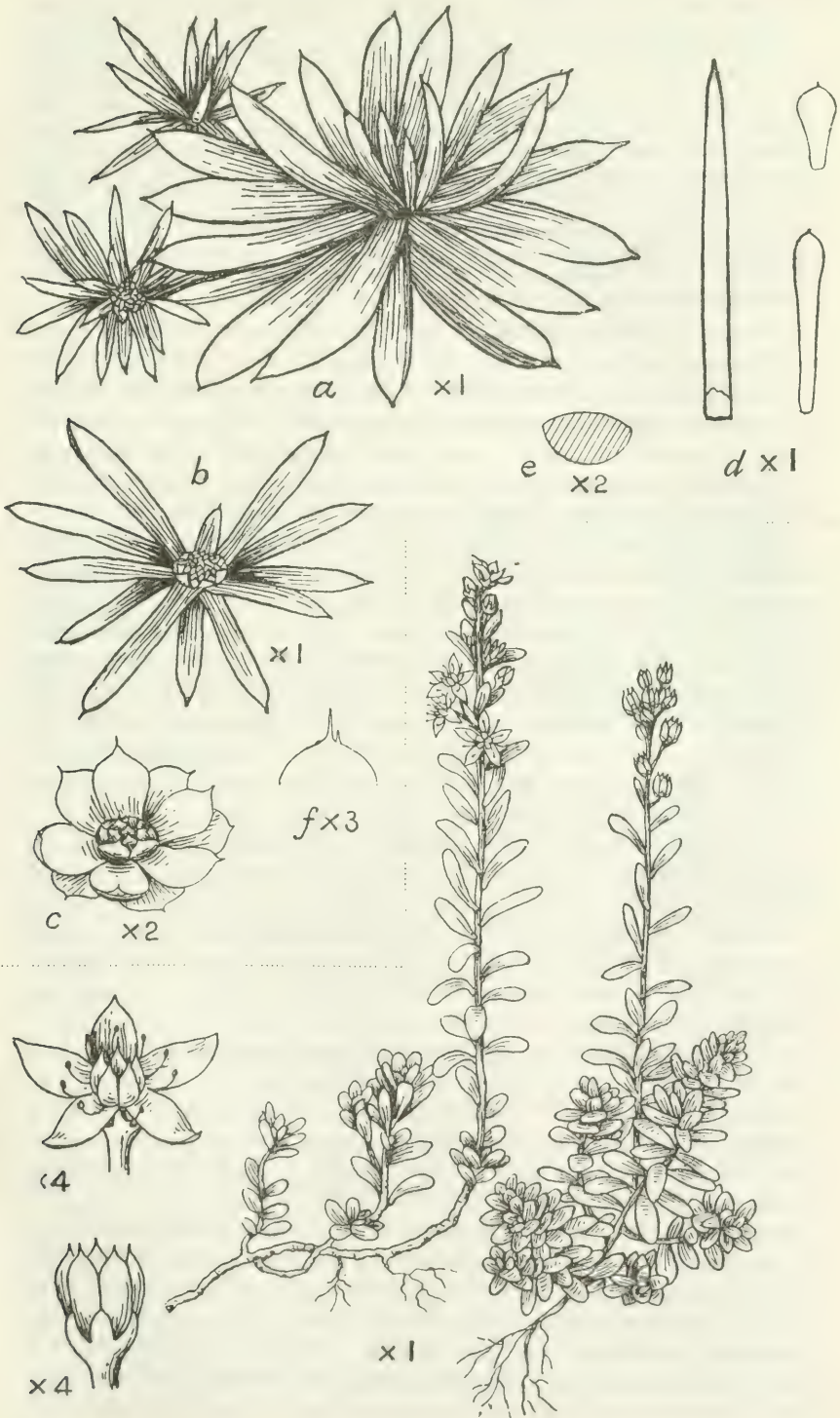


FIG. 91.—Upper portion, *S. Chaneti* Lèveillé. Lower portion, *S. magellense* Tenore.

spine-pointed bracts, which become very small on the branches. *Inflorescence* a dense, very leafy, pyramidal or oblong panicle, extending from near the base of the stem to its apex, and about 2 inches wide; lower branches ascending, upper patent; ultimate bracts minute, subtending the pedicels, which equal or exceed the flowers, and are thickest under the calyx. *Buds* ovate-oblong, white tipped pink. *Flowers* very numerous, $\frac{1}{2}$ inch across, starlike. *Calyx* cup-shaped, green dotted with purple, segments ovate, apiculate, very fleshy, divided to the base. *Corolla* thrice the calyx, funnel-shaped near the base, patent above, petals $\frac{1}{2}$ inch long, lanceolate, acute, with ascending tips, white inside, outside keeled and mottled with red and green near the tip. *Stamens* spreading, slightly shorter than the petals, filaments white, anthers deep purple, the epipetalous ones inserted near the base of the petals. *Scales* pale yellow, spreading, retuse, oblong, twice as long as broad, equalling the stalk of the carpels. *Carpels* nearly equalling the petals, white, tapering into slender divergent styles, abruptly contracted below into a slender stalk, turning rosy in fruit.

Flowers September–October (August in China). Not hardy.

HABITAT.—China: Kansu; Pe-che-li.

The sub-globose spiny buds of flat, cuneate-spathulate leaves which, in cultivation, appear to be produced at irregular periods, probably represent a winter state, and are evidently a resting stage. I have had young plants from Mr. FARRER and from Edinburgh; the fine flowering specimen figured was sent by Mr. E. A. BOWLES.

The quite inadequate description of L veill  (*loc. cit.*) led me to consider Mr. FARRER's No. 336 from Kansu as distinct from *Chaneti*, especially when the author of the latter subsequently (*Bull. Geogr. Bot.*, 27, 74, 1917) identified his plant with *S. spinosum* Thunberg (*Cotyledon spinosa* Linn.), a quite different plant with a very dense raceme, well known in gardens and in herbaria; but access to the type of *Chaneti* in the L veill  herbarium now at Edinburgh, shows the identity of his plant and mine, so his name stands for this remarkable species.

The following notes supplied by Mr. REGINALD FARRER on the plant in its native surroundings are of interest:

“ Though on roofs in other places, as at Lanchow, I saw isolated plants suggesting No. 336 in very poor form, I am certain of my plant only at and about Siku, abounding on the flat roofs in solid sheets of foliage, very beautiful in their glaucous metallic sheen. I remember particularly how it filled every gully between the tiled ribs of the big military yamen, and how, on the roof of my pony-stall, it made in August a dense jungle of its upstanding stocky spires of white stars—no doubt in character far surpassing all that even Bowles' plant was able to produce, and in appearance most suggesting 8-inch spikes of *Saxifraga longifolia*, on a small, starved scale of blossom. Really a striking plant, but not, I fear, likely to prove hardy or resistant with us. For it thus loves only the hottest and poorest soils and rocks, in the hot, dry region of the Blackwater River's bed; and though it ascends from Siku (6,400) another 2,000 feet on the mountains, where it is sporadic on very hot rocks, it nowhere ascends within reach of the alpine zone. Its kindred vegetation is *Lilium tenuifolium*, *Convolvulus tragacanthoides*, *Leptodermis virgata*, *Hedysarum multijugum*, *Incarvillea variabilis*, and the Asters *hispidus* and *oreophilus*. I should add that in nature it is certainly not monocarpic, but each plant forms a close and ample agglomeration of rosettes, from which

only the flowering ones perish out year by year, exactly as in *Saxifraga Cotyledon*."

Named after its first collector, L. CHANET.

70. *Sedum alsinefolium* Allioni (fig. 92).

S. alsinefolium Allioni, "Flor. Pedemont.," 2, 119, tab. 22, fig. 2, 1785.
Masters in *Gard. Chron.*, 1878, ii. 750.

ILLUSTRATIONS.—Allioni, *loc. cit.* (poor). Cesati, "Stirpes Ital." fasc. 2 (good).

An extremely distinct species, which one would not suspect of being a *Sedum* when out of flower, the small, tufted hairy rosettes suggesting rather a Saxifrage. Hairy throughout, even to the back of the petals, which are of unusual breadth. It is not to be mistaken for any other species, its leaves, inflorescence, and flowers being all very distinct (see fig. 92).

DESCRIPTION.—A small tufted perennial, dark green, shining, hairy, sticky. *Barren shoots* short, forming close, flattish rosettes an inch across; *flowering shoots* 4–6 inches high, slender and weak, with spreading branches. *Leaves* of barren shoots stalked, fleshy, hairy on both sides, $\frac{1}{4}$ – $\frac{1}{2}$ inch long; the petiole half the ovate entire lamina, which is bluntly pointed at apex and tapered below; leaves of the flowering shoots larger and more distant, the upper ones sessile. *Inflorescence* a very lax panicle. *Buds* oblong-ovate, apiculate. *Flowers* comparatively few and small, $\frac{1}{2}$ inch across, on long pedicels. *Sepals* erect, green, hairy, fleshy, lanceolate, acute. *Petals* nearly erect in lower part, patent above, thrice the sepals, white, broadly ovate, apiculate, hairy on back. *Stamens* erect, shorter than the petals, filaments white, anthers pinkish. *Scales* bright red. *Carpels* green, erect, equalling the stamens, styles divergent.

Flowers June–July.

Rare in cultivation. I have seen it at Glasnevin (whither the late C. F. BALL brought it from the Alps), Kew, and Edinburgh; M. CORREVON sent it to Wisley, and MASTERS enters it in 1878 as seen by him in the living state, presumably in a garden. Rare in the wild state, being confined to Piedmont, the Alpes Maritimes, and Liguria. In my garden I found protection from slugs was desirable.

The name comes from the likeness of its leaves to those of an *Alsine*.

71. *Sedum magellense* Tenore (fig. 91, lower part).

S. magellense Tenore, *Flor. Napolitana*, 1, xxvi. 1811–15.

SYNONYM.—*S. olympicum* Boissier, "Diagnoses Plant. Nov.," Ser. 1, 3, 16, 1843.

ILLUSTRATIONS.—Tenore, *loc. cit.*, tab. 139, fig. 1. Raulin, "Crête," tab. 13, fig. c. Verh. z.-b. Gesellsch. Wien, 16, tab. 9–10, 1866.

A very distinct little plant, known at once by its racemose inflorescence, which is 1–2 inches long and only about $\frac{1}{4}$ inch broad, and its bright green, flat, obovate leaves $\frac{1}{4}$ inch long on the barren shoots. The oblong carpels, too, are very unusual. There is some variation as regards the flowers, which are sometimes pure white, or have a greenish or purplish tinge, and are larger in some forms than in others.

DESCRIPTION.—A small, bright-green evergreen perennial. *Roots* fibrous. *Stems* twiggly below, slender, rooting; barren shoots short, with crowded leaves, flowering shoots erect or ascending, 3-4 inches long, sometimes branched, leafy. *Leaves* alternate or opposite, glabrous, obovate, flat, fleshy, blunt, sessile, $\frac{1}{4}$ inch

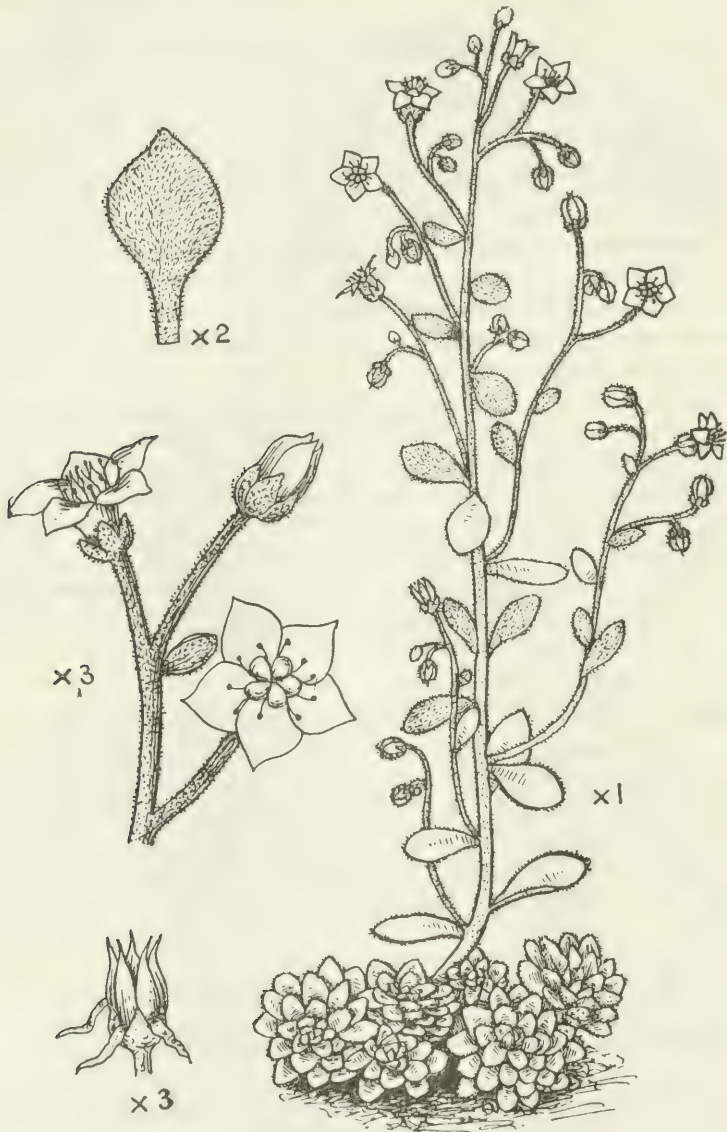


FIG. 92.—*S. alsinefolium* Allioni.

long; those of the flowering shoots oblong, $\frac{3}{8}$ inch long. *Inflorescence* a leafy raceme 1-2 inches long, sometimes branched, with the flowers solitary or several together on short, slender branches. *Flowers* white or whitish, $\frac{1}{4}$ inch across. *Calyx* green, cup-shaped, the triangular teeth equalling the tube. *Petals* lanceolate, acute, apiculate, wide-spreading, more than twice the calyx. *Stamens* shorter than the petals, filaments white, anthers red or purple. *Scales* spatulate, thrice as long as broad, yellowish, emarginate. *Carpels* green,

erect, equalling the stamens ; in fruit oblong, broadest near the tip, with a short, abrupt beak.

Flowers May-June, and often again later.

HABITAT.—Italy, Greece, Asia Minor.

A form from the rock garden at Dahlem has very large flowers, $\frac{3}{8}$ inch across, pure white, and leaves mostly opposite ; another from the same source has leaves broader and thicker than usual and $\frac{3}{8}$ inch flowers tinged purple ; a third, received from F. SÜNDERMANN, of Lindau, has greenish-white flowers of the normal size ($\frac{1}{4}$ inch) and alternate leaves.

Named after Monte Majella in Central Italy, the original station for the plant.

72. *Sedum monregalense* Balbis (fig. 93).

S. monregalense Balbis, "Miscell. Bot.," 23, 1804. Masters in *Gard. Chron.*, 1878, ii. 716.

SYNONYM.—*S. cruciatum* Desfontaines, "Cat. Plant. Paris," 162, 1829.

ILLUSTRATIONS.—Reichenbach, "Flor. German.," 23, tab. 64a. Balbis, *loc. cit.*, tab. 6. Cusin and Ansberque, "Herb. Flor. Française," Crassul., tab. 19.

A slender little plant, distinguished by its small oblanceolate leaves in whorls of four, and lax, hairy, branching inflorescence of white flowers.

DESCRIPTION.—A slender, weak perennial. *Stems* decumbent and rooting below, very erect above, the barren ones 1-2 inches high, glabrous or nearly so ; flowering stems 3-5 inches, hairy in the upper part, with axillary ascending branches throughout or towards the top. *Leaves* in whorls of 4, crowded, oblanceolate, blunt, fleshy, green, smooth or slightly glandular near the tip, $\frac{1}{4}$ inch long ; those of the flower-stems similar, whorls distant, the upper ones hairy. *Inflorescence* a loose-panicled cyme, with alternate hairy bracts and long pedicels. *Buds* ovate, apiculate. *Flowers* $\frac{3}{8}$ inch across. *Sepals* green, fleshy, ovate, acute, hairy. *Petals* white, ovate, acute, wide-spreading or slightly reflexed, with a greenish hairy keel, thrice the sepals. *Stamens* spreading, slightly shorter than the petals, anthers reddish. *Scales* small, white. *Carbels* whitish, erect, nearly erect in fruit.

Flowers July-August.

HABITAT.—South-east France, Corsica, Italy.

Rare in cultivation. I have seen it at the Botanic Gardens at Bremen and Edinburgh, and received it from the Tully Nursery, Co. Kildare, in all cases under the name *magellense*. It succeeds best in a damp, shady place.

73. *Sedum moranense* H. B. and K. (fig. 94).

S. moranense Humboldt, Bonpland, and Kunth, "Nov. Gen. et Sp.," 6, 44, 1823. Hemsley, "Biol. Centr. Amer., Bot.," 1, 397. "N. Amer. Flora," 22, 63.

SYNONYMS.—*S. Liebmannianum* of some gardens (not of Hemsley, see p. 174). *S. Greggii* of some gardens (not of Hemsley, which is a small yellow-flowered species not in cultivation, so far as I am aware).

A distinct little bushy plant typically some 3-4 inches high, with much-branched wiry red stems, bare below, clothed above with small

triangular fleshy leaves, and bearing small terminal cymes of few



FIG. 93.—*S. monregalense* Balbis.

white starry flowers. It has been long in cultivation, and is usually found in gardens under the erroneous names of *Liebmannianum* or *Greggii*. It is allied to the former (see p. 174), which, however, is

easily distinguished by its peculiar stems, the lower part of which is thick and silvery-white, owing to the presence of the bleached bases of the old leaves ; the latter is a quite different plant with yellow flowers.

DESCRIPTION.—A low, much-branched glabrous evergreen perennial. *Main roots* long, fleshy, resembling radishes. *Stem* in lower part procumbent and



FIG. 94.—*S. moranense* H. B. & K.

rooting, thin, red, bare and smooth save for leaf scars ; branches many, spreading, leafy. *Leaves* crowded, triangular, sessile, rounded below, tip blunt, about $\frac{1}{8}$ inch long by $\frac{1}{10}$ inch broad, nearly as thick as broad, glabrous, green, set at right angles to the stem. *Inflorescence* small, terminal, of about 2 short branches, each bearing several sessile flowers. *Buds* ovate-oblong, blunt. *Flowers* $\frac{3}{8}$ inch across. *Sepals* separate to base, linear-lanceolate, blunt, fleshy, slightly spurred. *Petals* wide-spreading, thrice the sepals, lanceolate, blunt, slightly apiculate, white, tinged red on back. *Stamens* slightly shorter than petals,

filaments white, anthers purple. Scales white, emarginate, longer than broad. Carpels erect, shorter than the stamens, white, later reddish and slightly spreading; in fruit bright red, wide-spreading.

Flowers July. Apparently hardy throughout the British Isles.

HABITAT.—Real de Moran, South Mexico.

The name is derived from the type locality.

Var. **arboreum** Praeger.

S. arboreum Masters in *Gard. Chron.*, 1878, ii. 717.

S. moranense H. B. K. var. *arboreum* Praeger in *Journ. of Bot.*, 55, 211, 1917.

Stem erect, much-branched, fastigiate, and often fasciate at the tips; a little upright bush 6–11 inches high, the stems sometimes as much as $\frac{1}{4}$ inch thick.

The type as found in gardens is somewhat variable in habit and stoutness. Occasionally the leaves are arranged in five spiral rows, which gives the plant an unfamiliar appearance. It varies much also as regards floriferousness.

The variety is very distinct in habit. Dr. MASTERS, when working at the genus *Sedum*, found this erect form in various gardens labelled *S. arboreum* or *arborescens*, and described it (*loc. cit.*) as a new species under the former name. It has evidently been in cultivation for a long time, and was one of the earliest known of Mexican *Sedums*. A fine specimen of it in the Kew herbarium, 9 to 11 inches in height, collected by C. E. PRINGLE at 10,000 feet in the Sierra de Pachuca, shows that var. *arboreum* is a native Mexican form.

74. ***Sedum Liebmannianum*** Hemsley (fig. 95).

S. Liebmannianum Hemsley, "Diagnoses Plant. Nov.," 1, 12, 1878.

Hemsley, "Biol. Centr. Amer., Bot.," 1, 396. Rose in "Contrib. U.S. Nat. Herb.," 13, 299, 1911.

SYNONYM.—*S. moranense* Britton and Rose in "N. Amer. Flora," 23, 63 (not of H. B. and K., see p. 171).

ILLUSTRATION.—Rose, *loc. cit.*, pl. 56 (photo).

There has been confusion regarding this plant, arising from its similarity in some points to *S. moranense* H. B. K. HEMSLEY, in his original description (*loc. cit.* 1878), does not refer to the most striking character of the plant, namely the persistent white inflated bases of the withered leaves, which give it a very distinct and peculiar appearance. HEMSLEY'S type specimens at Kew (Yavesia, Oaxaca, 7,500 feet, Liebmann [1841–43]) are now in very poor condition, but nevertheless this character is apparent.

Two years later, in *Gard. Chron.*, 1880, ii. 38, HEMSLEY published a fresh description "enlarged from the living plant at Kew," but the living plant in question was not *Liebmannianum*, but *moranense*, as shown by the type specimen of this description (so labelled by N. E.

Brown) preserved at Kew, as well as by internal evidence (*e.g.* "ramis rubris").

ROSE in "North American Flora" (1905) unites the two species under the older name. Soon after, *S. Liebmannianum* was rediscovered in Mexico by C. A. PURPUS and grown at Washington, where ROSE was about to describe it as a new species when its identity with HEMSLEY'S plant was recognized. He redescribed it in 1911 (*loc. cit.*) pointing out its most remarkable character—the thickened

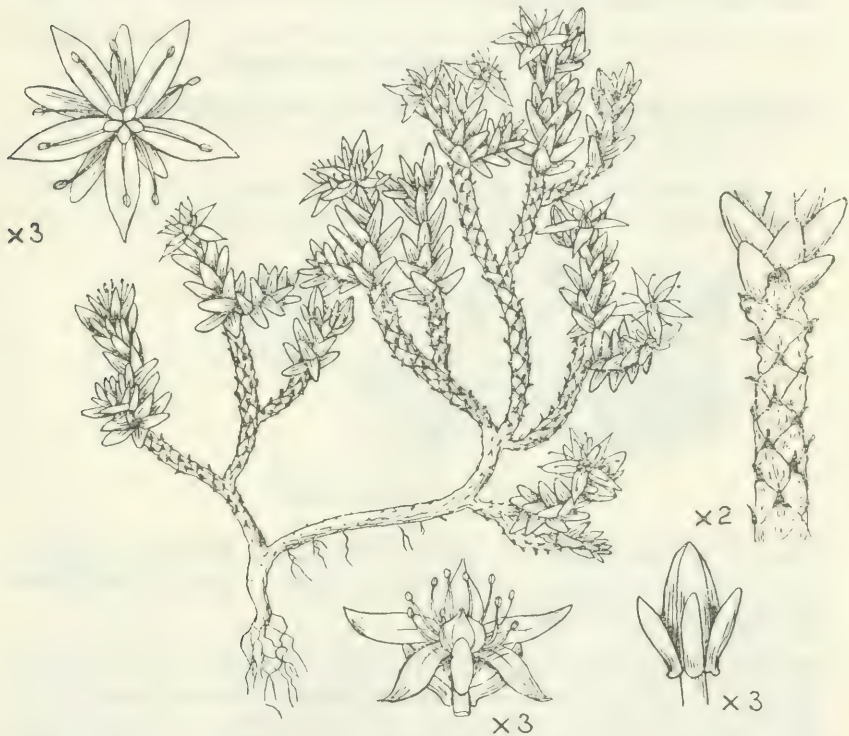


FIG. 95.—*S. Liebmannianum* Hemsley.

white stem due to the persistent inflated leaf-bases, and added a photograph in which this character is plainly seen.

In leaf and flower the two species come pretty close, but the leaves of *Liebmannianum* are larger and quite imbricated, and the petals are more sharply pointed. It is, moreover, nearly deciduous, the young leaves alone remaining through the winter and assuming a brown tint; and it is tender, while *moranense* is thoroughly evergreen and hardy.

DESCRIPTION.—A small almost deciduous glabrous perennial, 2–6 inches high. *Stems* procumbent and rooting below, ascending, branched, thickened to $\frac{1}{8}$ inch diameter by the persistent loose silvery bases of the old leaves, each with a black tip representing the lamina. *Leaves* crowded, oblong, blunt, very fleshy, sessile, $\frac{3}{16}$ inch long, green, tipped red. *Inflorescence* terminal, few-flowered. *Buds* oblong-ovate, rather blunt. *Flowers* 5-parted, sessile, $\frac{3}{8}$ inch across. *Sepals*

linear-lanceolate, blunt, green, very fleshy, resembling the leaves. *Petals* white, lanceolate, rather acute, keeled, wide-spreading, twice the sepals. *Stamens* slightly shorter than petals, filaments white, anthers red. *Scales* small, yellowish, broader than long. *Carpels* erect, greenish, shorter than the stamens.

Flowers June (gentle heat), July–August (cold frame). Not hardy.

HABITAT.—San Luis Potosi and Oaxaca, Mexico.

I have the plant from Washington, New York, and Edinburgh.

The name commemorates the Danish botanist F. LIEBMANN, who collected extensively in Mexico.

75. *Sedum compactum* Rose (fig. 96).

S. compactum Rose in "Contrib. U.S. Nat. Herb.," 13, 297, 1911.

ILLUSTRATION.—*Loc. cit.*, pl. 53 (photo).

A tiny creeping plant resembling *S. humifusum* in size and habit, but at once separated at any stage of growth by its glabrous leaves;

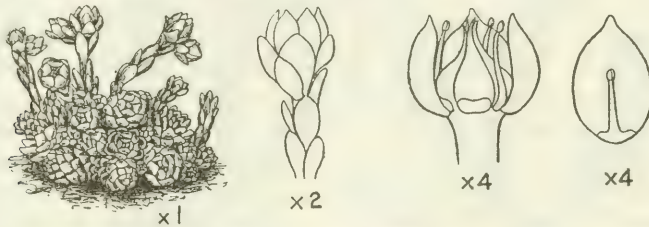


FIG. 96.—*S. compactum* Rose.

those of *S. humifusum* are strongly ciliate. In flower, the almost globular scented white blossoms are quite peculiar; those of *humifusum* are star-like, yellow and scentless.

DESCRIPTION.—Evergreen, perennial, minute, creeping, forming a close greyish mat. *Stems* very short, much branched. *Flower-stems* an inch high, erect, leafy. *Leaves* of barren stems densely imbricate, glabrous, greyish green, sometimes dotted purple, obovate, blunt, very fleshy, flat on face, rounded on back, $\frac{1}{8}$ inch long; leaves of flower-stems looser and larger. *Inflorescence* terminal, of 2–3 flowers. *Buds* ovate. *Flowers* sub-globose, a little over $\frac{1}{4}$ inch long. *Sepals* ovate, blunt, fleshy, concave, purplish. *Petals* oval, apiculate, white, concave, twice the sepals. *Stamens* curved, $\frac{2}{3}$ the petals, anthers yellow. *Scales* large, broad, yellow. *Carpels* short, erect, greenish.

Flowers June (gentle heat); July (cold frame). Not hardy.

HABITAT.—Oaxaca, Mexico.

Received from Washington and Edinburgh. The blossoms have a strong odour resembling elder flowers—scented blossoms are extremely rare in *Sedum*.

The specific name has reference to its close habit.

(2) Leaves terete or sub-terete.

A tolerably homogeneous group of European species with two from Western Asia. *S. dasyphyllum* and *S. brevifolium* are closely allied, as are also the two Asiatic species, *S. gracile* and *S. Alberti*.

The leaves of the Spanish *S. gypsumicum* incline to flatness, but its flowers place it close to *S. album*.

dasyphyllum Linn.

brevifolium DC.

anglicum Huds.

album Linn.

gypsumicum Boiss. and Reut.

hirsutum All.

Lydium Boiss.

gracile C. A. Meyer.

Alberti Regel.

76. *Sedum dasyphyllum* Linn. (fig. 97).

S. dasyphyllum Linn., "Species Plantarum," 431, 1753. Masters in *Gard. Chron.*, 1878, ii. 716.

ILLUSTRATIONS.—Sowerby, "English Bot.," ed. 3, pl. 530. Reichenbach, "Flor. German.," 23, tab. 56. Curtis, "Flora Londin.," 1, pl. 115. Tenore,



FIG. 97.—*S. dasyphyllum* Linn.

"Flor. Napol.," tab. 229. Jacquin, "Hort. Vindobon.," 2, tab. 153. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 23.

Recognized by its very small size, pinkish-grey colour, pinkish-white flowers, and opposite, egg-shaped, more or less hairy leaves. Even when the barren shoots are nearly without hairs, the inflorescence shows the characteristic pubescence.

DESCRIPTION.—A small evergreen tufted perennial, 1-2 inches high. Stems wiry, much branched below, with ascending branches, the barren ones short, densely leafy with opposite leaves, the flowering shoots taller, with larger more distant leaves which are opposite or alternate. Leaves ovoid to obovoid, slightly flattened on face, glaucous, more or less glandular-pubescent, $\frac{1}{4}$ to $\frac{1}{6}$ inch long. Buds obovate, very blunt. Inflorescence small, 2-branched, pubescent, of 2-4 flowers, pedicels equalling the flowers. Flowers usually 5-, sometimes 6-parted, $\frac{1}{4}$ inch across. Sepals small, ovate, very fleshy, separate to the base. Petals oblanceolate, apiculate, white on face with a yellowish base, pinkish on back, wide-spreading, thrice the sepals. Stamens slightly shorter than petals, filaments white, anthers purple. Scales yellow, spatulate. Carpels greenish, erect, equalling the stamens, nearly erect in fruit.

Flowers June. Hardy.

HABITAT.—Europe (excluding the north), N. Africa. Occurs on old walls in the southern part of the British Isles from Cambridge to Cork, but probably not native.

It is shy of moisture, but loves an old wall, on which it speedily naturalizes itself and spreads.

The specific name refers to the very thick leaves.

Var. *glanduliferum* Moris, "Flor. Sardoia," 2, 125, 1840.

SYNONYMS.—*S. glanduliferum* Gussone, "Florae Siculae Prodrromus," 1, 519.
S. corsicum, Duby in De Candolle, "Botanicon Gallicum," ed. 2, 1, 202.

ILLUSTRATIONS.—*Bot. Mag. Garden*, 1885, p. 314. Tenore, "Flor. Napol.," tab. 232. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 24.

Whole plant densely glandular pubescent, of same size as the type.

The species is variable as regards the distribution and amount of hairiness, but this extreme form is distinct, and a very beautiful object under the lens.

Var. *macrophyllum* Rouy and Camus, "Flore de France," 7, 115, 1901 (as sub-var.) (char. emend.).

"Feuilles largement ovoïdes, très épaisses, grandes (5–10 millim. de long) ; tiges, feuilles, rejets, inflorescence glabres." I have found

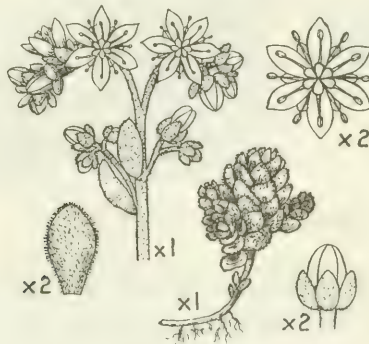


FIG. 98.—*S. dasycyllum* var. *Suendermanni* Praeger.

several very large forms in cultivation agreeing with var. *macrophyllum*, except that the plants vary from almost glabrous to rather hairy ; it seems best to extend the description so as to include all, as the large size is the striking character, and hairiness is so variable in the species.

Var. *Suendermanni* Praeger in *Journ. of Bot.*, 57, 50, 1919 (fig. 98).

Plant larger than in type, leaves of barren shoots densely imbricate, obovate, bluntly pointed at apex, cuneate below, flat on face, densely glandular-hairy ; inflorescence larger and more branched than in type ; calyx half as long as the corolla ; flowers large, $\frac{1}{8}$ inch diameter, petals 5 to 7 in number (usually 6). Flowers late July, about six weeks after *dasycyllum* type.

A peculiar form, well distinguished by its densely imbricated leaves and abundant, very large flowers, which in diameter are one and a half times the size of those of the type.

It was collected in Spain by F. SÜNDERMANN of Lindau (see his Catalogue for 1913), and distributed under the name *S. rivulare*; but *S. rivulare* Boissier (= *S. melanantherum* DC.) is a different plant, resembling a slender *S. anglicum* (for illustration see Boissier, "Voyage Midi d'Espagne," tab. 63).

I have grown a large series of *dasyphyllum* forms, collected mainly from garden sources, and find them puzzling. They vary much, in the first place, in size (from type to *macrophyllum*); next, in hairiness, from quite glabrous (sub-var. *glabratum* Rouy and Camus), sent by Dr. SCHROETER from Zurich, and collected on a wall at Midleton, Co.

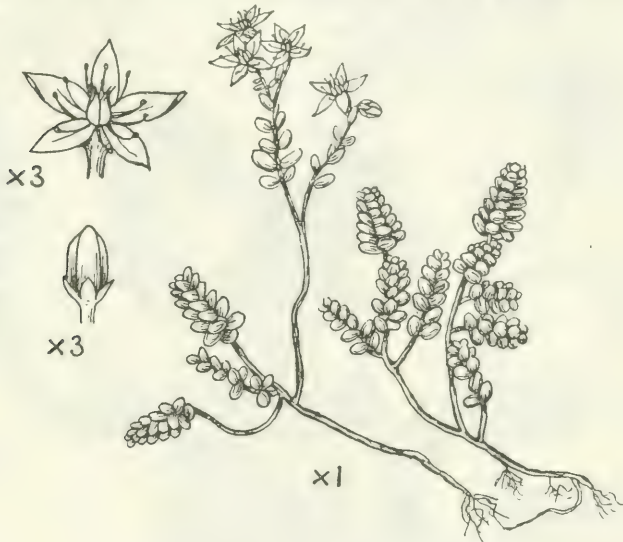


FIG. 99.—*S. brevifolium* DC.

Cork, to the densely hairy *glanduliferum*. Then one very hairy form has leaves which readily drop off, so that after heavy rain the stems are almost bare and the fallen leaves soon form a dense mat of young plants; while in other hairy forms the leaves are firmly attached.

According to KERNER, the flowers are sometimes replaced by leaf-buds.

77. *Sedum brevifolium* DC. (fig. 99).

S. brevifolium De Candolle, "Rapports Voyages," 2, 79, 1808. Masters in *Gard. Chron.* 1878, ii. 717.

SYNONYMS.—*S. farinosum* of gardens (not of Lowe, which is a Madeira plant allied to *album*, and not in cultivation so far as I am aware). *S. Pittoni* (a *nomen nudum*) of gardens.

ILLUSTRATIONS.—De Candolle, "Mém. Crassul.," plate 4A. Cusin, and Ansberque, "Herb. Flor. Française, Crassul.," tab. 23.

A delightful, tiny plant, known at once by its sub-globular mealy reddish leaves, arranged in four close vertical rows, and small white flowers.

DESCRIPTION.—A minute evergreen perennial, creeping, mealy, 1-2 inches high. *Stems* wiry, bare, branched, branches many, ascending, very leafy. *Leaves* opposite, ovoid or sub-globose, $\frac{1}{8}$ inch long, white-mealy, flushed red or purple, arranged in four close rows, alternate and usually not larger on the flowering shoots. *Inflorescence* small, few-flowered. *Buds* ovate, blunt. *Flowers* $\frac{5}{16}$ inch across, pedicels very slender, equalling $\frac{3}{4}$ the flowers. *Sepals* ovate-lanceolate, acute, fleshy, mealy, flushed red. *Petals* white, ovate, apiculate, 3 times the sepals, with a strong red nerve on back. *Stamens* shorter than the



FIG. 100.—*S. brevifolium* var. *quinquefarium* var. nov.

petals, filaments white, anthers purple. *Scales* quadrate, yellow. *Carpels* white, erect, shorter than the stamens, erect also in fruit.

Flowers July. Hardy if kept dry.

HABITAT.—South-west Europe, Morocco.

Var. *quinquefarium* var. nov.* (fig. 100).

DESCRIPTION.—*Stem* twice as thick and twice as long as in type. *Leaves* much larger, arranged in five spiral rows, $\frac{3}{16}$ inch long on the barren stems, up to $\frac{1}{8}$ inch long on the flowering stems. *Flowers* as in the type.

A very distinct-looking plant which, in the absence of floral differences, must be placed under *brevifolium*. In its larger 5-ranked

* *Caules* quam in typo duplo crassiores et duplo longiores. *Folia* in quinque ordines spirales disposita, ea surculorum sterilium ad 5 mm. longa, ea surculorum floriferorum ad 8 mm. longa.

leaves and strong large-leaved flowering shoots, it differs much from the type. I have seen it only at Edinburgh Botanic Garden, where it bore the name *dasyphyllum*. Origin unknown.

OBSERVATION.—Var. *Pottsii* of gardens. The so-called var. *Pottsii* was brought by the late Mr. POTTS of Edinburgh from the Jardin des Plantes in Paris about 1875; it is stated (see *Gard. Chronicle*, 1907, ii, 275) to be smaller in all its parts than the type. The plant as I have seen it in several gardens is not distinct, and Sir ISAAC BAYLEY BALFOUR, who is well versed in its history, confirms the opinion that it is only type.

A var. *majus* has been mentioned in gardening papers, but I know nothing of it.

S. brevifolium needs perfect drainage for its successful cultivation. Save for the Kew plant, all the half-dozen specimens which I have

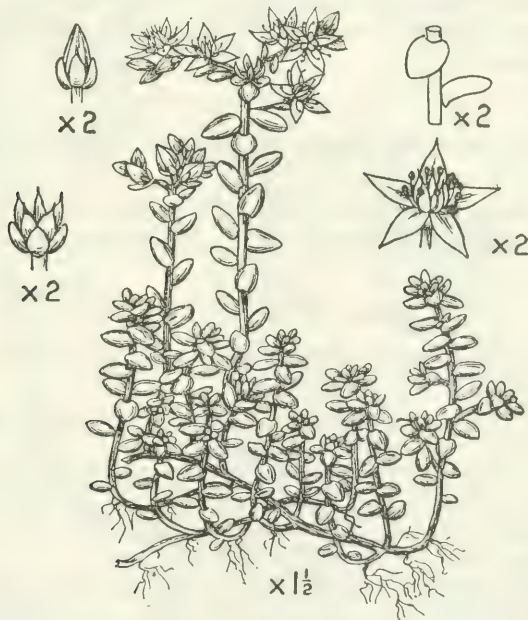


FIG. 101.—*S. anglicum* Hudson.

seen were labelled with the erroneous names of *farinosum* or *Pittoni*. The specific name is descriptive of the very short leaves.

78. ***Sedum anglicum* Hudson (fig. 101).**

S. anglicum Hudson, "Flora Anglica" (ed. 2), 196, 1778. Masters in *Gard. Chron.* 1878, ii. 716.

ILLUSTRATIONS.—Sowerby, "Engl. Bot." (ed. 3), pl. 531. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 22.

A pretty little plant, brightening rocky ground in our islands with its pinkish starry flowers, and later its red fruit. When out of

flower it rather resembles *S. acre*, but may then be known by its leaves broadest about the middle, not at the base. Its flat leaves and inflorescence of 2 (or at most 3) branches borne on stems only 1 to 2 inches high, distinguish it from small forms of *S. album*.

DESCRIPTION.—A minute, mat-forming, glabrous evergreen perennial. *Stem* slender, creeping and rooting, with many ascending barren and flowering shoots 1–2 inches high. *Leaves* alternate, crowded, often tinged red, sessile, elliptic, blunt, clasping, very thick, rounded on both faces, $\frac{1}{8}$ to $\frac{3}{16}$ inch long, set at right angles to the stem, with a slight spur not addressed to the stem. *Inflorescence* usually of 2 wide-spreading simple branches bearing each 3 to 6 flowers, with a flower in the fork. *Buds* ovate, blunt. *Flowers* $\frac{1}{2}$ inch across. *Sepals* ovate, blunt, very fleshy, resembling the leaves, separate to the base. *Petals* more than twice the sepals, lanceolate, apiculate, white, flushed pink on back, keeled. *Stamens* spreading, equalling the petals, filaments white, anthers purple. *Scales* crimson, spatulate, twice as long as broad. *Carpels* slightly spreading, nearly as long as the petals, white, turning red later, erect in fruit.

Flowers June–July. Hardy.

HABITAT.—Western Europe, from Norway to Spain.

It derives its name from the fact that it was first described from English specimens.

Var. **minus** var. nov.*

Plant very small, the leaves and flowers being $\frac{2}{3}$ of the normal size (linear). Flowers pinker.

A very pretty and distinct little plant, obtained in the garden of Mr. E. A. BOWLES at Waltham Cross. No doubt a wild form.

79. *Sedum album* Linn. (fig. 102).

S. album Linn., "Species Plantarum," 432, 1753. Masters in *Gard. Chron.* 1878, ii. 717.

SYNONYMS.—*S. Alberti* of gardens (not of Regel, see p. 191; nor of Regel's "Gartenflora," tab. 1019, fig. 2); *S. balticum* Hartm.

ILLUSTRATIONS.—Sowerby, "English Bot." ed. 3, pl. 529, fig. 1. Reichenbach, "Flor. German.," 23, tab. 55. De Candolle, "Plantes Grasses," tab. 22. "Flora Danica," 1, tab. 66. Curtis, "Flor. Londin.," 2, pl. 52. Allioni, "Flor. Pedemont.," 3, tab. 65. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 20. Plenck, "Icones Plant. Medicinalium," tab. 352.

Though varying much in shape and colour of leaf, this common species, which masquerades in gardens under many names, is always easily recognized, as no other species has any close resemblance to it. In the vegetative parts the yellow-flowered *S. divergens* somewhat resembles it, but is separated by its flattish opposite leaves, widest above. The very characteristic inflorescence finds its counterpart in *S. gypsicolum*, but this has very different leaves, flattened, ovoid-rhomboidal, and puberulous.

DESCRIPTION.—A small, glabrous, creeping, evergreen perennial, soon forming a large mat. *Stem* round, much branched, branches ascending. *Leaves* alternate, linear-oblong to obovate, terete or flattened above, $\frac{1}{4}$ to $\frac{1}{2}$ inch long, blunt, sessile, those of the flower-stem larger and fewer. *Flower-stem* 3 to 6 inches high, ascending, usually unbranched. *Inflorescence* of terminal and

* *Planta minima, foliis floribusque quam in typo, diametro $\frac{1}{2}$ minoribus, floribus roseoribus.*

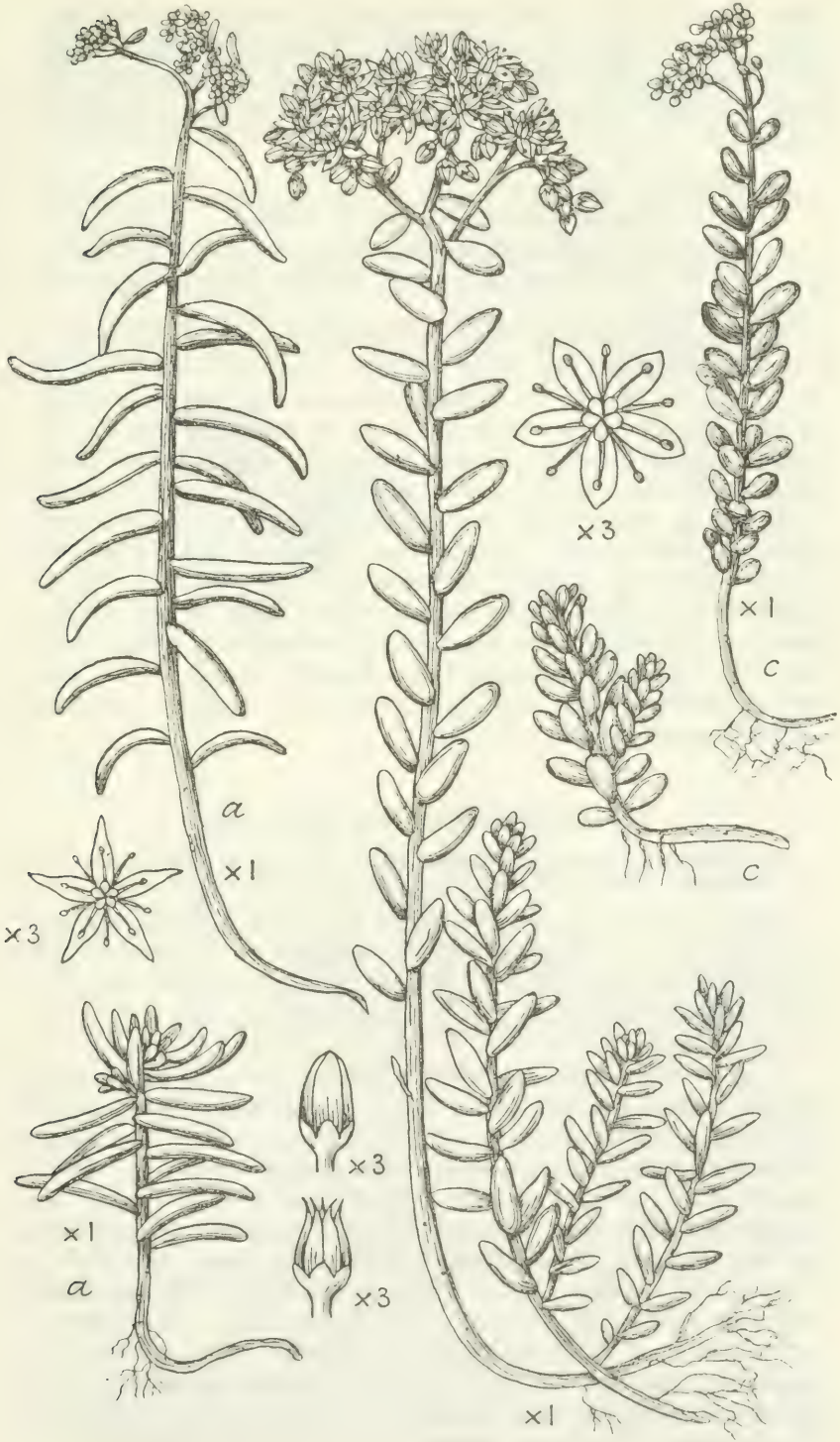


FIG. 102.—*S. album* Linn.

lateral cymose branches forming a flattish panicle 1 to 2 inches across. *Buds* ovate, blunt. *Flowers* many, $\frac{3}{8}$ inch across, exceeding the pedicels. *Calyx* cup-shaped, lobes green, ovate, blunt, equalling the tube, persistent in fruit. *Petals* lanceolate to ovate, white, blunt, 2 to 3 times the sepals. *Stamens* spreading, nearly equalling the petals, filaments white, anthers purple. *Scales* broadly spatulate, yellow. *Carpels* white, erect; erect also in fruit, when they are streaked red.

Flowers July. Hardy.

HABITAT.—Europe, Siberia, W. Asia, N. Africa.

A very common species in gardens, and quite naturalized on walls and rocks in many parts of our own islands, but seldom if ever indigenous there.

Very variable in leaf, different forms exhibiting in the garden a continuous series from linear (fig. 102, *a, a*) to almost globular (fig. 102, *c, c*). Near the former end of the series lies the type, described by Linnæus as “*foliis oblongis*,” while at the other end are the forms described under the names *Athoum* DC. = *brevifolium* Boiss., *turgidum* DC., &c. Much variation is also found as regards the shape of the leaf in cross-section, some forms being more or less flattened while others are circular. Some of the long-leaved forms have even a groove down the middle of the upper face of the leaf. But in the garden, at least, there is little use in attaching names to any of these forms, since all are linked together by intermediates. The flowers vary also, as regards both length and breadth of petal (see fig. 102), and as regards colour, most fading with a rosy tinge, but some remaining quite white.

Var. *micranthum* Bâstard (pro specie).

ILLUSTRATIONS.—Sowerby, “*English Bot.*,” ed. 3, 4, pl. 529, fig. 2. Cusin and Ansberque, “*Herb. Flor. Française, Crassul.*,” tab. 21.

‘Elle differt du *S. album* parce que les feuilles des jeunes pousses sont dressées et non étalées; du *S. turgidum* par les feuilles cylindriques peu ou point renflées; de tous deux par ses fleurs de moitié plus petites.’—Bastard in litt. ex De Candolle, “*Flore Française*,” Suppl., p. 523.

I quote the original description because there has been much looseness concerning this plant, the *S. micranthum* of some authors and field botanists being only var. *brevifolium* Boissier (“*folia caulina abbreviata ovato-oblonga*”) with flowers as large as, or only slightly smaller than, those of the type. True *S. micranthum* I have seen in cultivation only from specimens collected by several correspondents in the Pyrenees. *Brevifolium* and *turgidum* seem unworthy of varietal rank; in that case the distinguishing character of *micranthum* remains: flowers half the size of those of the type. The flowers of my plants are $\frac{2}{3}$ those of the type in diameter, which is rather less than $\frac{1}{2}$ in area; the plants are very small and compact, with leaves and stems shorter than in any of the dozens of *album* forms which I have grown. The occurrence of true *micranthum* in the British Isles

appears to rest on SOWERBY'S Sussex record ("Engl. Bot." *loc. cit.*, p. 53). I have not seen specimens. The diagnoses given by BABINGTON ("Man. Brit. Bot.") and HOOKER ("Students' Fl.") do not appear to represent *micranthum* Bast. at all. The Cork plant, as sent to me by several botanists, is only *brevifolium*.

Sub-var. *chloroticum* Rouy and Camus, "Flore de France," 7, 117 (fig. 103).

S. album var. *chloroticum* Lamotte, "Prodr.," 307.—Stems and leaves yellowish green. Flowers slightly greenish white.

A pretty little *micranthum* form, distinct for horticultural purposes, received from the Oxford Botanic Garden, belongs here. The total



FIG. 103.—*S. album* var. *micranthum* sub-var. *chloroticum*.

absence of red pigment throughout the stem, leaves, and flowers gives it a distinct appearance. It is more vigorously creeping than any other *micranthum* form I have seen.

f. murale.

S. murale of gardens. A form of *album* type of horticultural value, with purple foliage and pinkish flowers. Leaves, stems, and sepals purple, corolla pink on back with a red nerve, anthers pink,

scales orange, carpels turning pink, fruit red. Origin unknown to me; it has been much distributed in recent years and is a very useful plant for the rock garden.

80. *Sedum gypsicolum* Boiss. and Reut. (fig. 104).

S. gypsicolum Boissier and Reuter, "Diagnoses Plant. Nov. Hisp.," 13, 1842. Wilkomm and Lange, "Prodromus Florae Hispan.," 3, 140.

This little-known plant in flower strongly resembles *S. album*, and it has the habit of that species, but the leaves are widely different, their flattened, rather rhomboidal shape and dull greyish surface (due to fine pubescence) giving the plant an appearance quite distinct.

DESCRIPTION.—A small evergreen, creeping, puberulous perennial, forming a greyish mat, flushed red in exposure. *Stems* creeping, with many short, ascending, barren shoots, and flowering shoots 4 to 6 inches high, puberulous below, glabrous above. *Leaves* of barren shoots imbricate, arranged in about 5 spiral rows, thick, blunt, sessile, ovate-rhomboidal, $\frac{1}{2}$ inch long, puberulous, dull greyish green tinged red; those of the flower-shoots similar, more distant. *Inflorescence* corymbose, much branched, $1\frac{1}{2}$ inch across, lowest branches emerging about 2 inches below the summit. *Flowers* many, small, $\frac{1}{4}$ inch across, and, like the inflorescence, much resembling *S. album*. *Calyx* green, glabrous, only slightly fleshy, lobes triangular, blunt, equalling the tube. *Petals* white, ovate-lanceolate, acute, thrice the sepals. *Stamens* equalling the petals, anthers white, filaments purple. *Scales* minute, yellowish, broadly spatulate. *Carpels* equalling the stamens, white, erect, styles at first erect, later curving outwards.

Flowers June–July. Hardy.

HABITAT.—Spain and Portugal.

Though described over seventy years ago, I find no record of the plant in cultivation. It was collected in Spain by F. SÜNDERMANN, of Lindau, a few years ago, and came from him as "*Sedum* sp. Sierra Nevada."

81. *Sedum hirsutum* Allioni (fig. 105).

S. hirsutum Allioni, "Flor. Pedemont.," 2, 122, 1785.

ILLUSTRATIONS.—Allioni, *loc. cit.*, tab. 65, fig. 5. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 18.

A plant of about the size of *album*, or smaller, but tufted, not creeping. Distinguished by its densely hairy leaves (which are sub-terete and bluntly oblanceolate), and usually pure white, starry flowers. The only other *Sedum* in cultivation with such hairy, thick leaves is *S. dasyphyllum* var. *glanduliferum*, but in this the leaves are opposite, glaucous, shorter, and thicker, not alternate and green.

DESCRIPTION.—A small, tufted, evergreen perennial, green (reddish in exposure), hairy throughout with glandular viscous hairs. *Barren stems* ascending, about 1 inch long, with the leaves aggregated at their tips. *Flowering stems* 2 to 3 inches high, erect, leafy, hairy. *Leaves* oblanceolate, blunt, sessile, very fleshy, hairy, especially near the tips, $\frac{3}{4}$ inch by $\frac{1}{2}$ inch, elliptic in section. *Inflorescence* few-flowered, usually of 2 branches, drooping in bud, pedicels equalling or shorter than the flowers. *Buds* ovate, acute. *Flowers* white or tinged red, $\frac{1}{2}$ inch across. *Sepals* erect, lanceolate, green, fleshy, hairy. *Petals* oval, with a short claw, apiculate, wide-spreading or reflexed, more than twice the sepals, white, with a prominent red nerve on the hairy back. *Stamens* spreading, shorter than the petals, filaments white, anthers dark purple. *Scales*

small, yellow, cuneate. *Carpels* erect, white, slightly hairy, equalling the stamens, with slightly spreading styles ; nearly erect in fruit.



FIG. 104.—*S. gypsicolum* Boiss. and Reut.

Flowers June–July. Hardy if kept dry.

HABITAT.—South-west Europe, from Portugal to N. Italy, chiefly on the mountains.

Rare in cultivation. Mr. J. WOOD, of Boston Spa, has it (collected in the Pyrenees); and, by the kindness of correspondents,

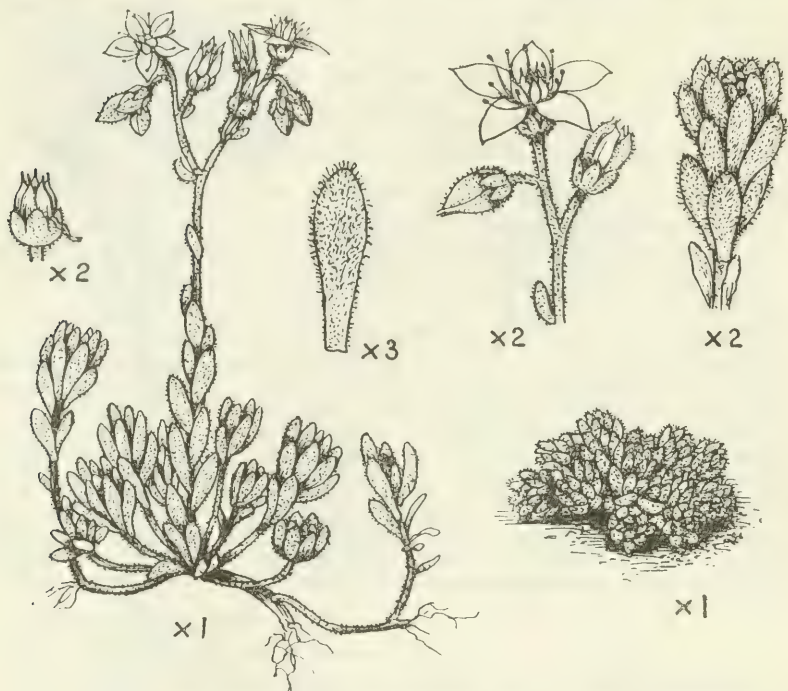


FIG. 105.—*S. hirsutum* Allioni.

I have received specimens collected in southern France, Portugal, and the Pyrenees.

Several of the floras (*e.g.* Rouy and Camus, Wilkomm and Lange) describe the flowers as purplish or red; in all the specimens I have seen they were china white.

The name has reference to the hairiness which is so conspicuous a character of the plant.

Var. *baeticum* Rouy.

Rouy in *Bull. Soc. Bot. de France*, **34**, 441, 1887 (as sub-species).

Praeger in *Journ. of Bot.* **56**, 150, 1918.

More robust than the type, very glandular-hairy in all its parts, pale green in colour, flowers half as large again in diameter, petals oval rather than oblong-lanceolate, carpels broader.

The plant from which the above description is taken was collected in Southern Spain a few years ago by Miss LUCKHAM, and sent to Wisley. It agrees with ROUY'S description of var. *baeticum* in all points save that in that form the flowers are a little larger, and the petals multinerved.

Its large size, pale colour, and absence of the runner-like shoots which are produced by strong plants of *S. hirsutum*, give it a distinct appearance.

82. *Sedum Lydium* Boissier (fig. 106).

S. Lydium Boissier, "Diagnoses Plant. Nov.," ser. I. 3, 17, 1843. Boissier, "Flor. Orientalis," 2, 782. Masters in *Gard. Chron.*, 1878, ii. 685.

A dainty little plant, especially in exposure, when its linear leaves assume a bright-red tint. Easily known among the small linear-



FIG. 106.—*S. Lydium* Boissier.

leaved, white-flowered Sedums by its dense, flat inflorescence borne on a comparatively tall stem.

DESCRIPTION.—A tiny evergreen perennial, forming a bright-green mat, mostly tinged red. *Stems* rooting below, with many ascending branches; barren shoots 1 inch high, densely leafy above; flowering shoots 2 to 4 inches, often branched below, with less-crowded similar leaves. *Leaves* terete, linear, sessile, green, reddish and minutely pimpled at the tip, $\frac{1}{2}$ inch long. *Inflorescence* compact, flattish, $\frac{3}{4}$ inch across, sparingly leafy. *Buds* ovate. *Flowers* $\frac{1}{4}$ inch across, longer than the pedicels. *Sepals* oblong, blunt, fleshy, green tipped red. *Petals* white, $1\frac{1}{2}$ times the sepals, lanceolate, rather acute, concave. *Stamens* equalling the petals, filaments white, anthers purple. *Scales* bright yellow, cuneate, notched, twice as long as broad. *Carpels* white, soon turning red, erect, shorter than the stamens; nearly erect and bright red in fruit.

Flowers June. Hardy.

HABITAT.—Asia Minor.

This tiny plant has been long in cultivation, and is frequent in gardens, sometimes under the misnomer of *S. lividum*. It is distinct and constant, and no varieties are recorded.

83. *Sedum gracile* C. A. Meyer (fig. 107).

S. gracile C. A. Meyer, "Enum. Plant. Cauc.," 151, 1831. Bossier, "Flora Orientalis," 2, 781. Hamet in *Trd. Bot. Sada* (Tiflis), 8, pt. iii. 25.

A small linear-leaved plant, having, when not in flower, some resemblance to *S. sexangulare*, but smaller and more tufted, not creeping. The flowers are white, not yellow as in *sexangulare*. Closely allied to *S. Alberti*, and almost identical in flower, but *Alberti* has a creeping habit and stems not quite so slender; the branches of the inflorescence



FIG. 107.—*S. gracile* C. A. Meyer.

are semi-erect and forked, and the flowers are slightly smaller, while *gracile*, as already stated, does not creep, and the cyme-branches are not forked, and spread almost horizontally.

DESCRIPTION.—A small evergreen glabrous perennial, bright-green in colour. *Stems* procumbent below but not creeping, much branched, terete, red, shining, clothed with old leaves save at the very base, with many ascending short, densely leafy shoots, the flowering ones $1\frac{1}{2}$ to 2 inches long, with leaves not so dense as on the barren shoots, which are shorter. *Leaves* linear-oblong, blunt, up to $\frac{5}{8}$ inch long on the flowering shoots, rather smaller on the barren shoots, flattish on face, much rounded on back, red-dotted, tips minutely papillose, sessile, prolonged into a short, blunt spur. *Inflorescence* usually of two, occasionally three or four simple patent branches with a flower in the fork, leafy throughout, the bracts identical with the leaves; branches each $\frac{1}{2}$ inch long and each bearing six or seven flowers. Buds ovate, acute. *Flowers* $\frac{5}{8}$ inch across, subsessile. *Sepals* elliptic, rather acute, fleshy, green, resembling the leaves and bracts, free almost to the base. *Petals* broadly lanceolate, thrice the sepals, acute to acuminate, patent, slightly keeled, white; on back often dotted red, with a greenish nerve. *Stamens* shorter than the petals, filaments white, anthers red-purple. *Scales* small, cuneate, retuse or emarginate, orange. *Carpels* pale

green or whitish, dotted red below on the inner face, at first erect, later slightly spreading, tapering into the slender short styles, equalling the stamens.

Flowers late June. Hardy.

HABITAT.—Caucasus region.

One of the most constant points of difference between this species and its close ally *S. Alberti* (at least so far as the plants which I have seen are concerned) is not mentioned by REGEL in describing the latter species, namely, that in *Alberti* the forked branches of the cyme bear no flowers (only leaves) between the flower which occupies the primary fork and that which occupies the secondary fork, while in *gracile* flowers are borne all the way from the primary fork to the end of the simple branches.

Rare in cultivation. I received it from REGEL and KESSELRING in Petrograd, and obtained it also at Kew (as *glaciale*) and Bremen.

84. *Sedum Alberti* Regel (fig. 108).

S. Alberti Regel in "Acta Horti Petropol.," 6, 299, 1880.

A small plant closely resembling *S. gracile* C. A. Meyer, from which it differs in its more creeping stem not clothed with old leaves and inflorescence of (mostly 3) semi-erect forked branches, devoid of flowers between the primary and secondary forks, whereas in *S. gracile* the branches (mostly 2) are unbranched and spread almost horizontally, or are recurved, and bear flowers throughout their length.

DESCRIPTION.—A small, glabrous, evergreen perennial. *Stems* procumbent, creeping, much branched, terete, red, shining, bare below, branches ascending, very leafy. *Flower-stem* $1\frac{1}{2}$ to 2 inches high, ascending, usually unbranched, with larger, less dense leaves. *Leaves* linear-oblong, blunt, up to $\frac{5}{16}$ inch long on the flower-stems, smaller on the barren shoots, flattish on face, rounded on back, red-dotted, tips minutely papillose, prolonged at base into a short blunt spur. *Inflorescence* of (usually) 3 semi-erect, leafy, forked branches, with a flower in the primary and secondary forks, but no flowers, only leaves, on the branches between these points; flowers 25–30 in all. *Buds* ovate, acute. *Flowers* subsessile, $\frac{5}{16}$ inch across. *Sepals* elliptic, rather acute, fleshy, green, resembling the leaves, free almost to the base. *Petals* broadly lanceolate, acute or acuminate, patent, thrice the sepals, white on face, often dotted red on back, with a greenish keel. *Stamens* shorter than petals, filaments white, anthers red-purple. *Scales* small, pale, reddish, cuneate, retuse or emarginate. *Carpels* pale green or whitish, dotted red near the base of the inner face, at first erect, later spreading, equalling the stamens, styles slender, short.

Flowers June. Hardy.

HABITAT.—Eastern Turkestan.

Received from Messrs. REGEL and KESSELRING of Petrograd as *S. gracile* (they also sent true *gracile*). Plants obtained under the name *S. Alberti* from the same firm and a number of British gardens were all forms of *S. album*. The plant illustrated in "Gartenflora" (tab. 1019, fig. 2) as *S. Alberti* is a totally different thing.

B. FLOWERS RED OR PURPLE.

(a) *Sub-shrub*.

Here belongs only one species, the remarkable *S. oxypetalum* of Mexico.

85. *Sedum oxypetalum* H. B. & K. (fig. 109).

S. oxypetalum Humboldt, Bonpland and Kunth, "Nov. Gen. et Sp.," 6, 45, 1823. Hemsley, "Biol. Centr. Amer., Bot.," 1, 397. "N. Amer. Flora," 22, 69.

The most tree-like of the shrubby *Sedums*, forming a trunk-like stem which, in old plants, is several inches thick at the base and covered with rough, brown bark. The bush tends to assume in greenhouses a rounded form and a height of 2 to 3 feet. Distinguished by its



FIG. 108.—*S. Alberti* Regel.

arborescent habit and smallish flat terminal cymes of dull red starlike flowers.

DESCRIPTION.—A glabrous, erect, sub-shrub, 2 to 3 feet high. *Stem* stout, erect, much branched, lower part very thick, bare, grey, rough. *Leaves* flat, fleshy, alternate, green, 1 to 1½ inch long, obovate-spathulate, rounded or retuse at apex, attenuate below, scarcely stalked, slightly spurred. *Cymes* terminal, lax, flat, very leafy, 1 to 2 inches across, of 3 forked branches with flowers in the forks, the bracts resembling the leaves. *Buds* lanceolate, ribbed, bluntly pointed, rather dark red. *Flowers* star-like, ½ inch across, sessile, dull red, with a strong scent of honey. *Sepals* small, green, fleshy, acute, tapering from a broad base, unequal. *Petals* linear-lanceolate, very acute, patent, 4 times the sepals, flesh-coloured, pale in the upper part. *Stamens* shorter than the petals, spreading, filaments red, anthers buff. *Scales* yellowish, cuneate, ½ the carpels. *Carpels* spreading, red, shorter than the stamens, spreading widely in fruit; styles erect, slender, yellow.

Flowers June–July (gentle heat); July–August (cold frame). Not hardy.

HABITAT.—Central Mexico.

Originally described, nearly a century ago, from specimens in Mexican gardens. It has been in cultivation in England for at least



FIG. 109.—*S. oxypetalum* H. B. and K.

forty years. In a cold frame the plant is deciduous; in gentle heat sub-evergreen.

I received it from New York, Upsala, Paris, Berlin, La Mortola, and Kew.

The name has reference to its very acute petals.

(b) *Herbs.*

(1) Leaves flat.

Of the six species placed here, the first four belong to the well-marked group *Involucrata* of Maximowicz, confined, except for the Chinese *S. Baileyi*, to the Caucasus and Asia Minor. They are creeping perennials with opposite leaves, which are mostly comparatively large. While the species in cultivation all have red flowers, white blossoms are found in some of the other species.

The remaining two species are Mexican plants without affinity with each other or with the preceding.

<i>spurium</i> M.B.	<i>Stevenianum</i> Rouy and Camus.
<i>stoloniferum</i> S. T. Gmel.	<i>rhodocarpum</i> Rose.
<i>proponticum</i> Aznavour.	<i>longipes</i> Rose.

86. *Sedum spurium* M.B. (fig. 110).

S. spurium Marschall von Bieberstein, "Flor. Taurico-Caucas.," 1, 352, 1808. Boissier, "Flor. Orient.," 2, 778. Hamet in *Trd. Bot. Sada* (Tiflis), 8, part iii. 11.

SYNONYMS.—*S. stoloniferum* of many authors (not of S. T. Gmelin, see p. 196). *S. portulacoides* of gardens (not of Willdenow, which = *ternatum*, see p. 159). *S. oppositifolium* Sims, *Bot. Mag.*, pl. 1807.

ILLUSTRATIONS.—Reichenbach, "Flor. German.," 23, tab. 46. *Bot. Mag.*, loc. cit. (white form), and pl. 2370. *Revue Horticole*, 1891, 523, fig. 137. (All rather poor.) "Gartenflora," tab. 818 (good l).

Its creeping habit and opposite pairs of leaves, which are wedge-shaped below and rounded and bluntly toothed in upper half, about $\frac{3}{4}$ as broad as long, and fringed with hairs, will always distinguish this species. Its ally, *S. stoloniferum*, may be separated easily by its smaller, more rhomboidal leaves of a lighter green and not margined with hairs, slenderer growth, bright-red stem, and especially by its flowers, which open widely like a star and are borne on a small lax inflorescence, while those of *spurium* are larger with semi-erect petals, and form a dense, flat inflorescence (compare figures 110 and 111).

DESCRIPTION.—A sub-evergreen perennial, forming a large mat. *Stems* creeping, round, rough with annular leaf-scars, finely hairy, with many leafy ascending branches; flowering stems reddish, about 6 inches high; barren stems shorter with more crowded leaves. *Leaves* opposite, about 1 inch long, $\frac{3}{4}$ broad, cuneiform-obovate, crenate-serrate in upper half, cuneate in lower half, shortly stalked, fringed with hyaline hairs, imbricated on the barren shoots, dark green. *Inflorescence* a flat, dense, terminal leafy umbellate cyme, of about 4 forked branches with flowers in the forks, concave in fruit, uppermost bracts oblanceolate. *Buds* ovate-lanceolate, very acute, ribbed. *Flowers* $\frac{1}{2}$ inch long, sessile, or lowest short-stalked, normally pink. *Sepals* narrow, slightly tapering to

a blunt point, erect, fleshy, reddish-green, persistent in fruit, separate nearly to the base. *Petals* almost erect, nearly $\frac{1}{2}$ inch long, linear-lanceolate, concave, keeled, blunt, more than twice the sepals. *Stamens* shorter than the petals, filaments pink, anthers orange-red. *Scales* whitish, wide-spreading, as long as



FIG. 110.—*S. spurium* M. B.

broad. *Carpels* erect, pink or white, equalling the stamens; in fruit reddish and nearly erect with spreading beaks.

Flowers July-August. Hardy.

HABITAT.—Caucasus and Transcaucasia.

One of the commonest Sedums in cultivation; and, like most of the species widely spread in gardens, it possesses a multitude of names. A white-flowered form of it was described as a new species—*S. oppositifolium*—in 1816 by SIMS (*Bot. Mag.*, pl. 1807) and the name has persisted—though challenged more than once—until HAMET finally disposed of it in 1908 ("Révision des Sédums du Caucase," in *Trd. Bot. Sada* (Tiflis), 8, part 3). Then it became confused with *S. stoloni-*

ferum S. T. Gmelin, and the latter name, being the older, was applied to it by many writers. Among the names under which it is found in cultivation at present are *altaicum*, *Braunii*, *Brownii*, *calabricum*, *coccineum*, *Comolli*, *hybridum*, *involucratum*, *lividum*, *Middendorffianum*, *mirabile*, *monregalense*, *pallidum*, *oreganum*, *populifolium*, *portulacoides*, *pulchellum*, *pulchrum*, *sarmentosum*, *undulatum*, *Wallichianum*. This list well exemplifies the appalling state of confusion that exists among the cultivated Sedums. There is little excuse in this case, for the plant varies but little, and is easily recognizable even when not in flower.

The only variation of note is in the colour of the flowers, which, normally pinkish, varies from white to deep crimson (var. *splendens* of gardens)—the latter a very fine form, which is well illustrated in Regel's "Gartenflora," tab. 818.

87. *Sedum stoloniferum* S. T. Gmelin (fig. 111).

S. stoloniferum S. T. Gmelin, "Reise," 3, 311, 1774. Boissier, "Flor. Orient.," 2, 779. Hamet in *Trd. Bot. Sada* (Tiflis), 8, part iii. 8. Not *S. stoloniferum* of Masters in *Gard. Chron.*, 1878, ii. 590, and of many other authors, which = *S. spurium*, M.B. (see p. 194).

ILLUSTRATION.—S. T. Gmelin, *loc. cit.*, tab. 35, fig. 2 (poor).

This Caucasian plant has been confused with its ally *S. spurium*, from which it is quite different. The two, which belong to a well-marked group almost confined to the Caucasus and Asia Minor, are distinct from all other cultivated Sedums in their creeping habit, broad leaves in opposite pairs, and pink flowers. The two are easily separated, and the chief differences between them are given under *S. spurium* on p. 194.

DESCRIPTION.—A semi-evergreen, creeping, glabrous perennial, forming a mat. *Roots* fibrous. *Stems* creeping, red, round, striate, rather rough, with annular leaf scars; branches many, ascending, the flowering shoots 6 inches high, the barren ones much shorter. *Leaves* opposite, numerous, bright green, loosely imbricate, rhomboid-spathulate, blunt, stalked, obscurely crenate in upper half, entire and tapering in lower half, margined with a narrow border of hyaline pimples, 1 inch long by $\frac{1}{2}$ inch broad, pale below; young leaves with fine pellucid dots; the leaves of the barren and flowering shoots similar, the latter more distant. *Inflorescence* a lax, leafy cyme of three wide-spreading branches which are often forked, with flowers in the forks. *Buds* ovate-lanceolate, acute. *Flowers* $\frac{1}{2}$ inch across, subsessile. *Sepals* linear, non-contiguous, blunt, green, separate nearly to the base. *Petals* rose, narrowly lanceolate, acute, edges incurved, wide-spreading, thrice the sepals. *Stamens* $\frac{2}{3}$ the petals, filaments rose, anthers bright red. *Scales* small, reddish, narrower above, emarginate. *Carpels* spreading, greenish pink, slightly shorter than the stamens, compressed; in fruit patent, forming, with the persistent sepals, a ten-rayed star.

Flowers June–July. Hardy.

HABITAT.—Asia Minor, Caucasus, Syria, Persia.

S. stoloniferum is rare in cultivation, though it grows very freely, and in my garden sows itself more than any other Sedum. I have seen it in the Botanic Gardens at Kew and Dresden; it came to me from Wisley as *S. involucratum* (an allied Caucasian plant not in cultivation),



FIG. III.—*S. stoloniferum* S. T. Gmelin.

from Glasnevin as *oppositifolium*, and from Mr. S. ARNOTT of Maxwelltown, Dumfries, without a name.

Its name, *stoloniferum*—"runner-bearing"—refers to the creeping stems.

88. *Sedum proponticum* Aznavour (fig. 112).

S. proponticum Aznavour in *Bulletin Soc. Bot. de France*, 44, 169, 1897.

SYNONYM.—*S. gemmiferum* of some gardens.

ILLUSTRATION.—Rouy, "Illustr. Plant. Europ. Rar.," tab. 257.

The present species differs from all others in cultivation in its short subterranean shoots clothed with very short, very thick, white tooth-like leaves; these shoots in late autumn come to the surface and produce flat rosettes, from which the flowering stems arise in the following spring. The aerial portions of the plant are also sufficiently distinct.

DESCRIPTION.—An evergreen perennial. *Roots* fibrous. *Barren shoots* arising from the base of old stems or from points on the roots, at first subterranean, 1–2 inches long, densely clothed with very short, imbricate, very thick, colourless leaves; rising to the surface in autumn and producing a very flat winter rosette of obovate green leaves. *Flowering shoots* single, erect or eventually decumbent-ascending, arising in spring from the rosettes before-mentioned, about 6 inches high, round, unbranched, stout, nearly smooth below, rough with deflexed glands above. *Leaves* of flowering shoots opposite, flat, dark green, fleshy, the lower ones shortly stalked, obovate, tapered below, rounded at apex, entire, the upper ones smaller, sessile, sometimes alternate, broadly ovate or nearly orbicular, slightly and bluntly toothed. *Inflorescence* terminal, lax, of 2 or 3 spreading, straight, simple, scabrid branches 1–2 inches long, with a flower in the fork; occasionally a short branch is also produced from one of the highest leaf-axils. *Bracts* leaf-like, becoming very small. *Flowers* mostly sessile, the lowest shortly stalked, rosy purple, $\frac{1}{2}$ to $\frac{3}{8}$ inch across. *Buds* lanceolate, blunt, strongly ribbed. *Sepals* green, very fleshy, lanceolate, blunt. *Petals* twice the sepals, broadly lanceolate, acuminate, wide-spreading, grooved on face, strongly keeled on back, light rosy purple with a white base. *Stamens* 10, about $\frac{3}{8}$ the petals, filaments white, anthers reddish. *Scales* very short, roundish, greenish or yellowish. *Carpels* erect, equalling the stamens, lanceolate, purple, with a line of papillæ on either side, facing the adjoining carpel.

Flowers July. Half hardy.

HABITAT.—Asia Minor, opposite Constantinople.

Received from REGEL and KESSELRING of Petrograd, in 1914, and from CORREVON of Geneva, in 1916, both under the name *S. gemmiferum* (a *nomen nudum*). A very curious plant, allied to *S. Listoniæ* Visiani, also from Asia Minor, which differs in its barren shoots not being subterranean, in its ciliate leaves, &c.; the latter species is not in cultivation.

S. proponticum is doubtfully hardy with us. I have lost it twice during the winter, and M. CORREVON reports that he has had to protect it at Geneva.

89. *Sedum Stevenianum* Rouy and Camus (fig. 113).

S. Stevenianum Rouy and Camus, "Flore de France," 7, 94, 1901.

Hamet in *Trd. Bot. Sada* (Tiflis), 8, part iii. 7.

SYNONYM.—*S. roseum* Steven in "Mém. Soc. Nat. Moscou," 3, 263, 1812 (not of Scopoli, for which see p. 28); Boissier, "Flora Orient.," 2, 780.

In size and habit, in the leaves broadest near the tip, and in the cup-shaped flowers, this little plant resembles *S. alpestre*; but it is smaller, the leaves are dotted with red, the petals are broader and have a red keel, the sepals are smaller, the scales larger and conspicuous.

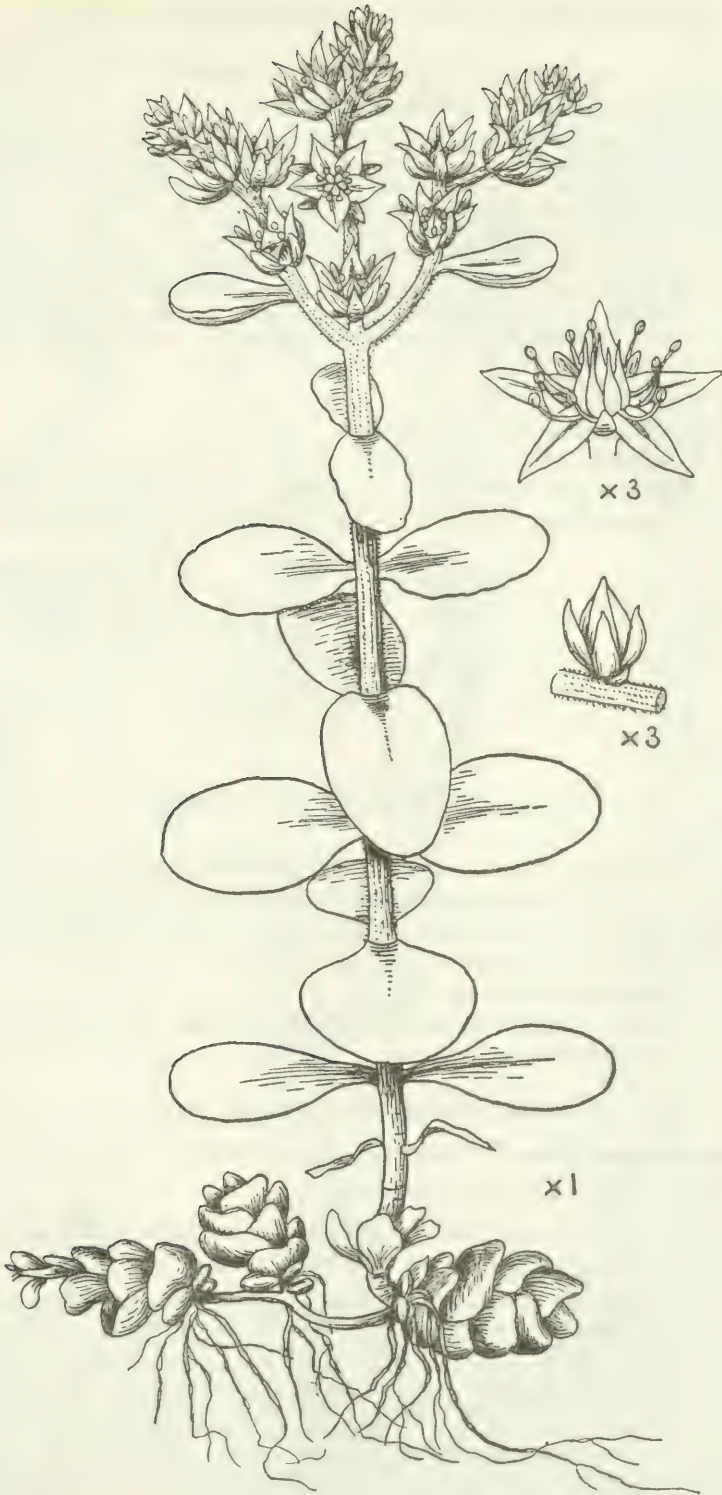


FIG. 112.—*S. proponiticum* Aznavour.

In my plant the leaves faded in autumn, but remained withered on the branches, giving them a shaggy appearance.

DESCRIPTION.—A minute, glabrous, tufted perennial. *Stems* rooting below, ascending, barren shoots very short, densely leafy, flowering shoots 1–2 inches, with less dense leaves. *Leaves* opposite, sessile, entire, obovate-cuneate, blunt, very fleshy, flat on face, rounded on back, dotted with red, $\frac{1}{4}$ inch long by $\frac{1}{10}$ inch broad. *Inflorescence* a small, terminal, few-flowered, cyme. *Buds* angular. *Flowers* $\frac{1}{4}$ inch across, with pedicels about equalling the calyx. *Sepals* resembling the upper leaves, separate almost to the base. *Petals* spreading, but not widely, greenish with a reddish keel, ovate-lanceolate, blunt, $1\frac{1}{2}$ –2 times the sepals. *Stamens* equalling the sepals, filaments green, anthers pale red. *Scales* pale orange, semiorbicular, emarginate, conspicuous. *Carpels* green, erect, shorter than the stamens.

Flowers May. Hardy.

HABITAT.—Asia Minor, Caucasus.

A little plant of no horticultural value. Very rare in cultivation, but it is grown (as *S. tenellum* M. B., also a small Caucasian species, but differing in its linear terete leaves, &c.) by REGEL and KESSELRING of

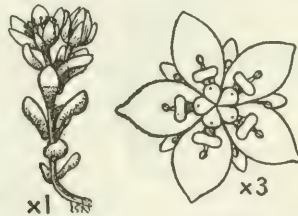


FIG. 113.—*S. Stevenianum* Rouy and Camus.

Petrograd, from whom I received it. Distinguished by its broad-topped leaves and cup-shaped, greenish-white flowers tinged with red.

My plant nearly died before I got it drawn, which accounts for the fragmentary character of fig. 113. Owing to the war I was not able to procure further material.

The name commemorates the original describer, who named it *S. roseum*, a name already occupied.

90. *Sedum rhodocarpum* Rose (fig. 114).

S. rhodocarpum Rose in "Contrib. U.S. Nat. Herb.," 13, 300, 1911.

ILLUSTRATION.—*Loc. cit.*, pl. 59 (photo).

A curious and very distinct species, unmistakable in its winged, triangular stem, ternate leaves, and large, greenish-red flowers.

DESCRIPTION.—A straggling, light-green evergreen perennial. *Stems* weak, smooth, green, ascending, unbranched, 6 to 9 inches high, triangular (occasionally square), with the angles winged, dying back after fruiting to near the base, young shoots arising from the lower part. *Leaves* entire, sessile, ternate (occasionally in fours), often alternate below the inflorescence, spatulate in lower part to orbicular in upper part of stem, often notched at apex, shorter than the internodes, about $\frac{3}{4}$ inch long, shortly spurred, rather thin. *Inflorescence* few-flowered, slightly branched, leafy. *Buds* oblong, blunt, greenish. *Flowers* stalked, $\frac{1}{2}$ inch across when fully expanded. *Sepals* semi-erect, very unequal, green, leaf-like, oblong-lanceolate, blunt. *Petals* greenish

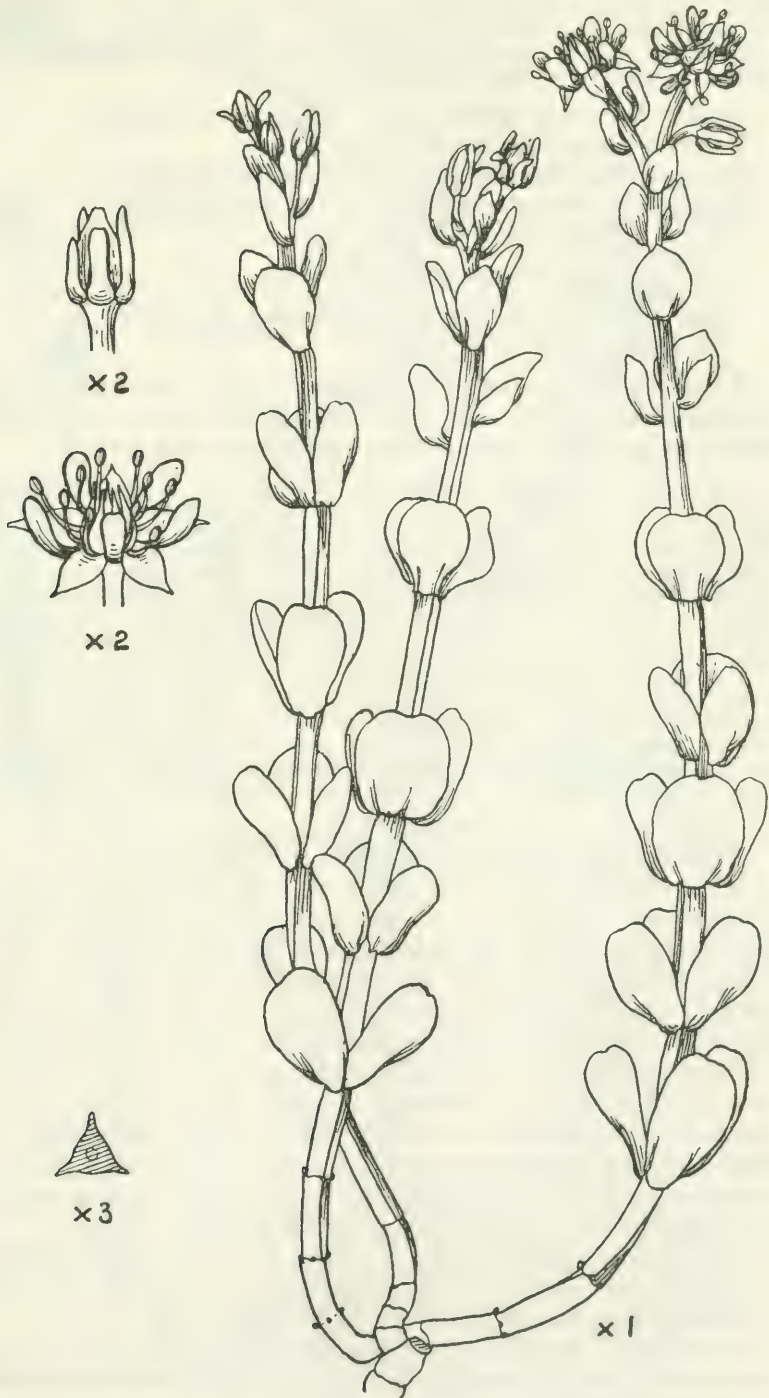


FIG. 114.—*S. rhodocarpum* Rose.

flushed with red, wide-spreading, later sharply reflexed, oblong, acute, keeled, equalling or shorter than the longest sepal. *Stamens* nearly erect, equalling the petals, filaments whitish, anthers purple. *Scales* yellowish, quadrate. *Carpels* green, slightly spreading, equalling the stamens, tapering into erect styles; the carpels become deep red in fruit.

Flowers December (gentle heat). Not hardy at Dublin.

HABITAT.—Sierra Madre, Monterey, Mexico.

Received from Washington, New York, and Edinburgh.

The name refers to the red colour assumed by the fruit.

91. *Sedum longipes* Rose (fig. 115).

S. longipes Rose in *Bulletin New York Bot. Garden*, 3, 43, 1903.
"N. Amer. Flora," 22, 70.

A curious *Sedum*, easily recognized by its long, low-arching, leafy branches rooting at intervals, small bright-green leaves very convex above, and small few reddish flowers with large forked scales.

DESCRIPTION.—Glabrous, bright-green, perennial. *Roots* fibrous. *Stems* smooth, round, green mottled red, long-arching or decumbent, rooting at intervals, often with purple aerial roots, branching at the rooting points or towards the ends, ends of branches erect, slender, bearing terminal flowers. *Leaves* alternate, rather distant, very fleshy, sessile, slightly spurred, obovate or spatulate, entire, very blunt, reflexed, very convex above, flattish below, up to $\frac{3}{8}$ inch long by $\frac{3}{16}$ broad, diminishing at ends of shoots to $\frac{1}{8}$ long. *Inflorescence* of several (usually 2) terminal flowers on long filiform pedicels. *Buds* broadly ellipsoid, blunt. *Flowers* reddish, few, inconspicuous, $\frac{5}{16}$ inch across. *Sepals* green, fleshy, wide-spreading, ovate-lanceolate, blunt, with a blunt spur. *Petals* ovate, blunt, patent, red in upper part, becoming silvery white near base. *Stamens* wide-spreading, nearly equalling the petals, filaments whitish, anthers orange. *Scales* very large, spreading, tips reflexed, coloured like the petals, forked in upper part, the branches widely divergent, each with 2 or 3 reflexed teeth. *Carpels* short, erect, green; styles short, reddish, with spreading tips.

Flowers January (gentle heat). Very sensitive to frost.

HABITAT.—Sierra de Tepoxtlan, Mexico.

A very distinct plant, remarkable both on account of its habit and its flowers. Planted where frost is excluded, it soon forms a tangled mass several feet across, the shoots arching for half a foot or so, then rooting and branching, and the branches arching similarly. The shoots of the following year arise from ovoid buds produced near the base of the stem, or at other points of the stem, especially where roots are formed. In a cold frame the stems get killed off by frost, the buds alone remaining (as often happens with *S. sarmentosum* in the open). The young leaves have a pimpled surface; the hypogynous scales are very remarkable and abnormal for the genus. Flowers solitary according to ROSE; in pairs in my plants; in clusters of as many as six in a specimen of PRINGLE'S in British Museum.

The large forked and toothed scales are very unusual in the genus. One of them is shown in the figure (fig. 115, *a*) where the carpel is foreshortened to show the full size of the scale.

In cultivation in Britain the flowers are very pale, no doubt owing to the weakness of the winter sunlight; but in dried Mexican specimens they are of a deep purple.

Received from New York and Edinburgh.



FIG. 115.—*S. longipes* Rose.

(2) Leaves terete.

The only red-flowered *Sedum* with terete leaves outside the *Rhodiola* section is the pretty North American *S. pulchellum*.

92. *Sedum pulchellum* Michaux (fig. 116).

S. pulchellum Michaux, "Flora Bor. Amer.," 1, 277, 1803. "N. Amer. Flora," 22, 63. Masters in *Gard. Chron.*, 1878, ii. 684.

ILLUSTRATIONS.—*Bot. Mag.*, pl. 6223. *Gard. Chron.*, 1874, ii. fig. 111; repeated, 1878, ii. fig. 114.

A handsome species, known at once by its pinkish, 4-parted flowers densely set on radiating recurved branches at the summit of the stem. The leaves are fresh green and linear, with a forked spur at the base, and the plant does not creep.

DESCRIPTION.—Evergreen, perennial, forming a bright-green tuft. *Stems* erect or trailing, not creeping, all eventually flowering, smooth, round, slender, red, bare and branched below. *Leaves* crowded, green, ascending, linear, terete, blunt, about $\frac{5}{8}$ inch long, produced below into a forked spur. *Inflorescence* 3 to 4 inches across, of 3 to 5 recurved simple leafy branches with a 5-parted flower in the fork. *Flowers* 4-parted (except the central one), sessile, rosy purple, $\frac{1}{2}$ inch across. *Buds* ovate, blunt, strongly 4-angled. *Sepals* green, fleshy, lanceolate, blunt, separate nearly to the base. *Petals* rosy purple, lanceolate, acute, keeled, twice the sepals. *Stamens* shorter than the petals, filaments rose, anthers red, oblong. *Scales* small, whitish. *Carpels* slender, rose, equalling the stamens, erect, later spreading, tapering into the long styles.

Flowers July–August. Hardy.

HABITAT.—United States, Missouri to Virginia and Texas.

One of the best *Sedums* in cultivation, its large, claw-like inflorescences of rosy-purple flowers being produced abundantly and for a long period. The plant is remarkable in its genus for its love of a damp habitat; the finest plants I have seen have been on the edge of water, and in my own garden, where there is a light, porous soil, I have to grow it in a pot plunged in a tub. The plant has been long known in gardens, and is generally correctly named; it is unmistakable.

Found in most collections. The name refers to its pleasing appearance.

C. FLOWERS YELLOW.

(a) *Sub-shrubs*.

Here belongs a characteristic group of Mexican *Sedums*, most of which are in cultivation. *S. nutans*, the most massive of all *Sedums*, has been placed by ROSE in a separate genus, *Cremnophila*, but its flowers present no distinct generic character. *S. praealtum*, *dendroideum*, and *confusum* form a compact closely related group.

<i>nutans</i> Rose.	<i>amecamecanum</i> Praeger.
<i>dendroideum</i> Moç. and Sessé.	<i>pachyphyllum</i> Rose.
<i>praealtum</i> DC.	<i>Treleasei</i> Rose.
<i>confusum</i> Hemsley.	

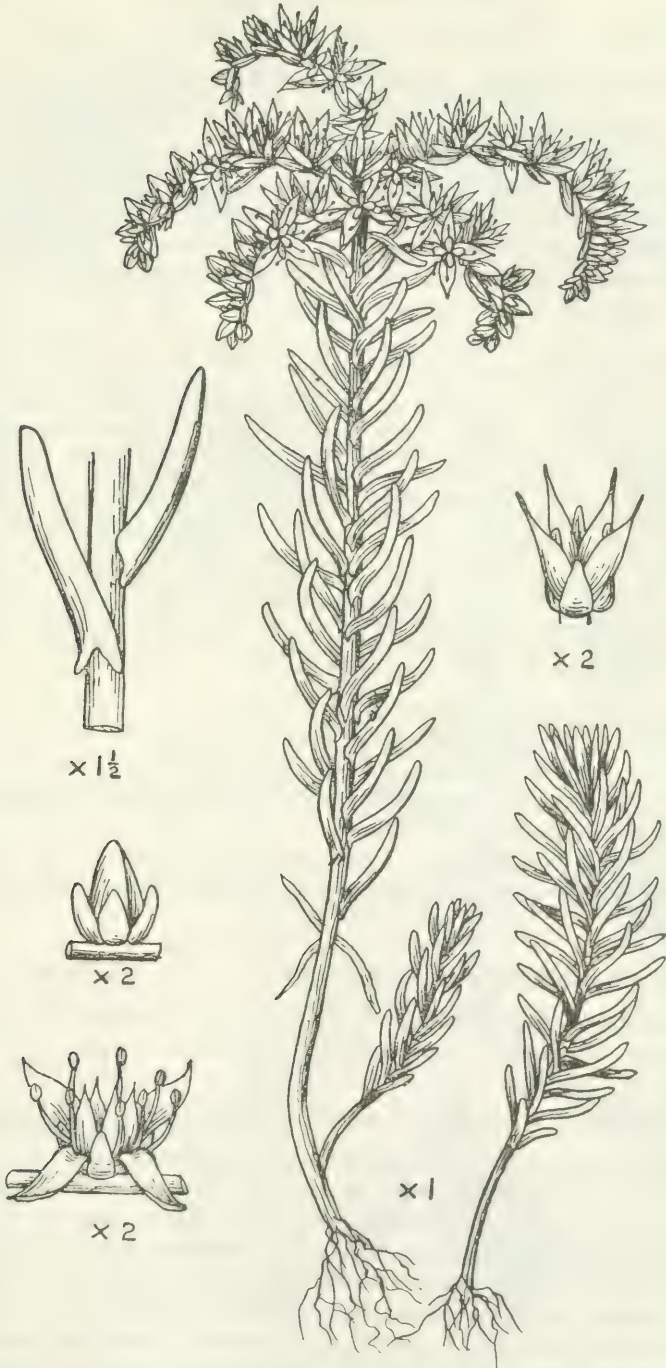


FIG. 116.—*S. pulchellum* Michaux.

93. *Sedum nutans* Rose (fig. 117).

S. nutans Rose in *Bull. New York Bot. Garden*, **3**, 43, 1903.

SYNONYM.—*Cremnophila nutans* Rose in "N. Amer. Flora," **22**, 56, 1905.

A remarkably massive plant with inflorescence of a type rare in *Sedum*—an elongated, compact panicle. Easily recognized by this character, by its yellow-green flowers, and very large leaves over half-an-inch thick. Its peculiar characters caused Dr. ROSE to place it in a separate genus, but as most of these features can be matched in one or another species of *Sedum*, it seems best to leave it in that genus where Dr. ROSE originally placed it.

DESCRIPTION.—A massive, very succulent, glabrous, evergreen perennial. *Stem* erect (in nature pendent on cliffs), $\frac{1}{2}$ – $\frac{3}{4}$ inch thick, branched, round, smooth save for leaf-scars, bare below. *Leaves* aggregated at top of branches, up to 3 by 2 by $\frac{3}{8}$ inch or more, sessile, oblong-ovate to trapezoidal, blunt, dark green, smooth, flat above, rather rounded below, crowded. *Flower-stem* axillary, ascending, 6 to 8 inches long, leafy, leaves alternate, almost obovoid, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, smaller upwards. *Inflorescence* an elongated panicle about 3 inches long by $1\frac{1}{2}$ inches wide; branches deflexed, leafy, with linear-obovate bracts, the lower branches with up to 8 flowers; panicle nodding. *Buds* obovate, very blunt. *Flowers* greenish-yellow, cup-shaped, 5- (occasionally 6-) parted. *Sepals* ascending, linear to linear-obovate, very fleshy, flattish on face, rounded on back, pale green, unequal, as long as the petals. *Petals* lanceolate, apiculate, ascending or patent, greenish yellow, separate to the base. *Stamens* equalling the petals, slightly spreading, filaments pale green, anthers yellow. *Scales* cuneate-oblong, rather longer than broad, upper part orange-scarlet. *Carpels* whitish, erect, with green slender spreading styles.

Flowers March (gentle heat). Not hardy.

HABITAT.—Cliffs at Tepoxtlan, Mexico.

Received from Edinburgh; seen also at Kew.

The name has reference to the nodding habit of the inflorescence, a character very unusual in *Sedum*.

Dr. ROSE describes the petals as bright yellow; but in the Edinburgh plant (which came from Washington) they are greenish yellow.

94. *Sedum dendroideum* Moç. and Sessé (fig. 118, 119b).

S. dendroideum Moç. and Sessé ex De Candolle "Prodromus," **3**, 409, 1828. Hemsley, "Biol. Centr. Amer., Botany," **1**, 394. "N. Amer. Flora," **22**, 69.

ILLUSTRATION.—De Candolle, "Mémoire Crassul.," pl. 9.

This species, with *S. praealtum* and *S. confusum*, form a closely related group much confused in gardens, and usually misnamed. The common plant of English cultivation, often seen in cottage windows, and, when named, usually called *dendroideum*, is *S. praealtum*. *S. confusum* is rarer in gardens, and is also usually labelled *dendroideum* when named at all. *S. dendroideum* itself I have only met with as an unnamed plant ($\frac{0.7}{8.41}$) sent from Washington. I have not succeeded in flowering it, but the leaf characters appear to identify it satisfactorily. In America, on the other hand, *dendroideum* appears to



FIG. 117.—*S. nutans* Rose.

be the species best known. In the "N. American Flora," ROSE's descriptions of *praealtum* and *confusum* are evidently copied from Hemsley, "Biol. Centr. Americana," and he even says of the former, "a very doubtful species." His description of *dendroideum*, on the other hand, is clearly original, though whether based on living or dried material does not appear.

The descriptions are not sufficiently full to point to satisfactory distinguishing characters of flower between this species and the other two, but it appears easily separated by its leaves (see fig. 119), which

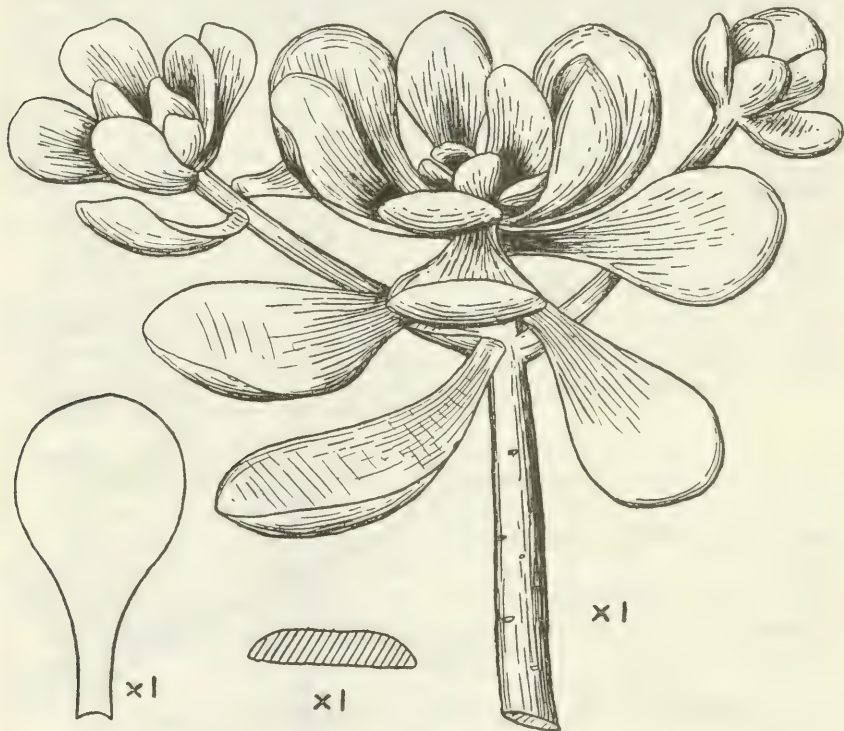


FIG. 118.—*S. dendroideum* Moç. and Sessé.

are distinctly stalked and have a nearly orbicular lamina. In my plant, also, they have a whitish margin when young (due to a waxy secretion) and a purplish margin when old, while in the two other species the leaves are wholly green; the leaf also is of much firmer texture than in *praealtum* or *confusum*, and the stem is stiff and erect, with few ascending branches, while in the others it branches frequently and soon forms a low bush. The petals, described as lanceolate, appear to be broader than those of *praealtum*, narrower than those of *confusum*. The inflorescence is large like that of *praealtum*, not congested as in *confusum*. In the following description the stem and leaf characters are taken mainly from my living plant, the remainder from DE CANDOLLE, HEMSLEY, and ROSE. To judge

from DE CANDOLLE'S figure the inflorescence is very like that of *S. praealtum*.

DESCRIPTION.—A sub-shrubby evergreen perennial. *Stem* erect, 1 to 2 feet high, up to $\frac{1}{2}$ inch thick, with few ascending branches. *Leaves* aggregated near the apices of the branches, rounded on face, flat on back, $1\frac{3}{4}$ inch long, $\frac{7}{8}$ inch broad, $\frac{1}{8}$ inch thick, stalked; petiole about $\frac{1}{2}$ inch long, $\frac{2}{15}$ inch broad, lamina spatulate-

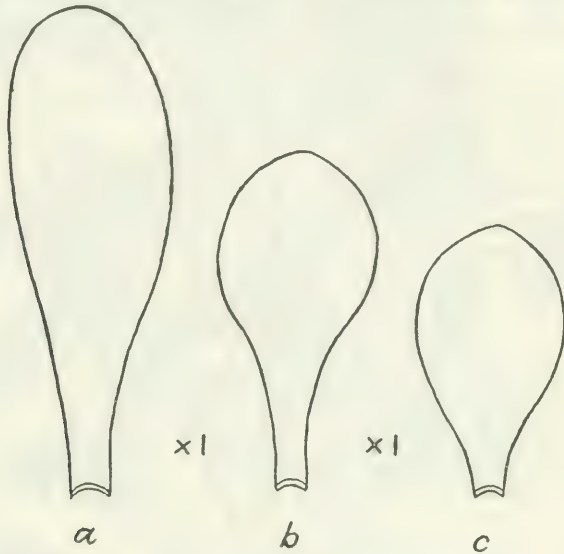


FIG. 119.—Leaves of (a) *S. praealtum*, (b) *S. dendroideum*, (c) *S. confusum*.

orbicular, cuneate below, semicircular above; margin entire, often white with wax when young, purple when old. *Inflorescence* terminal, cymose-paniculate, large, about 2 to 6 inches long by 4 inches across. *Flowers* bright yellow, nearly $\frac{1}{2}$ inch across. *Sepals* ovate, obtuse. *Petals* lanceolate, acute, $\frac{1}{4}$ inch long. *Scales* small, truncate, slightly retuse. *Carpels* spreading in fruit.

Not hardy.

HABITAT.—Central Mexico.

Derives its name from its tree-like habit (Greek *dendron*, a tree).

95. *Sedum praealtum* DC. (fig. 119a, 120).

S. praealtum De Candolle, "Plant. Rar. Genève," **10**, 21, 1847. Hemsley, "Biol. Centr. Amer., Bot.," **1**, 398. "N. Amer. Flora," **22**, 70.

This is the most widely spread in gardens of the shrubby *Sedums* of the *dendroideum* group, and is mostly grown under that name. Of garden *Sedums* it is most likely to be confused with *S. confusum*, a smaller plant with shorter leaves and smaller inflorescence; the differences between the two are particularized on p. 211. From its ally, *S. dendroideum*, it may be distinguished by its leaves not distinctly stalked and lamina more oblong (not suborbicular) (see fig. 119) and its more branched bushy habit.

DESCRIPTION.—A much-branched, glabrous, evergreen shrub, forming a low bush, 1 to 2 feet high, and equally wide. *Stems* round, smooth, green, woody



FIG. 120.—*S. praecaltum* DC.

below, leafy near the tips; branches wide-spreading. *Leaves* alternate, set at right angles to the stem, green and shining, flat, very fleshy, lanceolate-spathulate, entire, rounded or bluntly pointed at apex, narrowed below, sessile, flat on face, rather rounded on back, often curving upward, 2 to 2½ inches long, ½ to ¾ inch broad. *Inflorescence* a much-branched, lax, paniced cyme, 3 to 4 inches long and broad. *Buds* ovate, rather acute, ⅜ inch long. *Flowers* subsessile, ⅜ inch across. *Sepals* green, fleshy, blunt, ovate-lanceolate, twice as long as broad. *Petals* bright-yellow, patent, narrowly lanceolate, very acute, 4 to 5 times the sepals. *Stamens* spreading, yellow, ⅜ the petals. *Scales* minute, yellow. *Carpels* yellow, erect, later spreading, equalling the stamens, tapering into the styles, spreading in fruit.

Flowers May–June (in the open). Hardy in the milder parts of the British Isles.

HABITAT.—Mexico. Described by DE CANDOLLE over seventy years ago from cultivated specimens, and still widely grown in Europe. It is a common cottage-window plant in Ireland and parts of England and Scotland. In gardens it is usually called *S. dendroideum*; sometimes *S. confusum* or *S. giganteum*. Though now widespread in Europe, it appears to have been lost sight of in America. Dr. ROSE (*loc. cit.*) merely repeats HEMSLEY'S description, and doubts the validity of the species. It is, however, a well-marked and quite distinct plant.

The name (*praealtus* = very high) refers to its tall growth, which HEMSLEY sets down at 5 to 6 feet; but in these countries it never attains even half that height.

96. *Sedum confusum* Hemsley (fig. 119c, 121).

S. confusum Hemsley, "Diagnoses Plant. Nov.," 1, 10, 1878. Hemsley, "Biol. Centr. Amer., Bot.," 1, 393. "N. Amer. Flora," 22, 70.

ILLUSTRATION.—Saunders' "Refug. Botan.," 5, pl. 337.

SYNONYM.—*S. spathulifolium* Baker in Saunders' "Refug. Botan.," *loc. cit.* (not of Hooker, see p. 238).

The third member of the well-marked *dendroideum* group of shrubby Mexican Sedums. *S. confusum* is the smallest of the three, and differs from *praealtum* in its smaller, broader leaves, 1 to 1½ inches (not 2 to 2½ inches) long, twice (not 3 to 4 times) as long as broad, semi-elliptic (not pointed) at the apex, inflorescence smaller and denser (about 2 inches instead of 4 inches long and broad), petals broader (3, not 4 times as long as broad). *S. dendroideum* differs in its taller stiffer growth, stalked leaves, &c. (see figs. 118, 119).

DESCRIPTION.—A glabrous, evergreen, shrubby perennial, forming a bush a foot high and wide. *Stem* woody below, round, smooth, often reddish, much branched; branches ascending. *Leaves* alternate, longer than the internodes, flat, fleshy, bright green, shining, obovate-spathulate, 1 to 1½ inches long, usually semi-elliptic at apex (sometimes with a very blunt point), cuneate below, sessile, face with a median V-shaped groove with well-marked edges near the base, back paler with a slightly raised median ridge. *Inflorescence* terminal, compact, 1½ to 2 inches long and broad, cymose-paniculate; bracts linear, very fleshy, few. *Buds* ovate, bluntly pointed. *Flowers* yellow, ½ to ⅝ inch across, on very short pedicels (⅒ to ⅓ inch). *Sepals* yellowish green, very fleshy, ovate, blunt, nearly twice as long as broad, limb exceeding the tube. *Petals* patent or reflexed, ovate-lanceolate, acute, channelled, 3 times as long as broad. *Stamens* yellow, ⅔ the petals. *Scales* small, roundish, notched, yellow. *Carpels* lanceolate, greenish yellow, slightly spreading, with short erect styles; wide-spreading in fruit.



FIG. 121.—*S. confusum* Hemsley.

Flowers April (cold frame); May–June (in the open). Hardy in all mild areas in the British Isles.

HABITAT.—Not certainly known, but undoubtedly Mexico. Described by HEMSLEY forty years ago from English garden specimens labelled *S. spathulifolium*, and still found in English gardens. I have had it from nearly a dozen different sources, labelled *confusum*, *dendroideum*, or *praealtum*. Apparently not in cultivation in America, nor as yet re-collected in Mexico.

It is the hardiest of the *dendroideum* group, and survived the severest Dublin winters which killed out *S. praealtum* almost entirely.

A plant received from La Mortola as “sp. Mexico” is a large form, with longer branches, and leaves $1\frac{1}{2}$ to 2 inches long and proportionately broad. In flower it is identical with the type. Otherwise I have seen no variation in the species.

97. *Sedum amecamecanum* Praeger (fig. 122).

S. amecamecanum Praeger in *Journ. of Bot.*, **54**, 44, 1917.

A member of the sub-shrubby, flat-leaved section of Mexican Sedums, easily distinguished from the *dendroideum* group (*dendroideum*, *praealtum*, *confusum*) by its much smaller size and pale buff-yellow flowers; and from the rest of the section by its oblanceolate (not spatulate) leaves, &c.

DESCRIPTION.—A small, erect, glabrous, evergreen sub-shrub, 6 inches or more in height. *Stem* smooth, round, with wide-spreading branches, bare below, reddish, marked with small greyish leaf-scars. *Leaves* rather crowded, flat, fleshy, green, patent or reflexed, sessile, with a very short truncate spur, oblanceolate, bluntly pointed, $\frac{3}{4}$ inch long by $\frac{1}{4}$ inch broad. *Flowering shoots* not different from the barren ones. *Inflorescence* terminal, rather dense, roundish, $\frac{3}{4}$ to 1 inch in length and breadth, leafy, uppermost bracts resembling the sepals. *Buds* lanceolate to oblong, blunt, ribbed. *Flowers* $\frac{3}{8}$ inch across, of a palish buff-yellow. *Sepals* unequal, blunt, linear or club-shaped, very fleshy, green, wide-spreading, shortly spurred, separate to the base. *Petals* broadly lanceolate, wide-spreading, acute, $\frac{1}{4}$ longer than the longest sepal. *Stamens* yellow, spreading, $\frac{2}{3}$ the petals. *Scales* short, squarish, emarginate, deep orange above with a whitish base. *Carpels* erect, tapering, equalling the stamens, greenish yellow, styles slender, slightly spreading, orange-yellow.

Flowers May (cold frame). Not hardy at Dublin, but hardy at Rostrevor, a very mild spot.

HABITAT.—Amecameca, Mexico.

Sent to Wisley from Washington unnamed under the number $\frac{06}{10}$, having been collected by C. A. PURPUS in 1906 (No. 108).

98. *Sedum pachyphyllum* Rose (fig. 123).

S. pachyphyllum Rose in “Contrib. U.S. Nat. Herb.,” **13**, 299, 1911.

ILLUSTRATION.—*Loc. cit.*, pl. 58 (photo).

A large, very thick-leaved Sedum most resembling *S. allantoides* and to a less degree *S. Treleasei*; from the latter it can be at once separated by its terete, not flat, leaves. In flower, its dense, flattish

inflorescence of yellow flowers is very different from the loose white panicles of *S. allantoides*. The vegetative parts and habit of the



FIG. 122.—*S. amecamecanum* Praeger.

two are rather similar, but *S. pachyphyllum* is much less glaucous, the leaves are tipped with red, and the shoot ends in many young leaves. *S. allantoides* is very glaucous, without any flushing of red, and the young leaves are singularly few.

DESCRIPTION.—A large, very fleshy, rather shrubby, evergreen perennial. Stems woody and bare below, sprawling and sometimes rooting, round, smooth,



FIG. 123.—*S. pachyphyllum* Rose.

with many ascending or spreading branches up to a foot high. Leaves alternate, crowded, terete, slightly broader above, $1\frac{1}{2}$ inch long by $\frac{1}{2}$ inch thick, very blunt,

sessile, with a short adpressed spur, set at right angles to the stem and curved upwards, often in five spiral rows, slightly glaucous, tipped red. *Flower-stems* axillary, about 4 inches long, slender, with leaves similar to those of the barren stems, but spur more pronounced. *Inflorescence* cymose, dense, flattish, $1\frac{1}{2}$ to 2 inches across, often pendent, uppermost bracts small, linear. *Buds* greenish, strongly ribbed, ovate, acute. *Flowers* $\frac{3}{8}$ inch across, pedicels short, slender. *Sepals* spreading, linear or club-shaped, terete, blunt, unequal, pale green. *Petals* wide-spreading or slightly reflexed, ovate-lanceolate, bright yellow, slightly exceeding the longest sepal. *Stamens* wide-spreading, yellow, equalling the petals. *Scales* very short, twice as broad as long, yellow. *Carpels* erect, later slightly spreading, greenish yellow, shorter than the stamens, styles slender.

Flowers January (Washington), April (Glasnevin, gentle heat). Not hardy.

HABITAT.—Oaxaca, Mexico.

Received from Washington, Kew, and Edinburgh.

Its name *pachyphyllum* (= thick leaf) emphasizes one of its leading characters.

99. *Sedum Treleasei* Rose (fig. 124).

S. Treleasei Rose in "Contrib. U.S. Nat. Herb.," 13, 300, 1911.

ILLUSTRATION.—*Loc. cit.*; pl. 60 (photo.).

This striking plant belongs to the massive, fleshy-leaved section of the Mexican Sedums. In growth and leaf it comes near *S. Adolphi* Hamet, but in the latter the leaves are only half as thick, of a firmer texture, and in colour yellowish flushed with red, while in *S. Treleasei* they are densely glaucous-pruinose. The flowers of *S. Treleasei* are bright yellow, of *S. Adolphi* white. In inflorescence and flower *S. Treleasei* much resembles *S. pachyphyllum* Rose, but that species has club-shaped, terete leaves like those of *S. allantoides* Rose.

DESCRIPTION.—A very fleshy, glaucous, evergreen perennial. *Roots* fibrous. *Stems* at first erect, later ascending or sprawling, branched, smooth, round, $\frac{1}{2}$ inch or more thick, ultimately rather woody. *Leaves* alternate, rather crowded, sessile, set at right angles to the stem, curved upwards, oblong-obovate, bluntly pointed at apex, broad at base, almost flat on face, semicircular in section, of a rather soft fleshiness, very glaucous-pruinose, about $1\frac{1}{4}$ inch by $\frac{5}{8}$ inch by $\frac{3}{8}$ inch. *Flowering branch* lateral, from one of the uppermost leaf-axils, slender, erect, pinkish, 3–5 inches long, clothed with a few (6 to 12) small, oblong leaves. *Inflorescence* erect or nodding, cymose, of several forked branches, compact, sub-globular, 1 to $1\frac{1}{2}$ inch across, bracts few, minute. *Flowers* on short pedicels, $\frac{1}{2}$ inch across, bright yellow. *Buds* obovate, strongly ribbed, greenish. *Sepals* very unequal, linear-lanceolate, acute, very fleshy, glabrous, greenish. *Petals* about twice the average sepal, ovate-lanceolate, acute, $\frac{1}{2}$ inch long, patent or reflexed. *Stamens* equalling the petals, spreading, bright yellow, filaments tapering. *Scales* small, quadrate, slightly longer than broad, lightly emarginate, orange. *Carpels* erect, contracting rather abruptly into long, slightly divergent styles, which equal the stamens.

Flowers April (Glasnevin, gentle heat). Not hardy.

HABITAT.—Mexico.

My plants came from Washington, New York, and Edinburgh.

Named after Dr. WILLIAM TRELEASE, the first collector of the plant.

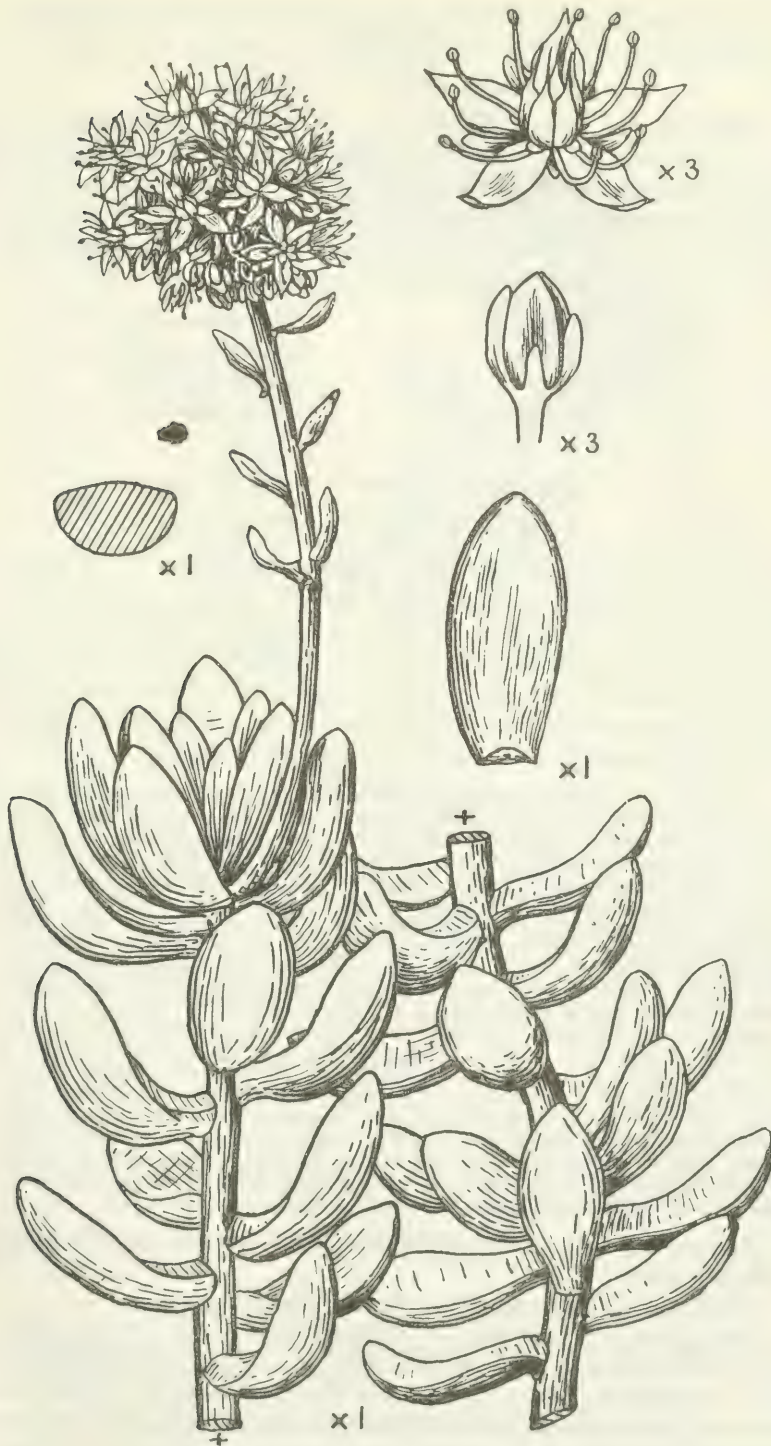


FIG. 124.—*S. Treleasei* Rose.

(b) Herbs.

(1) Leaves opposite or whorled.

Eight of the cultivated Sedums fall in here, belonging either to N. America or E. Asia. The opposite-leaved *S. rubroglaucum* and *S. divergens* have many points of resemblance, and the three ternate-leaved species, *S. Chauveaudi*, *sarmentosum*, and *lineare*, from the Far East, are allied. *S. mexicanum* is exceptional among the Seda Genuina in having many-leaved whorls.

<i>rubroglaucum</i> Praeger	<i>Chauveaudi</i> Hamet
<i>divergens</i> S. Wats.	<i>sarmentosum</i> Bunge
<i>Stahlii</i> Solms	<i>lineare</i> Thunberg
<i>Zentaro-Tashiroi</i> Makino	<i>mexicanum</i> Britton

100. *Sedum rubroglaucum* Praeger (fig. 125).

S. rubroglaucum Praeger in *Journ. of Bot.*, 57, 51, 1919.

A small plant of the type of *S. spathulifolium* Hooker; its petals, connate in the lower part, class it with the group of species which BRITTON places in a separate genus, Gormanina. From any other species of that type in cultivation it may be known by its combination of the following characters: stem crimson, leaves glaucous with a depressed apiculus and a clasping petiole, flowers large ($\frac{3}{4}$ inch across), yellow, few, petals broad, connate in the lowest fourth.

DESCRIPTION.—A small, dark-green, glaucous evergreen perennial, much flushed with crimson. *Roots* fibrous. *Barren stems* procumbent, bearing a loose rosette of leaves and emitting short, runner-like axillary shoots at first ascending and sparingly leafy, afterwards prostrate and naked save at the tips, where they produce similar rosettes and eventually root; stems crimson when young, black when old. *Flowering stems* erect, 2 inches high from the centre of the rosettes. *Leaves* mostly opposite, sometimes alternate, glaucous, extremely fleshy, shortly stalked, about $\frac{3}{4}$ inch long, $\frac{5}{10}$ inch broad, $\frac{3}{10}$ inch thick; lamina obovate, rounded at apex, with a short, depressed apiculus, flat or concave on face, the anterior edges sharply marked and meeting in the depressed apiculus, much rounded on back; petiole short, widening into a clasping base, not spurred, broad, so that those of an opposite pair of leaves meet or nearly so; leaves of flowering stems similar but narrower. *Inflorescence* of few, rather drooping flowers, on pedicels nearly as long as the flowers. *Buds* ovate, blunt. *Flowers* $\frac{3}{8}$ inch across, yellow. *Sepals* erect, very fleshy, free to the base, ovate, rather acute, green, nearly $\frac{1}{4}$ inch long. *Petals* twice the sepals, erect in lower part, spreading above, apiculate or blunt, ovate-oblong in upper half, cuneate in lower part, connate in the basal one-fourth, $\frac{3}{8}$ inch long. *Stamens* equalling the petals, filaments green, anthers yellow. *Scales* much broader than long, yellowish. *Carpels* equalling the stamens, erect, long, slender, green, tapering to very short styles.

Flowers September (in 1916, but very possibly the normal flowering time is earlier).

HABITAT.—California: Short Trail, Yosemite Valley.

This plant was sent fresh as gathered in June 1915, by Professor H. M. HALL, labelled "*Sedum obtusatum* or *yosemitense*," accompanied by *S. yosemitense* (from Ledge Trail in the same locality). It is quite different from *yosemitense*, which has green leaves without a clasping base, much smaller flowers, free lanceolate petals, &c. From those species of Gormanina which have yellow flowers: it is also easily dis-

tinguished. Only one of these is in cultivation so far as I am aware — *G. oregana* Britton (*Sedum oreganum* Nuttall, *S. obtusatum* of

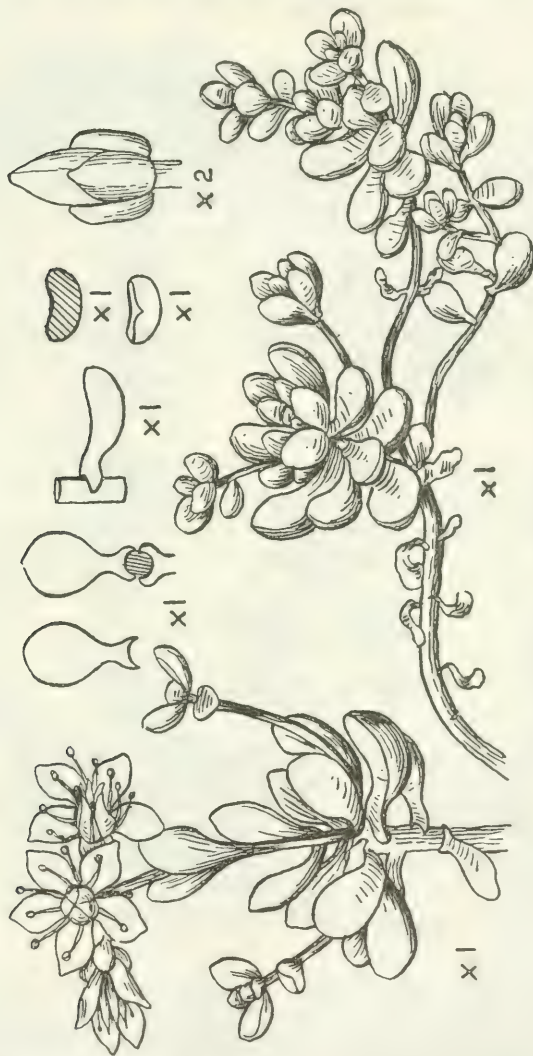


FIG. 125.—*S. rubroglaucum* Praeger.

gardens), which is known at once by its very long, tapering, semi-erect petals. From true *S. obtusatum* the present plant differs in its much larger flowers, in the shape of its leaves, &c.

101. *Sedum divergens* S. Watson (fig. 126).

S. divergens S. Watson in "Proc. Amer. Acad.," 17, 372, 1882. "N. Amer. Flora," 22, 73, 1905.

SYNONYM.—*S. Willisii* (a *nomen nudum*) of gardens.

A pleasing little plant on account of its neat habit, the red tint which its leaves assume in exposure, and the large size of its deep yellow

flowers; becoming frequent in gardens, mostly under the erroneous name of *S. Willisii*. In appearance it is intermediate between



FIG. 126.—*S. divergens* S. Watson.

S. album and *S. oreganum*; it has the habit of the former, but its flat, obovate leaves tinged with red recall the latter. It differs from

both in having opposite leaves; from the former also in its flat (not subterete) leaves and yellow (not white) flowers; from the latter in its smaller, thicker leaves and wide-spreading (not nearly erect) shorter petals.

DESCRIPTION.—A small, creeping, glabrous, evergreen perennial. *Stems* slender, prostrate, rooting, with barren and flowering ascending reddish branches; barren branches many, leafy, 2 to 3 inches, flowering stems 3 to 6 inches, with larger similar leaves. *Leaves* opposite, smooth, green, often flushed red, $\frac{1}{4}$ by $\frac{1}{8}$ inch or a little more, half as thick as broad, very fleshy, sessile, obovate to obovate-spathulate, rounded at apex or with a blunt point on the under side, those of the flowering shoots often alternate. *Inflorescence* of 2 (sometimes 3) once or twice forked branches, with flowers in the forks, flattish, not very dense, 1–2 inches across, branches ascending in fruit. *Buds* ovate, bluntly pointed, strongly ribbed. *Flowers* $\frac{3}{8}$ inch across, longer than the pedicels. *Calyx* cup-shaped, lobes triangular, acute, fleshy, pale-green or reddish, separate nearly to the base. *Petals* bright yellow, patent, oblong-lanceolate, acute, thrice the sepals, keeled on back, deeply grooved on face. *Stamens* yellow, wide-spreading, equalling the petals. *Scales* very small, retuse, yellow to orange. *Carpels* greenish, shorter than the stamens, tapering into the slender styles, at first erect, soon spreading, stellate in fruit.

Flowers June.

HABITAT.—Western N. America from Oregon to British Columbia.

I have had in cultivation two wild gatherings sent from British Columbia, and also garden plants from about a dozen sources. The species appears very constant in its characters.

102. *Sedum Stahlia* Solms (fig. 127).

S. Stahlia Solms, "Samml. Bot. Gart. Strassburg," 1900, 4. "N. Amer. Flora," 22, 66.

ILLUSTRATIONS.—*Bot. Mag.*, pl. 7908. "Gartenwelt," 8, 6, 1904 (photo).

Though described less than twenty years ago, this species is already very widely spread as a greenhouse plant. It cannot be confounded with any other *Sedum*, its rather large, egg-shaped, downy, red-brown opposite leaves being alone sufficient to distinguish it. These leaves fall off easily, and young plants arise from them very readily.

DESCRIPTION.—Evergreen perennial, finely downy. *Stems* many, erect or spreading, slender, woody below, 4 to 8 inches long, seldom branched save at the base, finely hairy above. *Leaves* opposite, egg-shaped, slightly flattened on face, sessile, very blunt, finely downy, about $\frac{1}{2}$ by $\frac{1}{4}$ by $\frac{1}{8}$ inch. *Inflorescence* a terminal cyme of 2 to 3 forked branches with flowers in the forks, 2 inches across, leafy, with bracts similar to the stem-leaves but smaller. *Buds* lanceolate, rather acute, ribbed. *Flowers* subsessile, $\frac{1}{2}$ inch across. *Calyx* bell-shaped, nearly erect, sepals green, fleshy, hairy, lanceolate, free nearly to the base. *Petals* yellow, twice the sepals, lanceolate, shortly acuminate, wide-spreading in upper part. *Stamens* yellow, erect, slightly shorter than the petals. *Scales* small, yellow, spreading, emarginate, as broad as long. *Carpels* yellow, erect, slender, equalling the stamens, styles short.

Flowers August–September (cold frame). Hardy at Cork (R. H. Beamish), Warley (Miss Willmott), Waltham Cross (E. A. Bowles), and Rostrevor (Sir John Ross). Nearly hardy at Dublin.

HABITAT.—Puebla, Mexico.

Named after Professor Ernst Stahl of Jena.

103. *Sedum Zentaro-Tashiroi* Makino (fig. 128).

S. Zentaro-Tashiroi Makino in *Bot. Mag., Tokyo*, 24, 125, 1910.

ILLUSTRATION.—*Loc. cit.*, fig. 12.

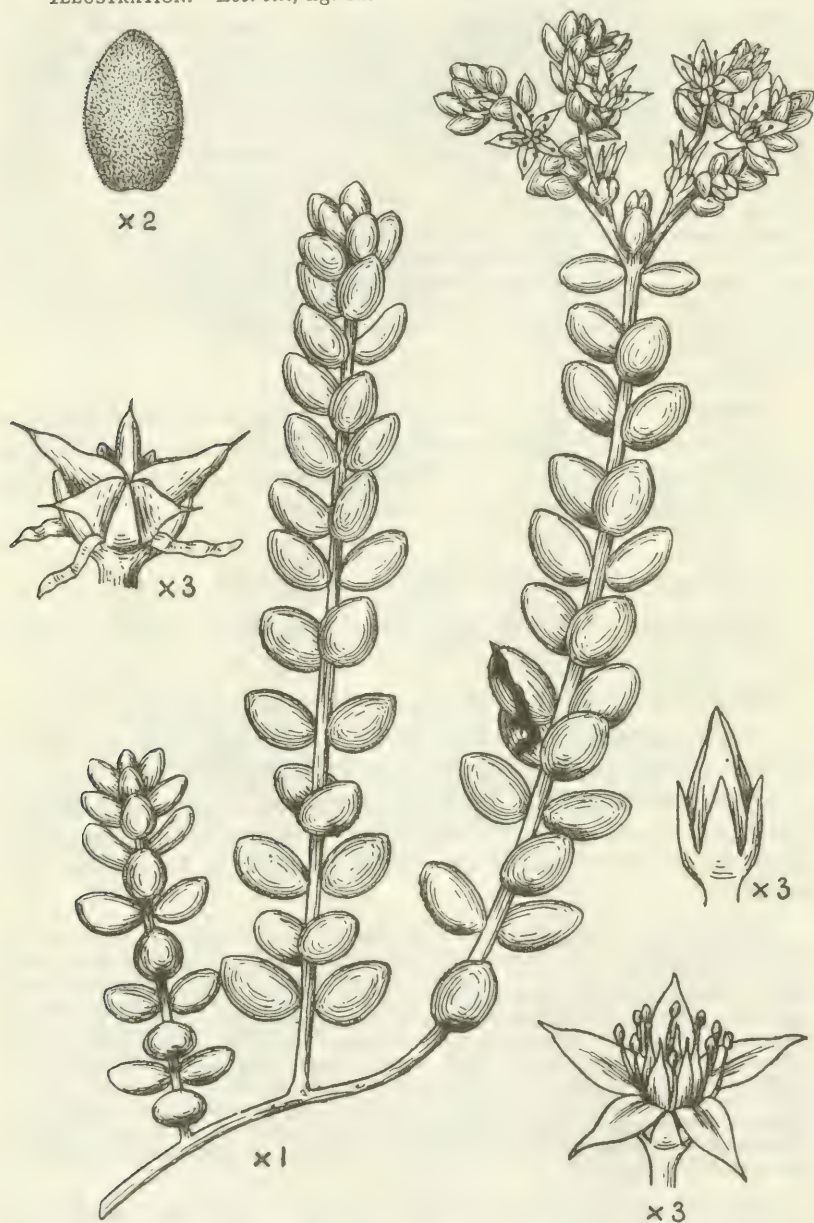


FIG. 127.—*S. Stahlii* Solms.

This plant is included in the present account since it is stated to be in cultivation at Tokyo. It is a small, yellow-flowered species related to *S. subtile* Miquel, which also belongs to Japan. Its creeping

stems with ascending branches, spatulate leaves in whorls of four, and few-flowered cymes of yellow flowers distinguish it. The following account is condensed from the original description and figure.

DESCRIPTION.—A small, glabrous, caespitose perennial. *Roots* fibrous. *Stems* creeping, with erect or ascending simple branches 2 to 5 inches high, round, light green, purplish and rooting at base. *Leaves* 4- (occasionally 5-) verticillate, or the upper ones alternate, shorter than the internodes, those of the

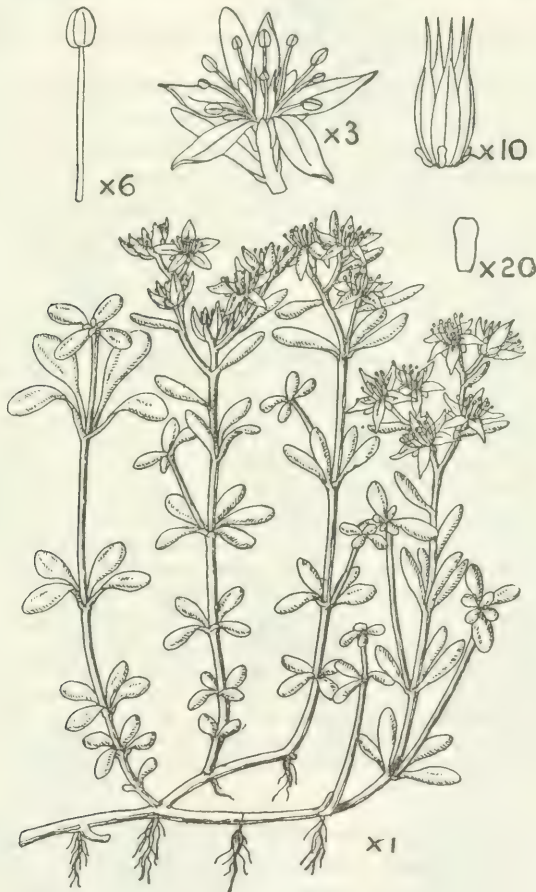


FIG. 128.—*S. zentaro-tashiroi* Makino.

barren shoots and lower part of flowering shoots spatulate-obovate, obtuse or subretuse at apex, attenuated into a petiole; largest above, upper leaves of flowering shoots spatulate-linear, obtuse or acute, narrower below, $\frac{1}{2}$ inch long. *Inflorescence* a 2- or 3-branched few-flowered cyme, branches 2- to 3-flowered, bracts linear, green. *Flowers* short-stalked, $\frac{1}{8}$ inch diameter, yellow. *Sepals* unequal, linear to linear-lanceolate, blunt. *Petals* wide-spreading, ovate-lanceolate, shortly acuminate. *Stamens* scarcely shorter than the petals, filaments yellow, anthers reddish. *Scales* minute, spatulate-oblong, truncate-rounded at apex. *Carpels* erect, lanceolate, connate below, greenish-yellow; styles slender, $\frac{1}{8}$ the ovaries. *Fruit* spreading.

Flowers May. ? Hardy.

HABITAT.—Japan. Named after the finder, who obtained it in the province of Tsushima in 1909.

The figure has been copied from that accompanying the original description, enlarged to natural size.

104. *Sedum Chauveaudi* Hamet (fig. 129).

S. Chauveaudi Hamet in Lecomte, "Notulae Systematicae," 1, 137, 1909.

SYNONYM.—*S. triphyllum* Praeger in *Journ. of Bot.*, 57, 54, 1919.

A Chinese plant resembling *S. sarmentosum* Bunge and *S. lineare* Thunberg in its free, creeping habit and leaves borne in threes; but the leaves are blunt and broadest near the apex (not pointed and broadest below the middle), and its compact, very leafy, inflorescence is widely different from that of either of the species mentioned. It differs also in many floral characters, such as its spathulate sepals.

DESCRIPTION.—A glabrous, evergreen perennial, creeping vigorously and emitting roots freely from all the older joints. *Barren shoots* 6 to 9 inches long, leafy, tips ascending, stem round, red, slightly rough. *Flowering shoots* similar, shorter, not rising above the barren ones, unbranched, leafy, densely mammillate in the upper part. *Leaves* of the barren shoots ternate, equalling or longer than the internodes, oblong-ob lanceolate, tapered below, scarcely stalked, rounded at apex, flat, slightly fleshy, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, $\frac{1}{8}$ inch broad, spurred, basal part erect, upper part spreading, beaded on margin, fresh green, pale below; young leaves often with a silvery margin; spur blunt, generally deltoid, sometimes bifid; leaves of the flowering shoots similar, the upper ones often alternate. *Inflorescence* terminal, dense, very leafy, flat, 1 to 2 inches across, of three dichotomous branches with flowers in the forks; lowest flower shortly stalked, rest sessile or subsessile; bracts crowded, large, resembling the leaves, spurred, edges beaded. *Buds* lanceolate, with a campanulate calyx, blunt, ribbed, streaked with red. *Flowers* yellow, $\frac{3}{8}$ inch across. *Sepals* unequal, very blunt, separate nearly to the base, bluntly spurred, greenish yellow streaked with red, the larger spathulate, $\frac{1}{4}$ inch long, the smaller spathulate-linear, $\frac{1}{8}$ inch long. *Petals* linear-lanceolate, rather acute, hooded at the tip, $\frac{3}{8}$ inch long, $1\frac{1}{2}$ to 2 times the sepals, yellow, streaked with red on back. *Stamens* 10, nearly equalling the petals, the epipetalous ones inserted $\frac{2}{3}$ from the base of the petals, filaments yellow, anthers orange-red. *Scales* small, quadrate, orange. *Carpels* slender, erect, nearly as long as the stamens, greenish yellow, the slender styles occupying $\frac{1}{3}$ of the length.

Flowers August–October. Hardy at Dublin.

HABITAT.—Yunnan. Raised from seed collected by Rev. Père E. E. MAIRE near Tong-tchouan in 1915, labelled "Rochers à mi-mont, altitude 2,990 mètres."

HAMET, perhaps by a slip, describes the flowering stems as erect, 18–22 cm. high, and rather robust, and the barren shoots as short (3–6 cm.). On the strength of these and minor differences, I described Père MAIRE's plant as new (*loc. cit.*). If the dimensions of the barren and fertile shoots are interchanged, this description will fit both plants in the Léveillé herbarium named *Chauveaudi* by HAMET, and also the plants which I have had in cultivation for some years. HAMET does not mention the dense mammillation of the flower-stems, a conspicuous feature of the living plant, and sufficiently obvious in dried material.



FIG. 129.—*S. Chauveaudii* Hamet.

105. *Sedum sarmentosum* Bunge (fig. 130).

S. sarmentosum Bunge in "Mém. Sav. Etr. Pétersbourg," 2, 104, 1835.
 Maximowicz in *Bull. Acad. Pétersb.*, 29, 149. (Not *S. sarmentosum*
 Masters in *Gard. Chron.* 1878, ii. 626, which is *S. mexicanum*
 Britton, see p. 229).



FIG. 130.—*S. sarmentosum* Bunge.

Easily known by its long, decumbent stems (which often grow a foot in the season) clothed with broadly lanceolate entire leaves

arranged in threes, and short flowering stems. Its nearest ally is the Japanese *S. lineare*, which is of similar appearance, but has longer leaves only half as broad and flowering stems several times taller; it is, moreover, tender, and unable to endure the winter out of doors. The variegated *Sedum* grown in greenhouses under the name of *S. sarmentosum variegatum*, or *S. carneum variegatum*, is a form of *S. lineare*, not of *sarmentosum* (see p. 229).

DESCRIPTION.—A glabrous, evergreen, prostrate perennial. *Stems* smooth, round, reddish; barren shoots long (to 1 foot or more), prostrate, rooting at the tip and occasionally elsewhere, often branched, in the open usually dying in winter save for the rooted base and tip; flowering shoots ascending, short (about 3 inches), unbranched. *Leaves* ternate, broadly lanceolate, acute, bright green, flat, fleshy, entire, sessile, 1 by $\frac{1}{4}$ inch, with a semicircular membranous adpressed spur, those of the barren and flowering shoots similar. *Inflorescence* a flat, rather lax, leafy cyme, of 3 often forked branches, 2 inches across. *Buds* ovate, acute. *Flowers* sessile save the lowest, $\frac{1}{2}$ to $\frac{3}{8}$ inch across. *Sepals* equal or nearly so, linear-lanceolate, green, fleshy, blunt, separate to the base. *Petals* bright yellow, linear-lanceolate, acute, wide-spreading, equalling the sepals or $\frac{1}{3}$ longer than them. *Stamens* spreading, shorter than the petals, filaments yellow, anthers yellow on the faces, red on the edges. *Scales* small, whitish, quadrate, slightly notched. *Carpels* yellow, compressed, equalling the stamens, in fruit spreading, overtopped by the large persistent calyx; styles tapering.

Flowers July. Hardy.

HABITAT.—North China, Japan.

Rather rare in cultivation. The name *sarmentosum* (Latin twiggy) is used in botany to signify the producing of runners as in the strawberry, and refers to the character of the barren shoots, which are very unusual in *Sedum*, though matched to some extent in its close ally *S. lineare*, and exceeded in the Mexican *S. longipes*.

106. *Sedum lineare* Thunberg (fig. 131).

S. lineare Thunberg, "Flora Japon.," 187, 1784. Miquel in *Annales Mus. Bot. Lugd.-Batav.*, 2, 156. Maximowicz in *Bull. Acad. Pétersbourg*, 29, 148.

The variegated form of this species has been long in cultivation under the names of *sarmentosum variegatum* and *carneum variegatum*. This form, which is well known, is more compact and stouter in growth than the type, as represented by the only living plant which I have seen, and by good dried specimens in the Edinburgh Herbarium. I had a long hunt for this (the type), but finally found it in one of the houses at Dahlem (Berlin Botanic Garden) under the name of *sarmentosum*, to which the present species is closely allied, but from which it is at all times distinguishable by its much narrower, longer leaves, taller flower-stems, and other characters.

DESCRIPTION.—A straggling, glabrous, evergreen perennial. *Stem* weak, decumbent and sometimes rooting below, reddish, round, smooth, branches mostly ascending, but barren shoots sometimes elongate, prostrate, and rooting as in *S. sarmentosum*; flower-stems about 6 inches, not shorter than the ascending barren shoots. *Leaves* ternate, linear to linear-lanceolate, rather light green, flat on face, paler and rounded on back, bluntly pointed, sessile, shortly spurred, ascending, $\frac{3}{4}$ —1 by $\frac{1}{4}$ inch, mostly exceeding the internodes. *Inflorescence* terminal, lax, flat, umbellate, 1 $\frac{1}{2}$ inch across, of a central, short-stalked flower

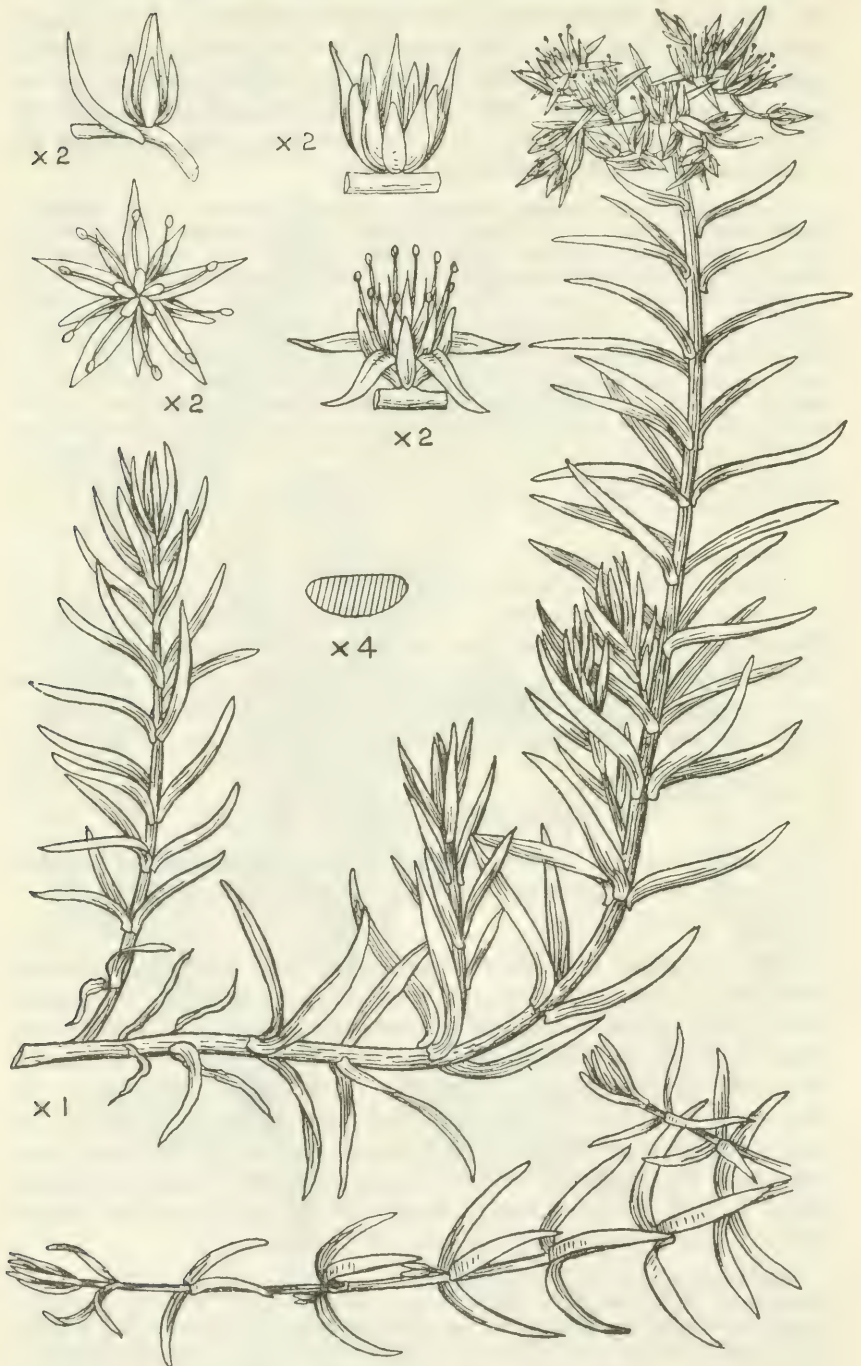


FIG. 131.—*S. lineare* Thunberg.

and 2 or 3 forked branches bearing sessile flowers. *Buds* lanceolate, acute. *Flowers* yellow, star-like, $\frac{3}{8}$ inch across. *Sepals* yellowish, narrowly lanceolate, blunt, ascending, standing up between the petals. *Petals* bright yellow, narrowly lanceolate, very acute, patent, twice the sepals. *Stamens* $\frac{3}{8}$ the petals, filaments bright yellow, anthers reddish. *Scales* small, pale yellow, broadest above, about as long as broad. *Carpels* yellow, slightly spreading, slender, tapering into the very slender styles, equalling the stamens.

Flowers May (gentle heat); July (cold frame). Nearly hardy at Dublin. Hardy at Rostrevor.

HABITAT.—Japan, China, ? Luchu Archipelago.

Var. **robustum** * var. nov. (fig. 132).

Plant grey-green, not bright green as in type, stouter and more branched, specially above. Inflorescence more leafy and often irregular in form. Flowers paler, sepals longer and broader, petals broader, carpels more divergent.

A curious form obtained at the Botanic Garden at Hamburg. Its greyish colour and stouter, more branched growth, give it a very distinct appearance, but no difference which could be called specific in the ordinary sense is to be found in the flowers. My plant sends up occasionally a variegated shoot.

f. **variegatum**.

SYNONYM.—*S. sarmentosum variegatum* and *S. carneum variegatum* of gardens. ILLUSTRATION.—Henderson's "Illustrated Bouquet," 3, pl. 60.

Leaves with a marginal stripe of white or cream, stems very pink. This is a rather stout form of the species, approaching in this respect var. *robustum* described above.

S. lineare appears to be a variable plant, as Miquel describes (*loc. cit.*) several varieties, differing from the type in stature and habit.

The specific name refers to the narrow leaves, which were originally described by THUNBERG (perhaps from dried specimens) as "teretilineararia."

107. **Sedum mexicanum**, Britton (fig. 133).

S. mexicanum Britton in *Bull. New York Bot. Gard.*, 1, 257, 1899. "N. Amer. Flora," 22, 65.

SYNONYM.—*S. sarmentosum* Masters in *Gard. Chron.*, 1878; ii. 626, excluding the var., which = *S. lineare f. variegatum*, see Praeger in *Journ. of Bot.* 55, 214. (Not *S. sarmentosum* Bunge, for which see p. 226).

A floriferous and showy species with a wealth of golden-yellow flowers. Easily recognized at any period of growth by its light-green shining tint, and its nearly terete linear leaves which, even on the same plant, are arranged singly and in whorls of 3, 4, or 5.

* Cinereo-viride, quam typo robustior, ramosior. Inflorescentia perfoliosa, saepe irregularis. Flores quam typo pallidiores, sepalis longioribus et latioribus, petalis latioribus, carpellis divergentioribus.



FIG. 132.—*S. lineare* var. *robustum* var. nov.

DESCRIPTION.—Bright-green, glabrous, evergreen perennial. *Roots* fibrous. *Stems* decumbent, sinuous and rooting below, with many ascending or erect branches about 6 inches high, almost all of which flower. *Leaves* alternate or in whorls of 3 to 5, usually alternate on the upper part of the flowering shoots, bright green, sessile, linear, nearly terete, blunt, $\frac{1}{4}$ to $\frac{1}{2}$ inch long. *Cyme* terminal, flattish, leafy. *Flowers* golden yellow, sessile, $\frac{3}{8}$ to $\frac{1}{2}$ inch across. *Sepals* unequal, resembling the leaves in shape and colour. *Petals* lanceolate, acute, concave, wide-spreading, twice the sepals. *Stamens* nearly as long as the petals, filaments



FIG. 133.—*S. mexicanum* Britton.

yellow, anthers reddish. *Scales* minute, cuneate, yellow. *Carpels* slightly spreading, yellow, equalling the stamens.

Flowers April (gentle heat); June (cold frame). Not hardy at Dublin; nearly so at Rostrevor.

HABITAT.—Near Mexico City.

Though only described in 1899 from specimens raised in America from seeds collected near Mexico City, there is evidence of its cultivation in England at an earlier date. It is clearly the plant (of which MAXIMOWICZ remarks "mihi ignotum"), described by MASTERS in 1878 as *S. sarmentosum* Bunge (a Chinese species), under which name

S. mexicanum was grown in the Succulent House at Kew until quite recently. The presumption is that MASTERS compiled his description from the plant at Kew, where he obtained much of the material for his monograph. There is no record as to the source of the Kew plant.

The species came to me from New York Botanic Garden, and also from the Villa Thuret, Cap d'Antibes (without a name), and I have seen it at Bremen (labelled "sp. aus Mexico") and Berlin (labelled *reflexum*); also, to my surprise, as a pot plant in a cottage window at Thomastown, in Co. Kilkenny, in Ireland.

(2) Leaves alternate.

(i.) *Leaves spatulate, flat.*

S. Palmeri and *S. compressum* are closely allied Mexican plants. *S. variicolor* is Chinese, belonging to the group Japonica of MAXIMOWICZ. The remaining four species belong to a well-marked group of the Western United States, some of which have been placed by ROSE in a separate genus, *Gormania*.

Palmeri S. Wats.

compressum Rose.

variicolor Praeger.

spathulifolium Hooker.

yosemitense Britton.

Hallii nov. comb.

oreganum Nuttall.

108. *Sedum Palmeri* S. Watson (fig. 134).

S. Palmeri S. Watson in *Proc. Amer. Acad.*, 17, 355, 1882. "N. Amer. Flora," 22, 69.

One of the best and most distinct of Mexican Sedums, the abundant drooping sprays of golden blossom contrasting finely with the glaucous foliage. It is also one of the hardiest.

It is close to *S. compressum*, which, however, has acute leaves, while those of *Palmeri* are rounded or quite bluntly pointed. The latter are, moreover, of a different tint, being very glaucous, while those of *compressum* are rather of a pale green, tending to be suffused with red as they get old.

In its bare, sinuous stems and rosette-like terminal clusters of entire spatulate leaves, the plant recalls the European *S. Anacampseros*.

DESCRIPTION.—A glaucous evergreen perennial of sprawling habit. *Stems* rather sinuous, bare and rooting below, round and smooth, decumbent, with ascending branches, 6 to 9 inches high. *Leaves* spatulate, entire, about 1 by $\frac{3}{8}$ inch, rounded or very bluntly pointed at the apex, glaucous, somewhat reflexed, forming, save when in full growth, a loose terminal rosette. *Flower-stem* erect, lateral (in early stage drooping and appearing terminal), slender, 2 to 4 inches long, bearing small scattered leaves; in strong plants several axillary flowering stems are also produced from lower down the shoot. *Inflorescence* cymose, of several drooping, wide-spreading branches, 1-4 inches long, bearing on their upper side a double row of crowded flowers, each with an ovate bract, the lower ones with pedicels equalling the flowers. *Flowers* $\frac{3}{8}$ inch across. *Sepals* pale green, unequal, lanceolate to linear-oblong, rather acute, the exterior one much larger than the others. *Petals* orange, about equalling the longest sepal, lanceo-



FIG. 134.—*S. Palmeri* S. Watson.

late, spreading, acute. *Stamens* orange, nearly equalling the petals. *Scales* minute, roundish, greenish. *Carpels* orange, nearly erect, shorter than the stamens.

Flowers February–April (gentle heat); May–June (cold frame and open ground). Hardy at Dublin and at Warley, Essex.

HABITAT.—Nuevo Leon and Coahuila, Mexico.

Much rarer in cultivation than its merits deserve. I have received it from Washington (viâ Wisley), New York, and the Missouri Botanic Garden, also from Dresden and the Muséum d'Histoire Naturelle at Paris. It is in a few English gardens, and Perry of Enfield, Haage & Schmidt of Erfurt, and Correvon of Geneva have it for sale.

The name commemorates Dr. E. PALMER, one of the foremost of Mexican botanical explorers.

109. *Sedum compressum* Rose (fig. 135).

S. compressum Rose in "Contrib. U.S. Nat. Herb.," 12, 440, 1909.

ILLUSTRATION.—*Loc. cit.*, pl. 80 (photo).

Closely allied to the better known *S. Palmeri*, and very like it in habit and flower, but recognizable by its acute or apiculate leaves. The sepals also are acute (not blunt as in *Palmeri*), the flowers larger and the mature and fading leaves are often flushed with red, which never happens in the more glaucous *S. Palmeri*. The flowers are of the same brilliant orange colour.

DESCRIPTION.—Evergreen perennial, smooth and glaucous. *Stems* sprawling, ascending or erect, about 6 inches high, bare save near the top, often rooting when prostrate, round, smooth, marked with leaf-scars. *Leaves* oblanceolate-trapezoidal, about 1 by $\frac{3}{8}$ inch, broadest $\frac{2}{3}$ way up, sessile, acute or apiculate, fleshy, flat on face, convex on back, glaucous, edges often beaded, forming a loose rosette, older ones often flushed red. *Flower-stem* slender, apparently terminal, afterwards lateral, 1 to 2 inches long, with smaller leaves. *Inflorescence* a 2- to 3-branched cyme, branches secund, at first drooping, afterwards erect. *Buds* narrow, with adpressed sepals. *Flowers* showy, orange, $\frac{3}{8}$ inch across, the lower stalked, the upper sessile. *Sepals* unequal, ultimately deflexed, linear-lanceolate to ovate, yellowish green, flat on face, convex on back, separate almost to the base. *Petals* patent, later deflexed, ovate-lanceolate, acute, equalling or exceeding the longest sepal. *Stamens* spreading, orange, nearly equalling the petals. *Scales* very small, squarish, yellow. *Carpels* orange, slender, at first erect, later slightly spreading, equalling the stamens, styles long, very slender.

Flowers January–March (gentle heat); April–May (cold frame). One of the hardiest of Mexican Sedums; at Dublin survived in the open the very severe winter of 1916–7.

HABITAT.—Tamaulipas, Mexico.

Received from Washington, and also (unnamed, mixed with *S. Palmeri*) from New York.

110. *Sedum variicolor* Praeger (figs. 136, 137).

S. variicolor Praeger in *Journ. of Bot.*, 57, 54, 1919.

A rather handsome, smallish Chinese perennial, unlike any other species in cultivation. To be recognized by the perennial growth of its stout, short, erect or widely divergent stems, its flat, entire, oblong-



FIG. 135.—*S. compressum* Rose.



FIG. 136.—*S. variicolor* Praeger.

spathulate leaves which fall in autumn, its large, lax, cymes of showy yellow flowers, and its peculiar carpels at first concave on the inner edge.

DESCRIPTION.—A smallish, glabrous, deciduous, perennial. *Rootstock* very short, thick, emitting strong fibrous roots below and many stems above. *Stems* perennial, half a foot long, erect, spreading, or procumbent, with short, wide-spreading, leafy, barren and flowering branches, about $\frac{3}{16}$ inch thick, minutely roughened, dark brownish and bare in lower part, green or reddish above. *Leaves* alternate, occasionally subternate, rather crowded, sessile, entire, flat, glabrous, oblong-spathulate or broadly oblanceolate, tapered below, shortly spurred, bluntly pointed and often slightly apiculate at apex, fleshy, bright green, $\frac{3}{4}$ inch long, $\frac{1}{4}$ inch broad, spur truncate. *Inflorescence* flat, 2 to 3 inches across, of three usually dichotomous, wide-spreading, finely mammillate, leafy branches with flowers in the forks, lowest flower as long as its pedicel, the rest subsessile or sessile; lower bracts resembling the leaves, upper bracts linear. *Buds* ovate, with a campanulate calyx, bluntly pointed, ribbed, the ribs green, yellow, or red. *Flowers* $\frac{5}{8}$ inch across, usually bright yellow. *Sepals* leaf-like, green, fleshy,

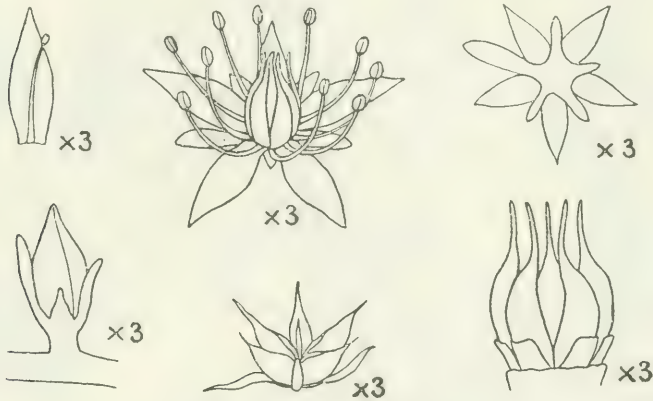


FIG. 137.—*S. varicolor* Praeger.

blunt, very unequal, from $\frac{1}{8}$ inch to $\frac{3}{8}$ inch long, from deltoid to oblong-linear or oblong-lanceolate or oblong-spathulate, widened at the base, not spurred, pale green, tube very short. *Petals* ovate-acuminate to lanceolate, with a short mucro behind the tip, patent, about equalling the longest sepal, $\frac{5}{16}$ inch long, deep yellow. *Stamens* spreading, slightly shorter than the petals, filaments tapering, yellow, anthers reddish. *Scales* quadrate, slightly retuse, lemon yellow. *Carpels* slender, equalling the stamens, at first erect with the inner edges concave and the styles contiguous, soon spreading, but not widely, with erect styles; styles long, slender, occupying nearly half the length of the carpels. Fruit stellate, $\frac{3}{8}$ inch across.

Flowers August–September. Hardy at Dublin.

HABITAT.—Yunnan. Seed was received from Rev. Père E. E. MAIRE in 1915 from Tong-tchouan, labelled “Eboulis des rochers des pics, altitude 2,800 mètres.”

This is a handsome little plant, and if it proves to be generally hardy, will deserve a place in the rock garden. The flowers are usually of a rich orange-yellow, but in the batch of plants raised from Père MAIRE'S seed there was a variety of colour unusual in the genus. Some plants bore pale-yellow flowers, others deep orange, while in others again red colour was added to enhance the deep-yellow blossoms; in one of the

most striking forms the stamens were crimson, the scales flushed with red, and the carpels deep yellow with the inner face crimson.

It derives its name from this variation in colour.

III. *Sedum spathulifolium* Hooker (fig. 138).

S. spathulifolium Hooker, "Flor. Bor. Amer.," 1, 227, 1832. Masters in *Gard. Chron.*, 1878, ii. 376 (but not fig. 68). "N. Amer. Flora," 22, 72.

A number of the North American Sedums are small species with spatulate leaves and yellow flowers, but only a few are in cultivation. The present species belongs to this group and may be distinguished by its loose rosettes of glaucous foliage turning red, its short, horizontal runner-like shoots, and its ample flat inflorescence. In one variety the plant is green, not glaucous.

DESCRIPTION.—A small evergreen glaucous perennial, forming a close, flat clump, tinged red in exposure. *Roots* fibrous. *Stems* smooth, round; the barren ones very short, erect, bearing a loose rosette of leaves about 1 inch across and emitting at base runner-like prostrate shoots 1 to 2 inches long, bare of leaves save near the ends, where they send out roots and form similar leaf-rosettes; flower-stems erect, leafy, 3 to 5 inches high. *Leaves* of barren shoots flat, fleshy, spatulate, with an abrupt pointed recurved tip, tapered below, 1 inch long by $\frac{3}{8}$ inch wide, glaucous, very white on back; those of flowering shoots distant, oblong, sessile, very fleshy. *Inflorescence* a large, flattish, rather dense, leafy cyme, 2 to 3 inches across. *Buds* ovate-lanceolate, acute. *Flowers* bright yellow, $\frac{1}{2}$ to $\frac{3}{4}$ inch across. *Sepals* glaucous, tapering, acute, standing up between the petals, tube short. *Petals* patent or slightly reflexed above, lanceolate, acute, bright yellow, more than twice the sepals. *Stamens* erect, slightly shorter than the petals, filaments yellow, anthers orange. *Scales* small, quadrate, orange. *Carpels* green or yellow, shorter than the stamens, much compressed, erect at first, soon spreading; wide-spreading in fruit.

Flowers May–June.

HABITAT.—British Columbia to California.

Generally found in gardens (in which it has a wide distribution, and is generally correctly named) in the small glaucous form with leaves often tipped with red, which may be regarded as typical; four native gatherings received from Western America all belong to this, or come close to it; but several other forms are occasionally found in cultivation. The first of these is so distinct as to merit a varietal name, and it is described below. Another, which came from the Royal Horticultural Society and from Kew, is, like the last, larger than the type, with leaves glaucous when young and deep purple when mature, and from the horticultural standpoint deserves a name. A third form, received from Canon ELLACOMBE, has an almost round tip end to the leaf (owing to the apiculate tip being much deflexed), which gives it a distinct appearance.

Var. *majus* var. nov.* (fig. 138, a).

Rosettes of barren shoots twice as large as in type, of about twenty, instead of ten, leaves. Leaves longer and broader, more apiculate,

* Rosulae quam in typo duplo majores, foliorum 15–20 composita. Folia longiora et latiora, magis apiculata, viridia, vix glauca, nec rubro-tincta, inflorescentia major.

green, scarcely glaucous, not suffused with red when old. Inflorescence larger.

No doubt a wild American form, as Sedums, being increased by division in most cases, do not tend to give garden sports. Received as "*Sedum* 'W. Pascoe'—*S. spathulifolium* × *obtusatum*," from Messrs.



FIG. 138.—*S. spathulifolium* Hooker.

STORMONTH (but it has no *obtusatum* blood in it); as "*S. spathulifolium* 'Wansfell' var." from Mr. WALPOLE, of Mount Usher, Co. Wicklow; and as *S. spathulifolium* from several other sources.

Var. *purpureum* var. nov.*

Rosettes large, $1\frac{1}{2}$ to 2 inches across, leaves deep-purple except when young, when they are white and mealy, inflorescence large.

* Rosulae amplae, folia atropurpurea, folia juvenia farinosa, inflorescentia ampla.

A handsome form, the bright-yellow flowers contrasting well with the purple foliage. Received from Wisley and from Kew, and Mr. CLARENCE ELLIOTT tells me he has it.

Attempts to illustrate the species have been unfortunate. The figure in *Gardeners' Chronicle*, 1878, ii. 377, has the leaves of *S. oreganum*, whilst the inflorescence is uncertain. That in *Gartenflora*, t. 741, is also wrong, though I am not sure what species it represents.

112. *Sedum yosemitense* Britton (fig. 139).

S. yosemitense Britton in *Bull. New. York Bot. Gard.*, 3, 44, 1903.

A mat-forming plant after the style of *S. spathulifolium* Hooker, resembling it in its rosettes of leaves arising from short, horizontal, leafless axillary shoots; but the leaves are fresh green, not glaucous as in typical *spathulifolium*, causing the plant to approach more nearly a small form of var. *majus* Praeger of the former species; the leaves come near those of *S. oreganum* Nuttall, but in their arrangement are different. The flowers are near those of *spathulifolium*, and have no resemblance to those of *oreganum*.

DESCRIPTION.—A small, glabrous, evergreen perennial, forming a loose mat. *Barren stems* axillary, leafless and horizontal below, ending in a short, erect rooting rosette of leaves. *Flowering stem* from the centre of the rosette, erect, leafy, unbranched, 3 to 4 inches high, smooth, round. *Leaves* of rosettes alternate, sessile, ovate-spathulate, very blunt, mostly bluntly apiculate, flat, very fleshy, often suffused with red, $\frac{1}{2}$ to $\frac{3}{4}$ inch long by $\frac{1}{4}$ to $\frac{3}{8}$ inch wide; those of the flowering shoots alternate, oblong or club-shaped, longer than the internodes, shortly and bluntly spurred. *Inflorescence* terminal, flat, about $1\frac{1}{2}$ inch across, of three forked branches with a flower in the primary fork, each flower subtended by a blunt linear or linear-spathulate leaf-like bract; pedicels stout, shorter than the flowers, up to $\frac{1}{2}$ inch long on lowest flowers, uppermost flowers sessile. *Buds* ovate-oblong, bluntly pointed, with short greenish ribs. *Flowers* $\frac{1}{2}$ inch across. *Calyx* cup-shaped, over $\frac{1}{2}$ inch long, green, fleshy, the segments oblong, bluntly pointed, longer than the tube. *Petals* wide-spreading, free to the base, oblong-lanceolate, acute, bright yellow, grooved on face, over $\frac{1}{4}$ inch long by over $\frac{1}{16}$ inch wide. *Stamens* spreading, a little shorter than the petals, filaments greenish, anthers bright yellow, attached close to the base of the petals. *Scales* minute, quadrate, retuse, yellow. *Carpels* slender, erect in flower, pale green, a little shorter than the stamens, spreading in fruit.

Flowers May.

Although my plants differ from Dr. BRITTON'S description of *S. yosemitense* in their flowers being bright yellow, not "pale yellow," and the leaves being spathulate rather than "obovate-orbicular to broadly obovate" and $\frac{1}{2}$ to $\frac{3}{4}$ inch long instead of "1 cm. or less," the essential portions of the description agree, and I have little doubt in retaining under this name my material, which I owe to the kindness of Prof. H. M. HALL, one of the original finders of the plant in the Yosemite Valley, to which, as at present known, it is confined; he sent it (as *S. yosemitense*) in June 1915, from Ledge Trail, Yosemite Valley, California.

113. *Sedum Hallii* nov. comb.

SYNONYM.—*Gormania Hallii* Britton in *Bull. New York Bot. Gard.*, 3, 29, 1903. "N. Amer. Flora," 22, 48.

A little plant resembling *S. yosemitense* in its vegetative parts, but the inflorescence is thyrsoid and mostly longer than broad, not

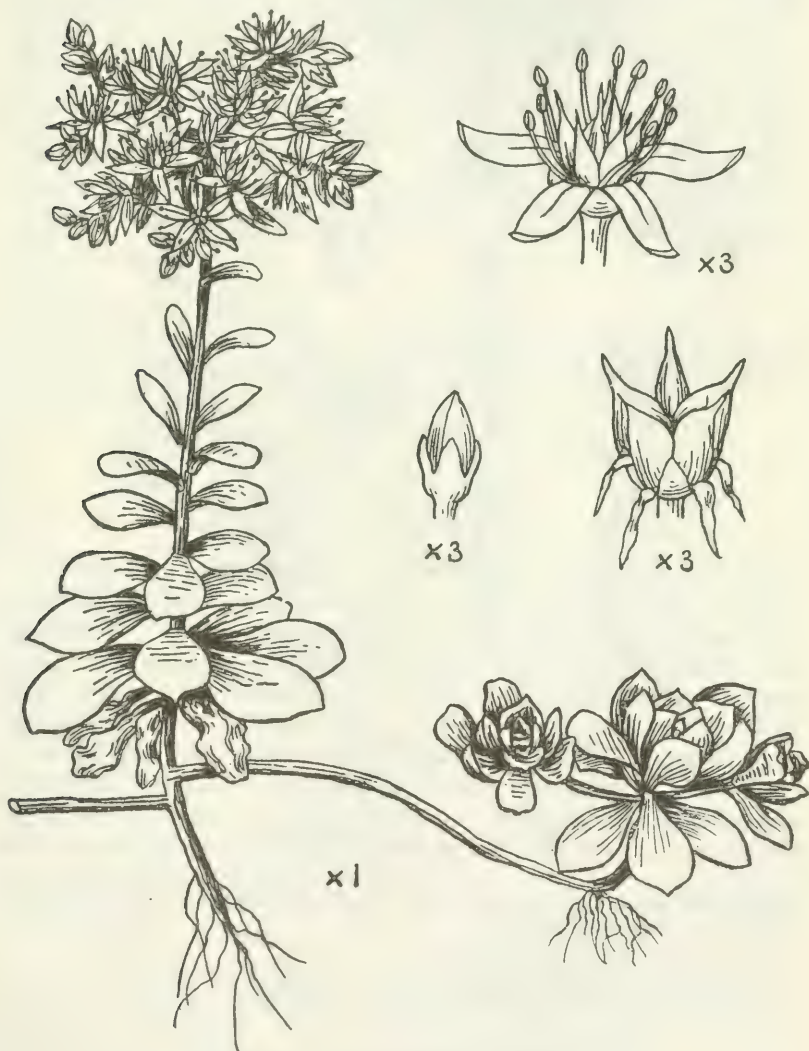


FIG. 139.—*S. yosemitense* Britton.

flat as in the latter species. Plants kindly sent me by Dr. ROSE died on arrival, but the plant is included here since it is in cultivation in Washington. The description is from "N. American Flora."

DESCRIPTION.—Spreading, matted, green, not glaucous, the flowering stem 3 inches high or less. *Leaves* spatulate to spatulate-obovate, $\frac{1}{2}$ inch long or less,

about $\frac{3}{16}$ inch wide, rounded or slightly retuse at the apex, a little concave on the upper surface, the upper ones similar, narrower. *Calyx* about $\frac{1}{8}$ inch long, its lobes oblong-lanceolate, obtusish. *Corolla* about $\frac{5}{16}$ inch long, bright yellow, its tube somewhat shorter than the calyx, its lobes oblong-lanceolate, obtusish.



FIG. 140.—*S. oreganum* Nuttall.

Pedicels very slender, $\frac{1}{16}$ to $\frac{5}{16}$ inch long. *Cyme* little compound, thyrsoïd, about 1 inch broad, 1 to 2 inches high.

Flowers July (in its habitat).

HABITAT.—Yosemite National Park, California.

114. *Sedum oreganum* Nuttall (fig. 140).

S. oreganum Nuttall, Torrey & Gray, "Flora N. America," 1, 559, 1840.

SYNONYMS.—*S. obtusatum* of gardens (not of A. Gray, "Proc. Amer. Acad.," 7, 342). *Gormania oregana* Britton in *Bulletin New York Bot. Gard.* 3, 30, 1903. "Sp. British Columbia," of some nurserymen's lists.

Not uncommon in gardens under the name *S. obtusatum*, an allied plant which is not in cultivation so far as I know. Among the group

of North American yellow-flowered spathulate-leaved Sedums it may be distinguished by its remarkably long, acute, sub-erect petals (resembling in shape and position those of the common *S. spurium*), and tapering buds no less than $\frac{5}{8}$ inch long.

DESCRIPTION.—A small, creeping, glabrous evergreen perennial, forming a green mat tinged red. *Stems* many, creeping, bare below, round, smooth, with many ascending branches; barren shoots 1 to 3 inches high, leafy, flowering shoots about 6 inches, unbranched, leaves more distant. *Leaves* alternate or opposite, shining green, often suffused with red, flat, very fleshy, spathulate, sessile, very blunt at apex, tapered below, about $\frac{3}{4}$ by $\frac{3}{8}$ inch; those of flowering stems similar. *Inflorescence* flat, $1\frac{1}{2}$ inch across, of 2 or 3 simple, forked, or twice-forked branches with flowers in the forks, bracts similar to the leaves, the uppermost ones very small. *Buds* ovate-elongate, $\frac{5}{8}$ inch long, tapered to a long, slender point. *Flowers* sessile or lower ones shortly stalked, not opening widely. *Sepals* ovate-lanceolate, acute, green, only slightly fleshy, tube short. *Petals* lanceolate-attenuate, erect or slightly spreading, tapering to a long point, united in their lowest $\frac{1}{3}$, nearly thrice the sepals, yellow. *Stamens* yellow, erect, $\frac{3}{8}$ the petals. *Scales* small, yellow. *Carpels* green, erect, equalling the stamens, nearly erect in fruit.

Flowers July–August.

HABITAT.—Western North America from Alaska to Northern California. Named after the locality in which it was first discovered—the mouth of the Oregon River.

(ii.) *Leaves not broadest above (ovate to linear).*

No fewer than twenty-two of the cultivated Sedums fall under this definition, natives of various parts of Europe, Asia, and America. The best-marked group among these is that formed by the last seven species, formed of six European and one (*S. stenopetalum*) N. American plant, and well illustrated by the British *S. rupestre* and *S. reflexum*. Resembling these in their linear leaf-form, but differing by their stellate fruit and smaller size, come three Himalayan or Chinese plants—*S. multicaule*, *trullipetalum*, *Celiae*, belonging to the group Japonica. *S. nudum* and *lancerottense* are closely allied tender species with egg-shaped leaves, from the Atlantic islands. The remainder are a rather miscellaneous assortment.

humifusum Rose.
cupressoides Hemsley.
acre Linn.
Stribrnyi Velen.
oaxacanum Rose.
nudum Aiton.
lancerottense R. P. Murray.
japonicum Siebold.
alpestre Villar.
Douglasii Hooker.
multicaule Wall.

trullipetalum H. f. & T.
Celiae Hamet.
multiceps Coss. & Dur.
sexangulare Linn.
rupestre Linn.
reflexum Linn.
altissimum Poiret.
anopetalum DC.
stenopetalum Pursh.
pruinatum Brotero.
amplexicaule DC.

115. *Sedum humifusum* Rose (fig. 141).

S. humifusum Rose in "Contrib. U.S. Nat. Herb.," 13, 298, 1911.

ILLUSTRATION.—*Loc. cit.*, pl. 55 (photo).

A delightful tiny species forming a fresh green, moss-like mat, and easily recognized by its strongly ciliate leaves and solitary star-like yellow flowers. In appearance nearest to *S. compactum*, but this has white sub-globular flowers and smooth leaves.

DESCRIPTION.—A minute evergreen mat-forming perennial. Marginal shoots creeping, somewhat elongate (up to 1 inch), the others more or less erect and forming tiny rosettes like those of a *Sempervivum*, $\frac{3}{16}$ inch across. The stems produce continually short axillary branches from about $\frac{1}{4}$ inch back from the growing point. *Leaves* closely imbricate, obovate, flattened, fleshy, strongly ciliate, with a little tuft of radiating hairs at the apex; old leaves reddish.

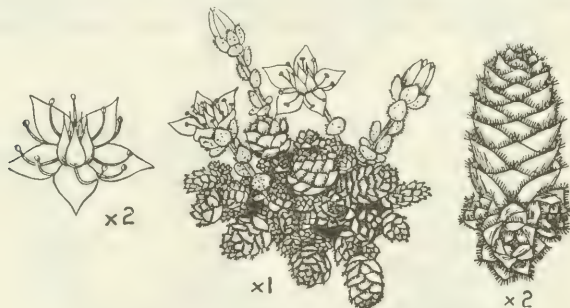


FIG. 141.—*S. humifusum* Rose.

Flower stems reddish, $\frac{1}{4}$ to $\frac{3}{4}$ inch long, slender, with a few leaves. *Flowers* solitary, terminal, $\frac{3}{8}$ inch across. *Sepals* green, ovate, very fleshy, ciliate, leaf-like, one-half the petals. *Petals* bright yellow, ovate, acute, spreading widely. *Stamens* yellow, spreading, equalling the carpels. *Scales* small, cuneate, orange-yellow. *Carpels* erect, yellow, equalling the stamens.

Flowers April (gentle heat); June (cold frame). Not hardy.

HABITAT.—Querétaro, Mexico.

Received from Washington, also from Upsala (whence it came from Darmstadt). I have seen it at Edinburgh and Dresden, and it was shown at the Royal Horticultural Society in July 1916.

The name *humifusum* (= spread over the ground) well describes its habit.

116. *Sedum cupressoides* Hemsley (fig. 142).

S. cupressoides Hemsley, "Diagnoses Plant. Nov.," 1, 11, 1878.
Hemsley, "Biol. Centr. Amer., Botany," 1, 393. "N. Amer. Flora," 22, 63.

ILLUSTRATION.—"Biol. Centr. Amer., Bot.," pl. 21.

A most distinct and interesting species, with the peculiar Cupressus type of foliage (from which it gains its name) that is met with in xerophilous forms of various genera, e.g., *Veronica* and *Crassula*. The flowers, which are bright yellow, were first described as rose-

coloured. It cannot be confused with any other garden species of *Sedum*. It appears to be closely related to *S. Greggii*, a species not in cultivation so far as I am aware, though its name occurs in garden lists; the plant so named is usually *S. moranense*, a larger plant than *Greggii*, and with white, not yellow, flowers.

DESCRIPTION.—A small, glabrous, evergreen perennial. *Stems* decumbent, bare, woody, and rooting below, with many short wide-spreading branches. *Leaves* very small, closely imbricate, adpressed, very fleshy, ovate-rhomboidal, blunt, flat on face, convex on back, $\frac{1}{8}$ inch long. *Flowers* $\frac{1}{2}$ inch across, sessile, borne

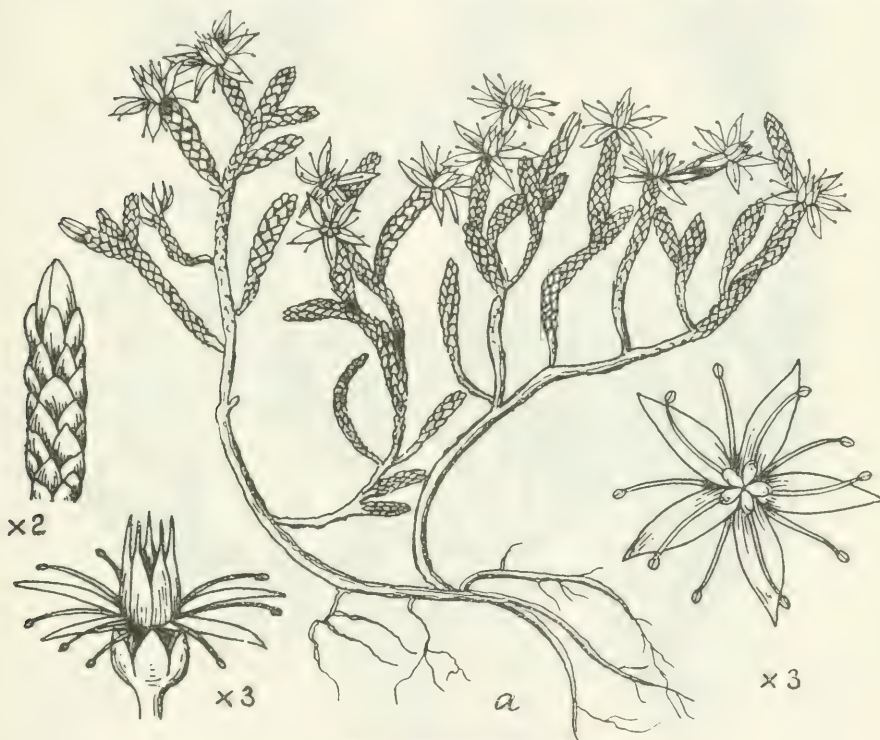


FIG. 142.—*S. cupressoides* Hemsley.

singly or 2 or 3 together at the ends of the branches. *Buds* lanceolate, blunt. *Sepals* green, fleshy, lanceolate, acute. *Petals* bright yellow, lanceolate, acute, wide-spreading, four times the sepals. *Stamens* nearly equalling the petals, wide-spreading, yellow. *Scales* yellow, as broad as long. *Carpels* yellow, erect, equalling the petals, styles long, slender.

Flowers July (gentle heat); August (cold frame). Sometimes survives the winter in the open in Dublin.

HABITAT.—Mountains of Oaxaca, Mexico.

Received from Washington and Edinburgh, and also from the garden of the late Sir FRANK CRISP at Henley-on-Thames.

HEMSLEY'S figure differs somewhat from my living plants in its narrower leaves, shorter sepals and petals, and shorter and more erect stamens—differences probably sufficiently explained by the fact that his figures were drawn from dried specimens.

117. *Sedum acre* Linn. (fig. 143).

S. acre Linn., "Species Plantarum," 432, 1753. Masters in *Gard. Chron.* 1878, ii. 684.

ILLUSTRATIONS.—Sowerby, "English Bot." (ed. 3), pl. 532; Reichenbach, "Flor. German.," 23, tab. 51; De Candolle, "Plantes Grasses," tab. 117; "Flora

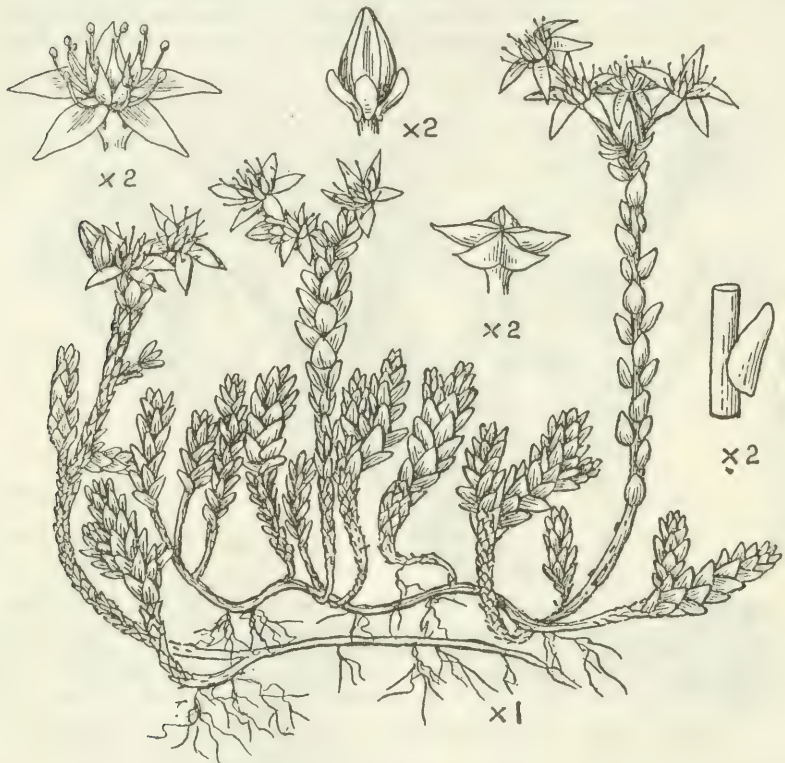


FIG. 143.—*S. acre* Linn.

Danica," tab. 1457; Curtis, "Flor. Londin.," 1, 114; Cusin and Ansberque, "Herb. Flore française, Crassul.," tab. 27; Tenore, "Flor. Nap.," tab. 229; Plenck, "Icones Plant. Medicinalium," tab. 351.

S. acre when in flower cannot be confounded with any other of the cultivated species, its large yellow blossoms and flattish triangular leaves, very broad at the base, easily distinguishing it. *S. sexangulare*, which it resembles in size and colour, has linear leaves and smaller flowers; *S. anglicum*, which it somewhat resembles when out of bloom, has leaves broadest near the middle, not broadest at the base.

DESCRIPTION.—A small creeping evergreen forming a mat. *Stem* creeping and rooting, much branched. *Barren branches* erect, $\frac{1}{2}$ to 2 inches high. *Leaves* alternate, imbricate, green, smooth, ascending, ovoid-triangular, blunt, slightly spurred, $\frac{2}{15}$ to $\frac{3}{15}$ inch long by $\frac{1}{15}$ wide at base, having an acrid taste. *Inflorescence* a short cyme of 2 to 3 branches each with 2 to 3 flowers, and a flower in the fork. *Buds* conical. *Flowers* $\frac{1}{2}$ inch across. *Sepals* leaf-like, green, fleshy, lanceolate, blunt. *Petals* bright yellow, lanceolate, acute, wide-spreading, twice the sepals.

Stamens yellow, shorter than the petals. *Scales* whitish. *Carpels* yellow, slightly spreading, shorter than the stamens, stellate-patent in fruit.

Flowers June. Hardy.

DISTRIBUTION.—Europe, Asia Minor, N. Asia, N. Africa. A common British wild-flower in dry places, especially near the sea.

Named *acre* from its biting flavour. The plant had formerly some reputation as an emetic and cathartic. Like the Houseleek



FIG. 144.—*S. acre* var. *majus* Masters.

and some other Sedums, it is often planted on houses as a preventive of fire.

Var. *majus* Masters in *Gard. Chron.* 1878, ii. 685 (fig. 144).

Var. *Maweanum* of gardens. A very distinct form, much larger than the type, and of pale-green colour. *Leaves* in seven very crowded rows, ovate-oblong, blunt, up to $\frac{3}{8}$ inch long by $\frac{1}{8}$ inch broad. *Flowers* $\frac{5}{8}$ inch across. Compared with the type, a large and solid plant, which might well pass for a different species until it blossoms, when, except for size, no difference in the floral parts can be discerned. Morocco, on mountains south-west of Tetuan (Maw)—Masters. Not infrequent in cultivation, under the name *Maweanum*.

f. *aureum* Masters, *loc. cit.* 685.

Shoots tipped with golden variegation throughout the earlier part of the year. A bright little plant, often used for edgings and carpet-bedding. Probably of garden origin.

f. *elegans* Masters, *loc. cit.*

Shoots tipped with silver variegation in the earlier part of the year. Not so showy nor so hardy as the last.

OBSERVATION.—*S. Drucei* Graebner, in "Bot. Exch. Club Report" for 1912, 160. This is the common British *S. acre* L., and I have elsewhere (*Journ. of Bot.*, 65, 212) recorded the observations according to which I fail to distinguish between it and Continental forms of the same species.

118. *Sedum Stribrnyi* Velenovsky (fig. 145).

S. Stribrnyi Velenovsky in *Oesterr. Bot. Zeitschrift*, 42, 14, 1892. Halácsy, 'Conspect. Flor. Graecae,' 1, 585.

While resembling a small *reflexum* in its leafy parts, the inflorescence recalls rather that of *acre*. Its most distinctive character is the manner in which the flowering stems begin to fork almost from the base and continue dividing to near the top, so that a single stem may bear a dozen ultimate flowering branches. The lax disposition of the flowers on the branches is also characteristic. *S. Stribrnyi* is a dull little plant until it blooms, when it is showy and effective.

DESCRIPTION.—An evergreen, glabrous perennial forming a tuft. *Stems* rooting below, with many ascending branches; barren shoots much branched, ascending, 2 to 6 inches high, flowering shoots also branched, 3 to 6 inches high. *Leaves* crowded, of a rather glaucous green, linear, slightly tapering upwards, blunt, sessile, slightly spurred, $\frac{1}{2}$ inch long, subterete, slightly flattened, chiefly above. *Inflorescence* compound, each branch of the flower-stem ending in a 2- or 3-branched cyme with a flower at the fork; the cyme-branches straight, almost erect, 1 to 2 inches long. *Flowers* $\frac{1}{2}$ inch across, subsessile. *Sepals* slightly unequal, very fleshy, subterete, green, lanceolate, blunt, resembling the leaves, persistent in fruit. *Petals* bright yellow, very acute, wide-spreading, lanceolate, strongly keeled, less than twice the sepals. *Stamens* yellow, slightly shorter than the petals. *Scales* very small, pale yellow. *Carpels* spreading, greenish yellow, spreading in fruit, which is rather cup-shaped.

Flowers July. Hardy.

HABITAT.—Bulgaria, Greece.

Described comparatively recently from Bulgarian specimens, and since found in Greece. Unknown in cultivation until a few years ago, when Sir JOSSLYN GORE-BOOTH, while collecting in Bulgaria, received the plant from STRIBRNY and brought it home, but in his garden it got labelled *S. Sartorianum*. About the same time the late Mr. C. F. BALL, of Glasnevin Garden, brought it back from the same country without a name.

Named after the Bulgarian botanist Stribrny.

119. *Sedum oaxacatum* Rose (fig. 146).

S. oaxacatum Rose in "Contrib. U.S. Nat. Herb.," 13, 299, 1911.

A stout little yellow-flowered, much-branched, creeping species, of distinct appearance among cultivated Sedums. Its obovate,



FIG. 145.—*S. Stribrnyi* Velenovsky.

thick, flat, sessile leaves $\frac{1}{4}$ inch long, borne on rough stems which lengthen indefinitely, and yellow flowers borne singly or 2 or 3 together at the tips of the branches, will distinguish it.

DESCRIPTION.—A small, glabrous, evergreen, creeping perennial. *Roots* fibrous, strong. *Stem* much branched, prostrate, with ascending tips, rooting,

but not very freely, purplish, rough with minute spreading scale-like projections, up to $\frac{1}{4}$ inch diameter at base, where it is strongly rooted; young branches $\frac{1}{16}$ inch diameter, branches widely divergent. *Leaves* alternate, longer than the internodes,

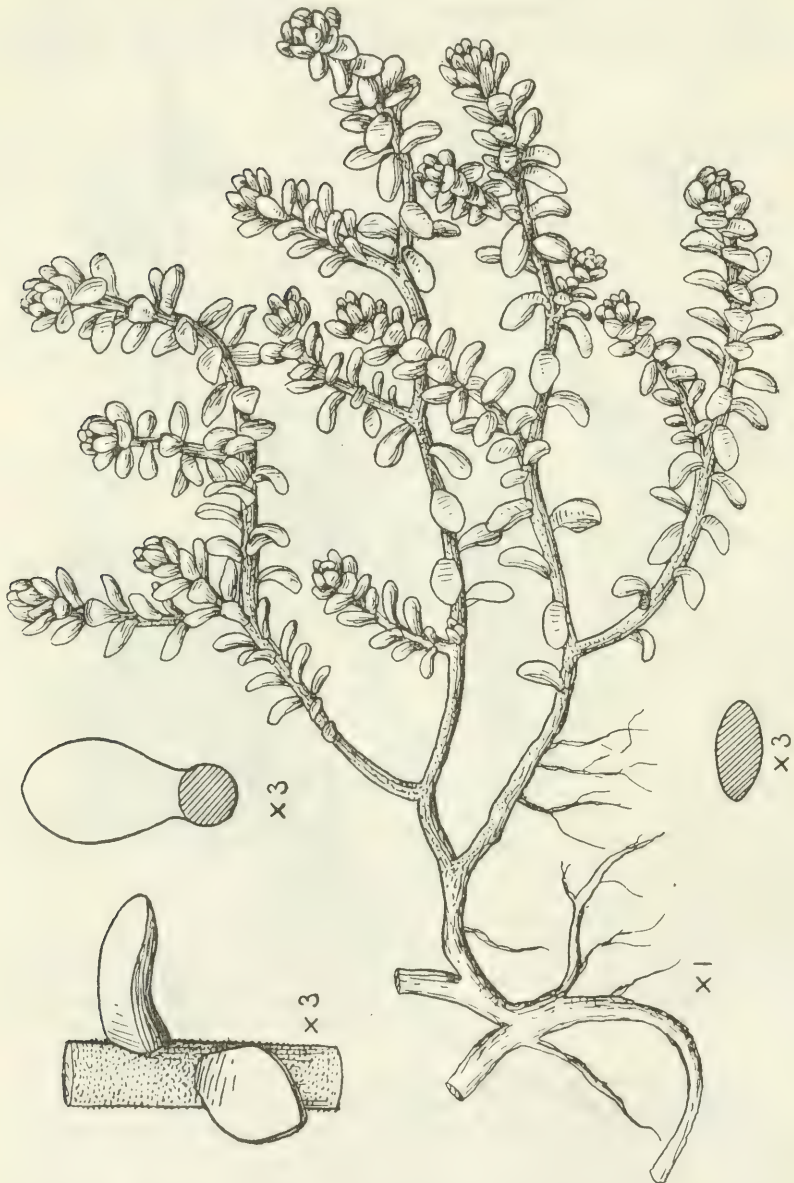


FIG. 146.—*S. oaxacanicum* Rose.

patent, obovate, sessile, flattish, face convex longitudinally and transversely, about $\frac{1}{4}$ inch long, over $\frac{1}{4}$ inch broad, over $\frac{1}{16}$ inch thick, glabrous, greyish green; young leaves with a whitish bloom, quite flat on face. *Inflorescence* terminal, of 1 to 4 flowers. "*Sepals* linear, 3 mm. long, distinct nearly to the base, petals yellow, distinct, longer than the sepals; stamens 10; carpels 5, widely spreading, with long styles."

Not hardy.

HABITAT.—Cerro San Filipe, Oaxaca, Mexico.

Material sent from Washington (under the name *S. diversifolium* Rose), has grown freely but has never flowered, and the description of the flower given above is quoted from ROSE (*loc. cit.*).

Derives its name from its habitat, Oaxaca.

120. *Sedum nudum* Aiton (fig. 147).

S. nudum Aiton, "Hort. Kew." ed. 1, 2, 112, 1789. Lowe, "Flor. Madeira," 1, 324.

ILLUSTRATION.—De Candolle, "Plantes Grasses," tab. 155.

The only one of several interesting endemic Madeiran species which is in cultivation. The present plant has green, egg-shaped leaves (pale green in the plants I have seen), resembling those of short-leaved forms of *S. album*, and few-flowered cymes of small greenish-yellow flowers. In nature it forms a low, tangled subshrub, but the cultivated plant has weak, sinuous stems which sprawl on the ground. It is closely allied to *S. lanceroottense* R. P. Murray, which is confined to Teneriffe; the differences between the two are discussed under the latter species.

DESCRIPTION.—A small, glabrous evergreen. *Stems* sinuous, in nature woody and forming a low subshrub, in cultivation weak, sprawling and occasionally rooting, bare below, with many ascending leafy shoots a few inches long. *Leaves* green or glaucous, sessile, obovate-oblong, very blunt, nearly terete, slightly flattened on face, alternate, set at right angles to the stem, up to $\frac{3}{8}$ inch long by $\frac{3}{16}$ broad and thick. *Inflorescence* a small few-flowered cyme, generally of 2 or 3 simple branches with a central flower, flowers about 4 to 10 in all, bracts resembling the leaves. *Buds* ovate, blunt, with greenish ribs. *Flowers* up to $\frac{3}{8}$ inch across, the lowest on a pedicel longer than the flower, the uppermost sessile. *Sepals* resembling the leaves, green, very fleshy, unequal, wide-spreading, obovate, very blunt, almost exactly egg-shaped, not spurred. *Petals* nearly twice the sepals, linear-lanceolate, rather bluntish, wide-spreading, greenish yellow, keeled. *Stamens* 10, spreading, shorter than the petals, filaments yellow, anthers brownish yellow. *Scales* orange, cuneate, notched, $\frac{1}{2}$ the carpels. *Carpels* divergent even in bud, wide-spreading later, greenish yellow, styles slender; stellate in fruit, when they are surrounded by the very swollen, unequal sepals.

Flowers May (Kew, gentle heat); June (cold frame). Not hardy.

HABITAT.—Madeira.

DE CANDOLLE states that it flowers in summer at Kew, in winter at the Jardin des Plantes. It is a shy bloomer in cultivation, and the flowers which I was fortunate enough to get at Kew were the first that had been noticed on the plant, which has been long in cultivation there. DE CANDOLLE states that MASSON, who discovered it, sent it to England in 1777. AITON ("Hortus Kewensis") states that it was received at Kew in that year. The plant, as cultivated there now, is quite possibly derived from the original stock. LOWE says the leaves are generally bright full green, occasionally pale or glaucous. The Kew plant is pale green, and produced as many as sixteen flowers on the inflorescence, the three branches of which were forked.

By the kindness of Dr. G. V. PEREZ, of Teneriffe, I received, in 1916, plants collected in Madeira the previous year by Señor MENEZES.

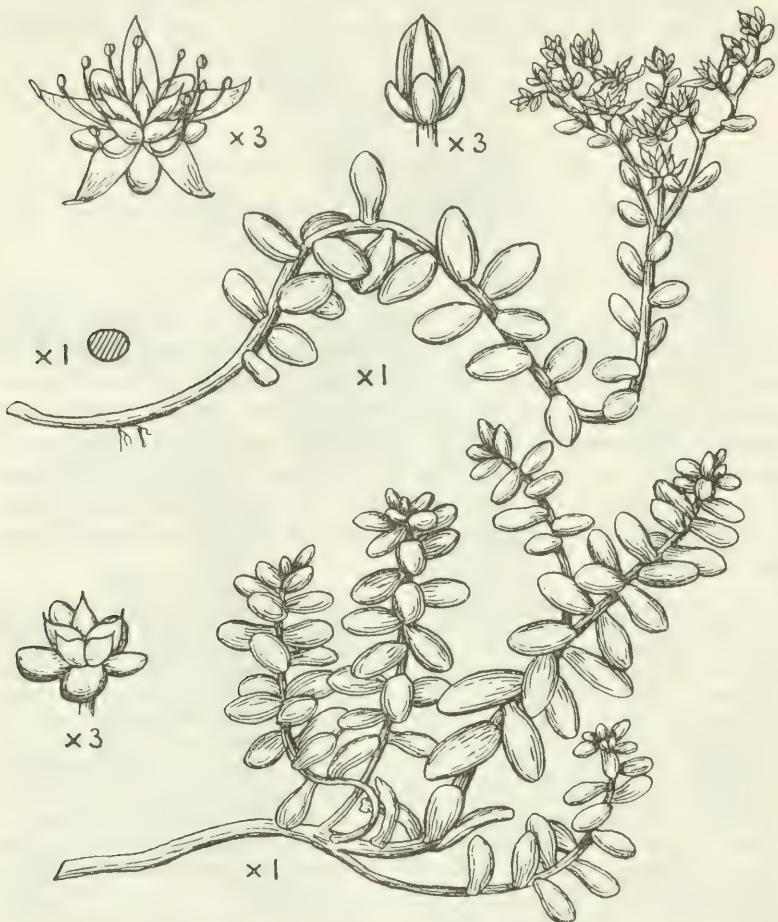


FIG. 147.—*S. nudum* Aiton.

They closely resemble the Kew plant, but the leaves were rather greener and more slender.

121. *Sedum lancerottense* R. P. Murray (fig. 148).

S. lancerottense R. P. Murray in *Journ. of Bot.*, 37, 201, 1899.

This plant (the only *Sedum* in the Canaries, excepting the widely-spread annual *S. rubens*) comes very close to *S. nudum* Aiton from Madeira, and should possibly be looked on as a geographical race of that species; but without a greater variety of material for study (I have grown one gathering of *lancerottense* and two of *nudum*) I prefer to leave it as the describer has placed it. The best characters for distinguishing the two lie in the spurred sepals, minute yellow

scales, and carpels *at first erect* of *lancerottense*; in *nudum* the sepals

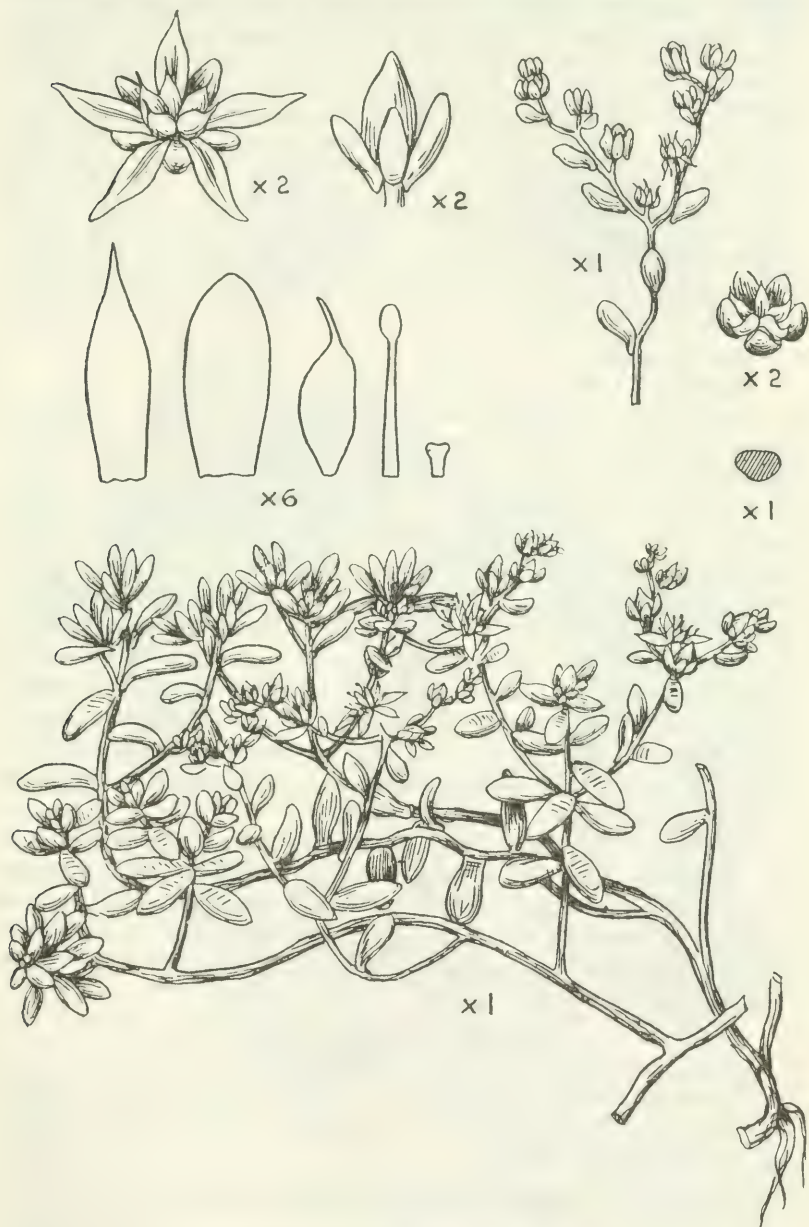


FIG. 148.—*S. lancerottense* R. P. Murray.

are not spurred, the scales are conspicuous, orange, $\frac{1}{3}$ as long as the carpels, and the carpels spreading, even in bud.

DESCRIPTION.—A small, pale green, glabrous, evergreen perennial. *Stems* sinuous, smooth, round, in cultivation weak, sprawling, and occasionally rooting,

brown and leafless below, with many ascending pale-green, wide-spreading, leafy shoots a few inches long. *Leaves* pale green, sessile, alternate, ovate-oblong or obovate-oblong, very blunt, nearly terete, slightly flattened on face, $\frac{1}{4}$ to $\frac{1}{2}$ inch long by $\frac{3}{16}$ inch in breadth and thickness, set at right angles to the stem, bluntly prolonged below the point of insertion. *Inflorescence* borne on shoots similar to the barren ones, terminal, a few-flowered cyme of 2 or 3 usually simple, spreading, zigzag branches with or without a central flower; flowers about 6 to 12 in all, each subtended by a bract resembling the leaves. *Flowers* yellow, $\frac{3}{8}$ inch in diameter, the lower with pedicels shorter than the flowers, the upper sessile. *Buds* ovate, bluntly pointed, strongly ribbed. *Sepals* resembling the leaves, green, very fleshy, unequal, oblong-ovate, very blunt, bluntly spurred. *Petals* twice the smaller sepals, longer than the longest sepal, free, lanceolate, acute, often with a short apiculus, patent above, yellow, keeled. *Stamens* 10, spreading, a little shorter than the petals, filaments greenish yellow, tapering, anthers oblong, yellow. *Scales* very minute, $\frac{1}{4}$ as long as the carpels, oblong-cuneate, yellow. *Carpels* equalling the stamens, at first erect, soon divergent, connate in lower half, greenish yellow, spreading in fruit, enclosed and equalled by the enlarging sepals.

Flowers summer. Not hardy.

HABITAT.—Lanzarote, Canary Islands.

The original description is inadequate: "Glabrum, tortuosum, foliis subovoideis, floribus breviter pedicellatis in cymam anfractam bipartitam terminalem scorpioideam bracteata dispositis; sepalis 5, obtusis; staminibus 10." It is stated to come near *S. nudum* but to "differ widely in habit," and attention is called to the "cymes remarkably wavy, almost recalling the arched internodes of *Ranunculus reptans* L." As regards habit, *S. nudum* in Madeira forms small tangled shrubby masses, but in cultivation (e.g., old plants at Kew) it is herbaceous and nearly prostrate, with ascending branches, and is indistinguishable in growth-form from *lancerottense*. In leaf *nudum* varies somewhat as regards shape and colour, and I find no character to separate the two plants. The best diagnostic features, as stated above lie in the sepals and scales. In my plants, too, the petals are more acute and of a clearer yellow colour.

Dr. G. V. PEREZ, of Teneriffe, kindly had this plant searched for in Mr. MURRAY'S station—"in rupibus abruptis el Risco dictis in Lanzarote"—and sent living specimens. The spot where these plants were collected is described as south-west of the rock called La Chachara, which stands 500 mètres north-west of the chapel of Las Nieves, Famara, Lanzarote.

122. *Sedum japonicum* Siebold (fig. 149).

S. japonicum Siebold ex Miquel in "Annales Mus. Bot. Lugduno-Batavae," 2, 156, 1855-6. Maximowicz in *Bull. Acad. S. Pétersbourg*, 29, 151, 1883.

ILLUSTRATIONS.—Makino, "Illustr. Flor. Japan," pl. 51. Regel "Gartenflora," 1866, tab. 513, figs. 3, 4.

This plant is in cultivation in Japan, at least in its var. *senanense* Makino, and deserves, therefore, a brief description in the present paper. It is a yellow-flowered species, with stems and leaves recalling those of *S. album*. These points, in conjunction with its long, unequal, blunt, narrow sepals and stellate fruit, will separate it from any other species found in cultivation. MASTERS (*loc. cit.* p. 463) includes it in his

account of the cultivated Stonecrops, but states that he had not seen it, and, as the name is sometimes applied in catalogues to other species, the plant cannot be accepted as formerly in English gardens. The

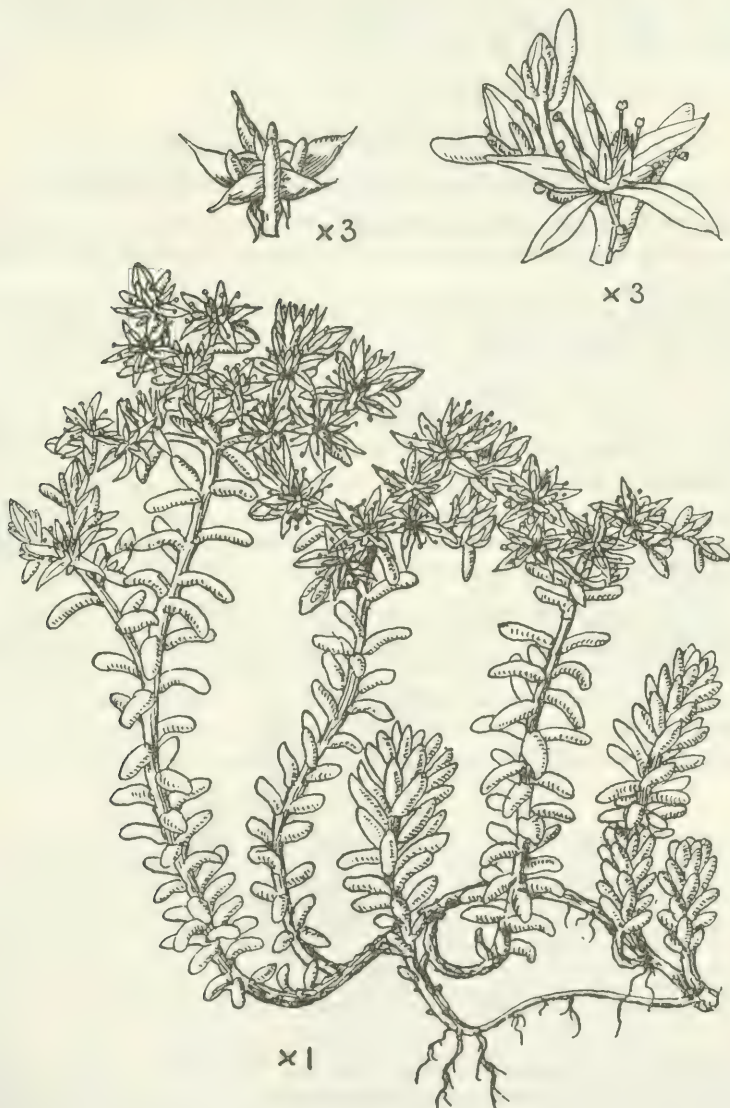


FIG. 149.—*S. japonicum* Siebold.

following description is condensed from MIQUEL and MAXIMOWICZ (*loc. cit.*) and the figure is taken from Makino (*loc. cit.*).

DESCRIPTION.—A glabrous, creeping, evergreen perennial. *Stems* rooting below, round, smooth, with ascending barren and flowering branches, 4 to 6 inches high, the former usually the taller. *Leaves* alternate, $\frac{1}{4}$ inch long, twice as long as the internodes, linear-oblong, obtuse, sessile, semiterete, shortly spurred. *In-*

flouescence a terminal, flattish cyme of 2 to 3 forked branches with flowers in the forks, $1\frac{1}{2}$ to 3 inches across, with bracts resembling the leaves, but smaller. *Flowers* yellow, $\frac{1}{2}$ inch across, on short thick pedicels. *Sepals* green, spreading, linear-oblong, obtuse, shortly spurred. *Petals* yellow, oblong-lanceolate, acuminate, 1-nerved, patent, $\frac{1}{2}$ longer than the sepals. *Stamens* slightly shorter than the petals, the epipetalous ones inserted $\frac{1}{2}$ way up from the base, and shorter than the epispalous ones, anthers yellow. *Carpels* spreading, connate at base, thrice as long as the slender styles, patent in fruit.

HABITAT.—E. China, Japan.

Var. *senanense* Makino in *Bot. Mag., Tokyo*, 19, 67, 1905.

SYNONYM.—*S. senanense* Makino in *Bot. Mag., Tokyo*, 16, 213, 1902.

Differs from the type in its much smaller leaves, more slender stems, being much suffused with red &c., and is a Japanese alpine form of the species.

The type is stated by MIQUEL to flower in July, while the variety flowers (in Tokyo) in May. Both appear to be frequent in Japan.

123. *Sedum alpestre* Villar (fig. 150).

S. alpestre Villar, "Prospectus Plant. Dauph.," 49, 1779; "Hist. Plant. Dauph.," 3, 684, 1789.

SYNONYM.—*S. repens* Schleicher.

ILLUSTRATIONS.—Reichenbach, "Flor. German.," 23, tab. 58. Hallier, "Flor. Deutschland," 26, pl. 2651. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 26.

A tiny, rather dull, plant, easily known by its bright-green flattened leaves, rather broader towards the tip, and few terminal inconspicuous



FIG. 150.—*S. alpestre* Villar.

greenish-yellow flowers with erect petals. Of no horticultural value, it is only occasionally found in cultivation. I saw it at Berlin (from the Riesengebirge), and Bremen (from the Carpathians), and Mr. E. BOWLES sent it to me from the Alps and Apennines. Named *alpestre* from its mountain habitat.

DESCRIPTION.—Minute evergreen perennial, glabrous, bright green. *Stem* creeping, with ascending barren and flowering shoots. *Leaves* oblong-obovate, flattened, very fleshy, blunt, tapered and slightly spurred below, larger and more crowded at the ends of the shoots; barren shoots short, with leaves forming rosettes at their ends; flowering shoots taller (2 to 3 inches). *Flowers* $\frac{3}{8}$ inch long, several together at the summit of the stems. *Sepals* resembling the leaves,

green, fleshy, nearly erect, broadest near the very blunt tip, tube very short. *Petals* greenish yellow, $1\frac{1}{2}$ times the sepals, ovate, blunt, erect. *Stamens* equalling the sepals, filaments green, anthers yellow. *Carpels* green, at first erect, spreading widely in fruit.

Flowers June. Hardy.

HABITAT.—Mountains of Central and Southern Europe and Asia Minor.

124. *Sedum Douglasii* Hooker (fig. 151).

S. Douglasii Hooker, "Flora Bor. Amer." 1, 228, 1832.

SYNONYM.—*S. himalense* or *himalaicum* of many gardens (not *S. himalense* of Don, for which see p. 51).

Sedum Douglasii recalls in its narrow, very fleshy leaves and golden-yellow flowers the difficult *rupestre* group which, though mainly European, has a representative in North America (to which region the present species belongs) in *S. stenopetalum*. But in its stellate fruit it differs so widely from the members of that group that it can hardly be included with them. As it is often confused with one or other of the *rupestre* section, some simple diagnostic characters may be mentioned. From *S. stenopetalum* the flattened leaves, the shaggy clothing of withered leaves on the middle portion of the shoots, and the short proliferous branches on the flowering stems distinguish the present species. *S. reflexum* and *S. rupestre* are separated by their creeping character, linear leaves, and inflorescence drooping and convex when young. *S. allissimum* has taller flowering stems, whitish flowers, and, like *reflexum*, has no persistent withered leaves nor proliferous buds on the flowering-shoots. *S. anopetalum* is separated by its creeping habit, long sepals, and absence of withered leaves and proliferous shoots.

DESCRIPTION.—A small, stout, erect, glabrous, evergreen perennial, green, often tinged red. *Stems* bare below, clothed in middle portion with withered leaves, leafy near top; barren shoots 1 to 3 inches high, erect, slightly branched; flowering stems stout, 3 to 12 inches high, unbranched, leaves more distant, the upper ones with short axillary shoots which persist after the fall of the leaf and ultimately drop off and take root. *Leaves* alternate, crowded, linear to linear-lanceolate, subterete, flattened especially on the upper side, rather acute, $\frac{1}{2}$ – $\frac{3}{4}$ inch long by $\frac{1}{12}$ broad, with a short adpressed membranous spur; those of the flowering stem distant, linear-lanceolate, blunt. *Inflorescence* a compact, leafy cyme with about 3 stiff, stout, straight, few-flowered branches and a flower in the fork. *Buds* acute, ribbed, ovate. *Flowers* sessile, bright yellow, $\frac{1}{4}$ to $\frac{5}{8}$ inch across. *Sepals* yellow, ovate, acute, not fleshy. *Petals* 4 times the sepals, ovate-lanceolate, acute, with an apiculus behind the tip, orange-yellow, wide-spreading, keeled. *Stamens* yellow, spreading, slightly shorter than the petals. *Scales* quadrate, short, yellow. *Carpels* erect, later spreading, greenish yellow, shorter than the stamens; stellate-patent in fruit.

Flowers June–July. Hardy.

HABITAT.—Western N. America from British Columbia to California and Montana.

Not infrequent in English gardens, generally under the quite erroneous name of *himalense*.

The specific name commemorates David Douglas (1798-1834),

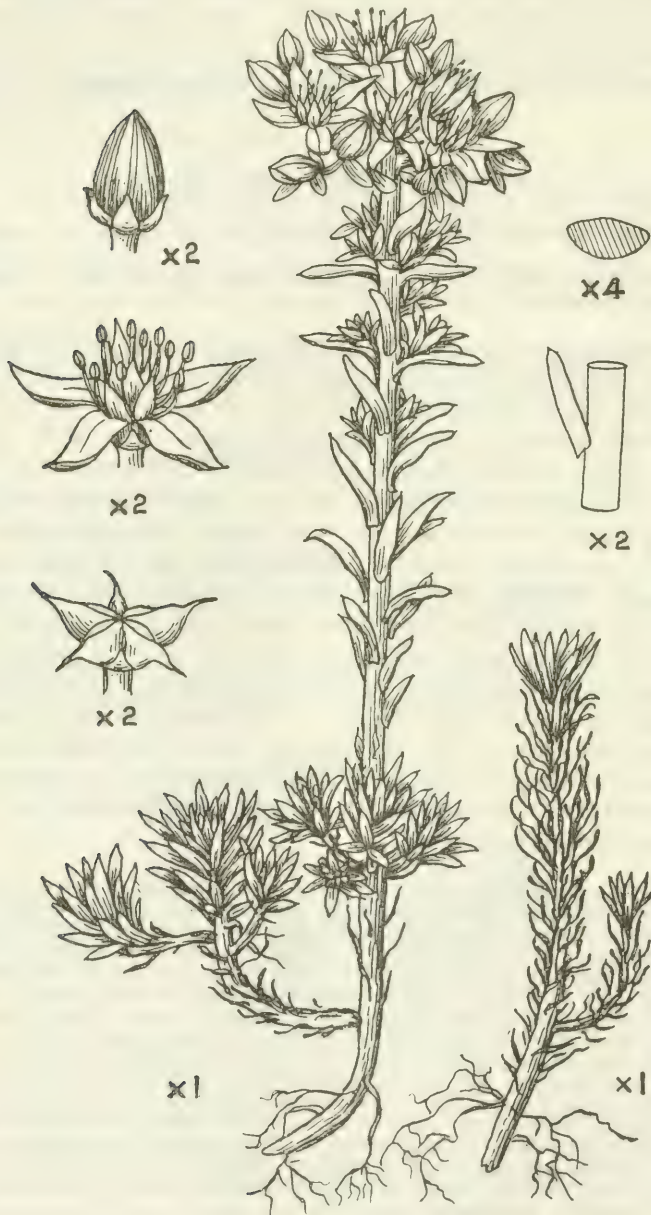


FIG. 151.—*S. Douglasii* Hooker.

who collected in North America under the auspices of the Royal Horticultural Society, and introduced many American plants into England.

125. *Sedum multicaule* Wallich (fig. 152).

S. multicaule Wallich, "Catalogue" No. 7232. Hooker fil. and Thoms. in *Journ. Linn. Soc., Bot.* **2**, 102. Clarke in Hooker, "Flor. Brit. India," **2**, 422. Hamet in *Bulletin Soc. Bot. France*, **56**, 47.

A small, unattractive species, with leaves resembling those of the *reflexum* group, and small dull yellow flowers. A common plant in the Himalayan region &c., not worth cultivation. Among the Sedums in cultivation it comes nearest to *S. trullipetalum* H. f. and T. and *S. Celiae* Hamet, but these have leaves only half as large ($\frac{1}{2}$ inch long, not $\frac{1}{2}$ inch). *S. trullipetalum* has, moreover, whitish-yellow clawed petals, and *S. Celiae* has not the stellate fruit characteristic of *multicaule*.

DESCRIPTION.—A small, glabrous perennial (in cultivation, often annual). *Stems* usually branched below, branches ascending, 3 to 4 inches high, smooth, round, leafy. *Leaves* alternate, sessile, shortly and bluntly spurred, apiculate, linear, very fleshy, flat on face, rounded on back, about $\frac{1}{2}$ inch long by $\frac{1}{8}$ inch broad. *Inflorescence* leafy, about 2 inches across, of several wide-spreading scorpioid branches, with a flower in the centre. *Buds* ovate, acute. *Flowers* sessile, $\frac{3}{8}$ inch across. *Sepals* resembling the leaves, very unequal, linear, apiculate, fleshy, green, the shortest equalling the petals, separate nearly to the base. *Petals* yellow, ovate-lanceolate, apiculate, inconspicuous. *Stamens* slightly shorter than the petals, filaments green, anthers yellow. *Scales* whitish, emarginate. *Carpels* green, at first erect, later wide-spreading; fruit stellate, often crimson.

Flowers July–August. Hardy.

HABITAT.—Himalayas, China, Japan.

Usually much branched below. Young plants were received from Edinburgh (grown from Himalayan seed), and seed received from Darjeeling Botanic Garden. There is an excellent unpublished coloured figure of the plant in the Kew collection of drawings, made by Mrs. GEORGE GOVAN, circa 1823–32.

Described by HAMET, who has made a special study of the plant (*loc. cit.*), as perennial, but during a period of several years the plant in my garden, even when protected in winter, behaved as an annual, making no barren shoots, dying in autumn, and sowing itself freely.

The name *multicaule*—many-stemmed—refers to its branching habit.

126. *Sedum trullipetalum* H. f. and T.

S. trullipetalum Hooker fil. and Thoms., in *Journ. Linn. Soc., Bot.*, **2**, 102, 1858. C. B. Clarke in Hooker, "Flor. Brit. India," **2**, 421. Hamet in *Bulletin Soc. Bot. France*, **56**, 47.

A small moss-like plant related to *S. multicaule* Wallich, *S. Celiae* Hamet (both of which are described and figured in the present paper) and others of the Japonica group. It differs from *multicaule* in its leaves half as large with a three-lobed (not entire) spur, petals clawed, obtuse, mucronate, nearly $\frac{5}{16}$ inch long (instead of not clawed,

acuminate, $\frac{3}{16}$ inch long), &c., from *Celiae* in its larger whitish-yellow

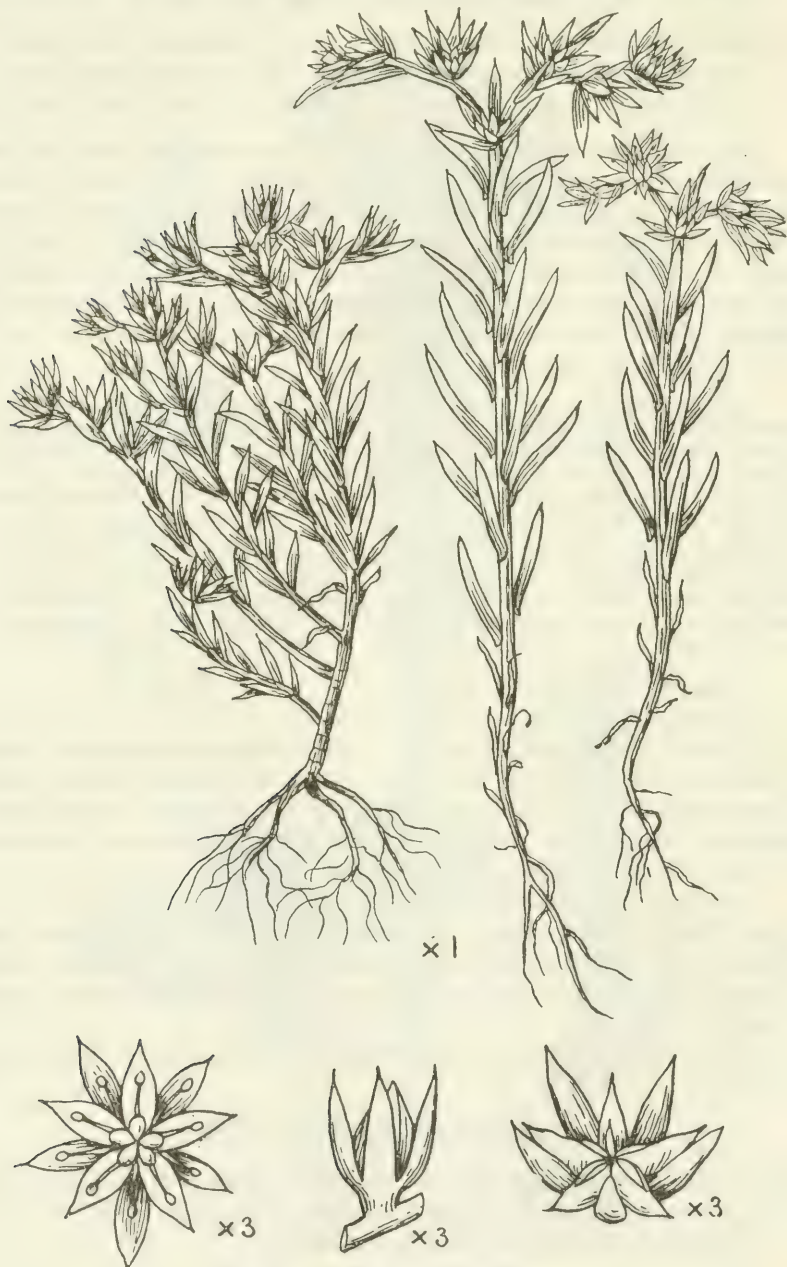


FIG. 152.—*S. multicaule* Wallich.

(not greenish - yellow) flowers with clawed (not ovate-lanceolate) petals, &c.

DESCRIPTION.—A very small, moss-like, glabrous perennial. *Roots* fibrous. *Stems* procumbent or erect, much branched, very leafy, the barren shoots short,

the flowering ones branched below, $2\frac{1}{2}$ –3 inches long. *Leaves* alternate, sessile, imbricate, linear, entire, acuminate, $\frac{1}{2}$ to $\frac{1}{4}$ inch long, broadening at the base into a 3-lobed spur. *Inflorescence* corymbose, dense, up to 1 inch across, bracts resembling the leaves. *Flowers* whitish yellow, $\frac{1}{2}$ inch across, nearly sessile. *Sepals* broadly lanceolate, acute. *Petals* slightly exceeding the sepals, $\frac{5}{16}$ inch long, clawed; claw linear, a little shorter than the ovate, acute, mucronate, keeled lamina. *Stamens* 10, about $\frac{3}{4}$ the petals, the epipetalous ones inserted a little less than half way up the petal. *Scales* a little longer than broad, retuse. *Carpels* a little shorter than the stamens, connate in the lower half, styles slender.

Flowers September. Hardy.

HABITAT.—Himalayan region; Yunnan.

A little, mossy, pale-flowered Sedum of no horticultural interest. My plants, which came from the Lloyd Botanic Garden, Darjeeling, died off badly in autumn just before flowering, and proved difficult to keep. The description of the floral parts given above is drawn largely from HAMET'S excellent account.

Hooker and Thomson call the species annual, and HAMET perennial. My plants persisted for three seasons, but, though barren stems were present, almost the whole perished in early autumn, only a few small buds—whether terminal or axillary I cannot say—remaining till spring, when they rooted and grew.

127. *Sedum Celiae* Hamet (fig. 153).

S. Celiae Hamet in *Bulletin de Géographie Botanique*, 23, 67, 1913.

A minute, green, spiny-leaved species allied to the well-known Himalayan (and Chinese) *S. multicaule* Wall., and forming one of a quite large group of small linear-leaved species of the Japonica section now known to occur in China. None of its allies except *multicaule* and *trullipetalum* are in cultivation. The first differs from it in its stellate fruit, much larger leaves, &c., the second in its dense inflorescence, whitish-yellow clawed petals, &c.

DESCRIPTION.—Perennial, minute, glabrous, bright green, creeping, about 2 inches high. *Stem* creeping, slender, smooth, round, reddish, barren and flowering ones similar, each with many short ascending branches, their lower part loosely clothed with old leaves. *Leaves* alternate, crowded, sessile, linear or slightly tapering, entire, acuminate, spine-pointed, thick (fig. 153, *b*), $\frac{1}{4}$ inch long by $\frac{1}{32}$ inch wide by $\frac{1}{16}$ inch thick, at base colourless with a median purple stripe or blotch, spur short, usually rounded, sometimes 3-lobed (fig. 153, *a*, *a*), occasionally deeply 3-lobed. *Cymes* lax, of 2 or 3 short, wide-spreading branches round a central flower, about 1 inch across, flat, leafy, with bracts forming a rough involucre round the base of the calyx of each flower. *Buds* ovate, acute, whitish, with green ribs in the upper part, the corolla exceeded by the long, green, erect sepals. *Flowers* sessile, rather greenish yellow, not opening widely, about $\frac{1}{2}$ inch across. *Sepals* lanceolate, acute, leaf-like, scarcely spurred, semi-erect, slightly exceeding the petals (or slightly shorter than them—R. Hamet). *Petals* yellow, ovate-lanceolate, acute, semi-erect, $\frac{3}{8}$ inch long, with a dorsal rib ending in a short apiculus behind and slightly exceeding the tip (fig. 153, *c*). *Stamens* a little shorter than the petals; filaments tapering, yellow, anthers reddish purple, the epipetalous ones inserted about $\frac{1}{4}$ from the base. *Scales* yellow, the lower half broadly linear, twice as long as broad, the upper half roundish, emarginate, broader than long. *Carpels* slender, erect, free save at the very base, slightly shorter than the stamens, pale green, tapering into slender erect styles. Seeds attached to a small, semiglobular placenta placed near the base of the inner face of the carpel (fig. 153, *d*). *Carpels* erect in fruit, slightly exceeded by the erect sepals.

Flowers August–September (gentle heat). Not hardy.
 HABITAT.—Yunnan.

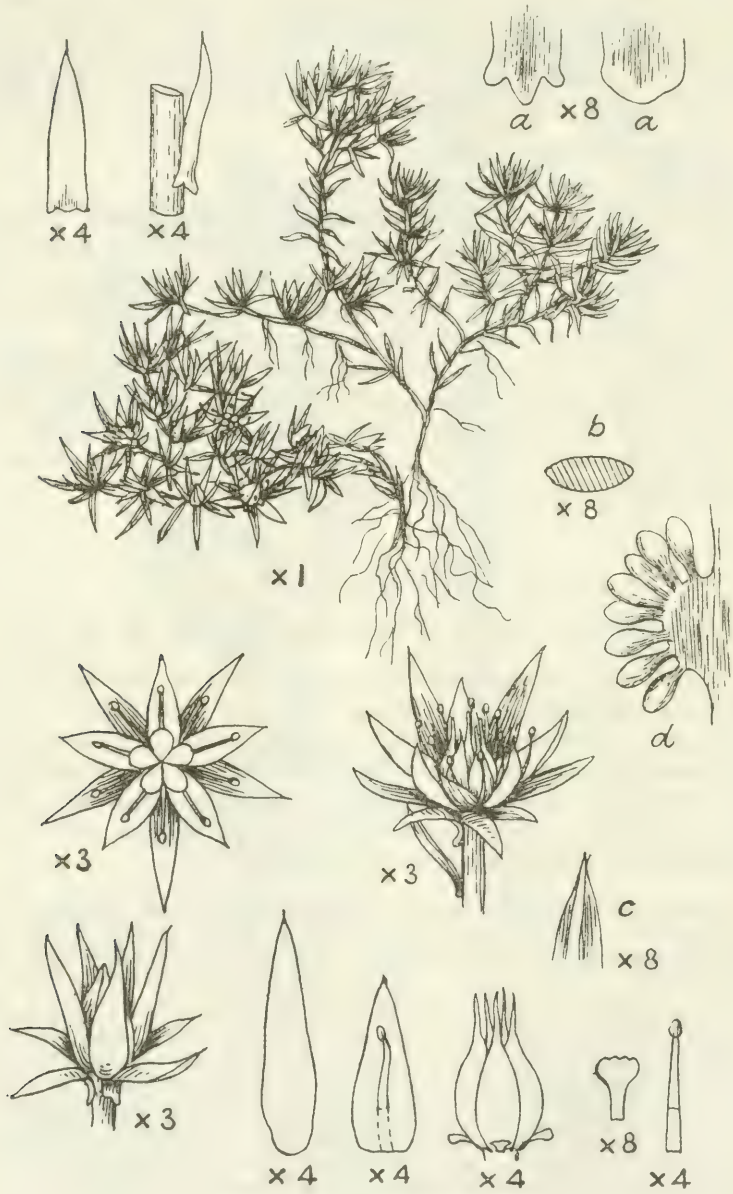


FIG. 153.—*S. Celiae* Hamet.

A single plant appeared at Glasnevin among other seedlings grown from seed collected by Rev. E. E. MAIRE in 1915 at and about Tong-tchouan, altitude 2,900 mètres. The species was described by R. HAMET from material (in the Paris Herbarium) obtained by the same collector in the same locality.

The Glasnevin plant, from which my description was drawn up, agrees satisfactorily with HAMET'S account of the species. The following differences may be noted. The spur is, according to HAMET, entire and blunt; while usually so in my plant, it is sometimes slightly, or even markedly, 3-lobed; and the flowers in my plant are sessile, not shortly pedicellate. With regard to the former character, it is not constant in several Chinese species; and the presence or absence of pedicels is to some extent dependent on the conditions of shade or exposure in which a plant grows; sessile flowers are often *potentially* pedicellate. The peculiar form of the placenta in *S. Celiae*—a semiorbicular mass placed near the base of the inner face of the carpel, instead of a ribbon running the length of the inner face, as is usual in the genus—is found in several other small Asiatic Sedums—*S. Przewalskii* Maximowicz, *S. Fedtschenkoï* Hamet, and *S. Seelemanni* Hamet.

Named after Mdlle. Alice Leblanc (by inversion of the Christian name).

128. *Sedum multiceps* Coss. and Dur. (fig. 154).

S. multiceps Cosson and Durieu in *Bulletin Soc. Bot. France*, 9, 171, 1862. Masters in *Gard. Chron.* 1878, ii. 717.

ILLUSTRATIONS.—COSSON, "Illustr. Flor. Atlant." 2, tab. 131. *Gard. Chron.*, 1876, ii. fig. 45, repeated 1878, ii. fig. 120.

Unmistakable among the linear-leaved hardy Sedums by reason of its shrubby growth. In winter the leaves fade, all except the uppermost, and form a shaggy covering on the stem. Flowers rather sparingly.

DESCRIPTION.—A small subdeciduous, much branched, bushy plant, 3 to 4 inches high. *Stems* grey, smooth and rooting below, shaggy with withered leaves in the middle portion, densely leafy above, branches ascending or wide-spreading. *Leaves* green, sessile, alternate, very crowded, linear-oblong, blunt, flat on face, finely papillose on the edges and on the rounded back, very fleshy, $\frac{1}{2}$ inch long. *Inflorescence* a small, few-flowered, 3-parted cyme, borne on an erect flower-shoot 1-2 inches long with small, comparatively distant, leaves. *Buds* ovate, acute, ribbed. *Flowers* nearly $\frac{1}{2}$ inch across, sessile, usually 5-merous. *Sepals* green, fleshy, linear, blunt. *Petals* yellow, oblong-lanceolate, apiculate, wide-spreading, twice the sepals. *Stamens* yellow, spreading, shorter than the petals. *Scales* small, yellowish. *Carpels* greenish-yellow, equalling the stamens, at first erect, wide-spreading in fruit.

Flowers July. Hardy.

HABITAT.—Algeria.

Not infrequent in cultivation, and usually correctly named.

The name *multiceps*—many-headed—refers to its branching habit.

129. *Sedum sexangulare* Linn. (fig. 155).

S. sexangulare Linn., "Species Plantarum," 432, 1753. Masters, *Gard. Chron.* 1878, ii. 685.

SYNONYMS.—*S. mite* Gilibert, "Flora Lithuan.," 5, 192. *S. bolontense* Loisel. in Desv. *Journ. Bot.* 2, 327, 1809; "Not.," 17. *S. Hillebrandii* Fenzl.

ILLUSTRATIONS.—De Candolle, "Plantes Grasses," tab. 118. Curtis, "Flora London." 3, pl. 113. Sowerby, "English Bot." ed. 3, pl. 533. Reichenbach, "Flora German." 23, tab. 57. Zenker, "Flor. Thuringen," 5, tab. 579.

A European species long cultivated in gardens, and sometimes run wild in areas where it is not indigenous. It makes a fine mass



FIG. 154.—*S. multiceps* Coss. and Dur.

of golden-yellow when in bloom, resembling *acre* at a distance, but the flowers are smaller and the leaves very different, being linear and arranged in six spiral rows, not triangular with a broad base. In foliage it somewhat resembles *S. Lydium* and *S. gracile*, but both of these have white flowers. Occasionally the characteristic spiral arrangement of the leaves is absent. Usually correctly named in gardens.

DESCRIPTION.—A small, evergreen, glabrous perennial, forming a fresh green mat. *Stems* creeping, much branched, barren shoots many, ascending, 1 to 2 inches long, flowering shoots a little taller. *Leaves* on barren shoots crowded, linear, blunt, terete, spreading, spurred, $\frac{1}{8}$ to $\frac{1}{4}$ inch long, usually in 6 spiral rows; those of flowering shoots similar, less crowded. *Inflorescence* a flat-topped cyme 1 to 2 inches across, of 3 branches with a flower in the fork. *Buds* ovate, acute. *Flowers* $\frac{3}{8}$ inch across. *Sepals* green, lanceolate, blunt, lobes longer than the tube, persistent in fruit. *Petals* yellow, linear-lanceolate, acute, wide-spreading, twice the sepals. *Stamens* yellow, spreading, shorter than the petals. *Scales*



FIG. 155.—*S. sexangulare* Linn.

small, yellow. *Carpels* yellow, erect, tapering into the styles, equalling the stamens, spreading in fruit.

Flowers July. Hardy.

HABITAT.—Widespread in Europe. Naturalized in some places in England.

The specific name refers to the arrangement of the leaves in six rows.

130. *Sedum rupestre* Linn. (figs. 156, 164, a).

S. rupestre Linn., "Species Plantarum," 431, 1753. Baker in *Gard. Chron.* 1877, ii. 307. Masters, *ibid.*, 1878, ii. 658.

SYNONYMS.—*S. elegans*, Lejeune, "Flore de Spa," 1, 205, 1811. *S. pruinatum* of many British and Continental authors (not of Brotero, for which see p. 277).



FIG. 156.—*S. rupestre* Linn.

ILLUSTRATIONS.—Sowerby, "English Bot." ed. 3, pl. 536. Reichenbach, "Flor. German.," 23, tab. 61.

This common plant, though variable, can without difficulty be separated from its allies of the *rupestre* section. The inflorescence drooping in bud separates it from all but *reflexum*; the leaves flat on face divide it from *reflexum* and *anopetalum*; the subglobose young inflorescence is shared only by *reflexum* and *altissimum* among its allies. In its stems, shaggy below with withered leaves, it is matched only by *Douglasii*.

DESCRIPTION.—An evergreen creeping perennial, forming a mat, usually glaucous. *Stems* creeping, much branched, branches ascending, shaggy with withered leaves below, densely leafy above; barren branches short with ascending tips, flowering branches with less crowded leaves, 6 to 12 inches high, drooping in bud. *Leaves* of barren shoots linear to linear-oblancoelate, $\frac{1}{2}$ to $\frac{3}{8}$ inch long by $\frac{1}{16}$ inch broad, sessile, apiculate, fleshy, flattish on face, rounded on back, very crowded towards the tip of the shoots, where they form dense rosettes; those of the flowering shoots lanceolate, ascending, more distinctly spurred. *Inflorescence* an umbellate cyme of about 5 forked branches with a few bracts at the primary branching; subglobose in bud owing to the reflexure of the branches, flattish in full flower, hollow-topped in fruit owing to the straightening out and growth of the branches. *Buds* oval, with straight sides, strongly ribbed. *Flowers* nearly $\frac{1}{2}$ inch across, mostly 5- (often 6- to 8-) parted, pedicels slender, shorter than the flowers. *Sepals* triangular, longer than broad, nearly free; only slightly fleshy, green, persistent in fruit. *Petals* oblong-linear, blunt, concave, golden yellow, wide-spreading, more than twice the sepals. *Stamens* yellow, spreading, equalling the petals. *Scales* small, yellow, quadrate. *Carpels* yellow, erect in flower and fruit.

Flowers July. Hardy.

HABITAT.—West Europe, from Spain to Germany. Naturalized in some parts of the British Isles, where it is an old and familiar garden plant; possibly native in the west.

Though not so variable as its near ally *S. reflexum*, it shows a considerable range as regards size and colour. The plant is always recognizable by its crowded linear leaves *quite flat* on the upper surface. In size it ranges from robust to slender and about half the size (var. *minus* auct.), and in colour from purple-glaucous tipped with red to uniform green. The var. *Forsterianum* (*S. Forsterianum* Smith, "English Bot." 26, pl. 1802) is a slender green form with inflorescence rather round-topped instead of flat. In a large series of cultivated forms which I got together in my garden, the green forms were all of small size, and so far agreed with *Forsterianum*, but the inflorescence character was not constant. The smallest forms which I met with were glaucous like the type.

Rouy and Camus ("Flore de France," 7, 111) admit several varieties (*Lejeunii*, *aureum*, *Trevirensis*), in which the principal character is the shape of the barren shoot; but this depends largely on questions of soil, situation, and condition, as the leaves tend to extend widely in shade or moisture, and to close up into a dense, egg-shaped mass in exposure or drought; so the shape of the shoots is an awkward character to use for diagnostic purposes. For ordinary purposes var. *Forsterianum* (the small slender green form) and var. *minus* (glaucous like the type but much smaller in all its parts) alone seems worth distinguishing.

At *a*, in fig. 156, is shown a barren shoot during drought, with the leaves incurved. At *b* is shown the same shoot after a subsequent short spell of wet weather.

The specific name refers to its preference for a rocky habitat.

131. *Sedum reflexum* Linn. (figs. 157, 164, *b*).

S. reflexum Linn., "Species Plantarum," ed. 2, 618, 1762, in part.
Baker in *Gard. Chron.* 1877, ii. 461. Masters, *ibid.* 1878, ii. 658.

SYNONYM.—*S. rupestre*, Linn., *loc. cit.*, in part.

ILLUSTRATIONS.—De Candolle, "Plantes Grasses," tab. 116. Sowerby, "English Bot." ed. 3, pl. 534. Reichenbach, "Flor. German.," 23, tab. 60. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 29.

This variable plant may be distinguished from the other members of the *rupestre* group by its possessing the following combination of characters: stem creeping (which excludes *Douglasii* and most forms of *stenopetalum*), leaves terete (excludes *stenopetalum*, *rupestre*, *altissimum*, *pruinatum*), young inflorescence subglobose (excludes all but *rupestre* and *altissimum*) and drooping (excludes all but *rupestre*), fruiting inflorescence cup-shaped (excludes all but *rupestre* and *altissimum*), flowers golden yellow (excludes *altissimum*, *pruinatum*, and most forms of *anopetalum*). It will be noted that in the characters chosen *rupestre* shows the most frequent agreement with *reflexum*; but the leaves of *rupestre*, quite flat above, will always distinguish it from the former.

DESCRIPTION.—A creeping evergreen perennial, forming a loose mat. *Stems* rooting below, ascending; barren shoots many, 1–4 inches long, round, smooth, leafy; flowering shoots 6–12 inches, unbranched, leaves more distant. *Leaves* crowded, green or glaucous, $\frac{1}{2}$ inch long, sessile, shortly spurred, linear, acute, nearly terete, ascending or recurved. *Inflorescence* a dense convex or flattish cyme, 1–1 $\frac{1}{2}$ inch across, of 3 to 5 forked branches with flowers in the forks; drooping and subglobose in bud, hollow-topped in fruit. *Buds* ovoid, blunt, ribbed. *Flowers* 5- to 7-parted, shortly stalked, $\frac{5}{8}$ inch across. *Calyx* cup-shaped, green, fleshy, persistent in fruit, lobes ovate-lanceolate, acute, tube very short. *Petals* bright yellow, linear-lanceolate, acute, keeled on back, grooved on face, wide-spreading, twice the sepals. *Stamens* yellow, spreading, shorter than the petals. *Scales* yellow, quadrate, notched. *Carpels* yellow, erect, equalling the stamens, tapering into the long slender styles.

Flowers July. Hardy.

HABITAT.—W., N., and Central Europe. Naturalized on old walls and occasionally on rocks in many parts of the British Isles.

One of the commonest of European Sedums both in the native state and in gardens, whence it often migrates to rocks and walls in districts where it is not indigenous. Its wide distribution in gardens and power of spreading, combined with a considerable variation in form and a similarity to several other species, have led to much confusion, and it is to be found grown under many erroneous names. As an instance of the confusion which exists among the Sedums as found in gardens, some of the names under which *S. reflexum* arrived from reputable sources may be quoted: *Alberti*, *alpestre*, *elongatum*,



FIG. 157.—*S. reflexum* Linn.

grandiflorum, *hispanicum*, *Hildebrandtii*, *ibericum*, *Jacquini*, *lividum*, *montanum*, *portulacoides*, *pruinatum*, *stoloniferum*, *Verloti*.

I have cultivated about a hundred plants of this species, from gardens in most parts of Europe, including many selected forms from British gardens. This large series showed a considerable and continuous range of variation as regards size (from very robust forms down to others indistinguishable without flower from *S. anopetalum*) and colour (from glaucous to quite green). The species varies also as regards the character from which it takes its name—the reflexed leaves on the flowering stems, these being often straight. The colour of the flowers in the cultivated forms appears to be always normal—a fine yellow.

Var. *albescens* Haworth, "Revis. Succ." 28, which figures in British floras, is described as having the leaves glaucous, those of the flowering shoots not reflexed, plant smaller and leaves more slender, and flowers pale yellow. In the last character alone does it seem to differ from all of my garden forms, many of which showed some of these characters, and several all of them except the last.

Many other varieties are described. BAKER, in his account of the Sedums of the *rupestre* group (*Gard. Chron.* 1877, ii. 461), includes vars. *collinum*, *virens*, *albescens*, *minus*, *recurvatum*, *septangulare*, *virescens*, and *cristatum*, and ROUY and CAMUS ("Flore de France," 7, 109) give *adpressum*, *collinum*, *recurvatum*, *graniticum*, *reflexum* Briq., *arrigens*, *Smithianum*, *albescens*, and *caesium*; but a series such as that in my garden disillusions one as to the value of these, except so far as, in the native state, they may represent local races, and be of interest geographically. For garden purposes the only one requiring mention is

Monstr. *cristatum* of gardens (fig. 158),

a fasciate form long in cultivation, and one of the most curious of Sedums, the flattened stems often being 2 inches broad. In this condition it never flowers, but normal shoots are frequently produced, and these flower freely if allowed to develop.

132. *Sedum altissimum* Poiret (figs. 159, 164, d).

S. altissimum Poiret, "Encycl.," 4, 634, 1796.

SYNONYMS.—*S. ochroleucum* Villar (not of Chaix, which = *anopetalum*), Baker in *Gard. Chron.* 1877, ii. 307. *S. acutifolium* of gardens (not of Ledebour, which is a white-flowered Caucasian species allied to *album*, and not in cultivation). *S. rufescens* Tenore.

ILLUSTRATIONS.—Jacquin, "Hort. Vindob.," 1, tab. 81 (as *Sempervivum sedi-forme*). De Candolle, "Plantes Grasses," tab. 40. Tenore, "Flor. Napol.," tab. 41. Reichenbach, "Icon. Crit.," 3, 285. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 32.

S. altissimum most resembles, on the whole, *S. reflexum*, from which it may be distinguished by its leaves distinctly flattened (not terete) and lanceolate (not linear) in outline, by its taller flowering shoots

which are erect (not drooping) in bud, and by its whitish (not bright yellow) flowers. The leaves are more conspicuously acute than in any other species of the section, and end in a little, thorn-like point. In the peculiar greenish-white tint of the flowers it matches *S. anopetalum*, as also in its acute leaves and inflorescence erect in bud; but the latter has leaves and flower stems of only half the length, the leaves are linear and terete, and the inflorescence flat, not sub-globular, in bud.

The plant varies much in size and colour, from robust forms with flower stems two feet high bearing leaves up to $1\frac{1}{2}$ inch long, to



FIG. 158.—*Sedum reflexum* var. *cristatum*.

quite dwarf forms rising only to 6 inches; and as regards colour from pale green or dark green to fine purple-glaucous. The large forms include var. *latifolium* of Rouy and Camus, "Flore de France," 7, 108, which is also the *S. nicaense* of Allioni, "Flor. Pedemont." ii. 122, iii. tab. 90, fig. 1; *S. coerulescens* Haworth in *Phil. Mag.*, 66, 172, 1825, is a small purple-glaucous form.

DESCRIPTION.—Evergreen perennial, glabrous, usually glaucous. *Roots* fibrous. *Stems* decumbent, woody and rooting below, with ascending branches. *Barren shoots* many, very leafy, 3–6 inches high. *Flowering stems* $\frac{1}{2}$ to 2 feet high, unbranched, very erect. *Leaves* of the barren stems alternate, $\frac{1}{2}$ to $\frac{3}{4}$ inch long by $\frac{2}{10}$ to $\frac{3}{10}$ inch wide, flattened, especially on face, linear-lanceolate, acute, spine-pointed, sessile, slightly spurred: those of the flower-stems similar but larger, up to $1\frac{1}{2}$ by $\frac{1}{2}$ inch, more distant, smaller upward. *Inflorescence* a compact, leafless, subglobose cyme of several forked branches with a flower in the forks, erect and globose in bud, very hollow and obconical in fruit. *Buds* oblong, very blunt, strongly ribbed, ribs greenish. *Flowers* $\frac{1}{2}$ inch across, sessile or nearly so, mostly 5-merous. *Sepals* green, fleshy, ovate, acute, tube short. *Petals* $2\frac{1}{2}$ times the sepals, boat-shaped, keeled, oblong-lanceolate, broadest near the

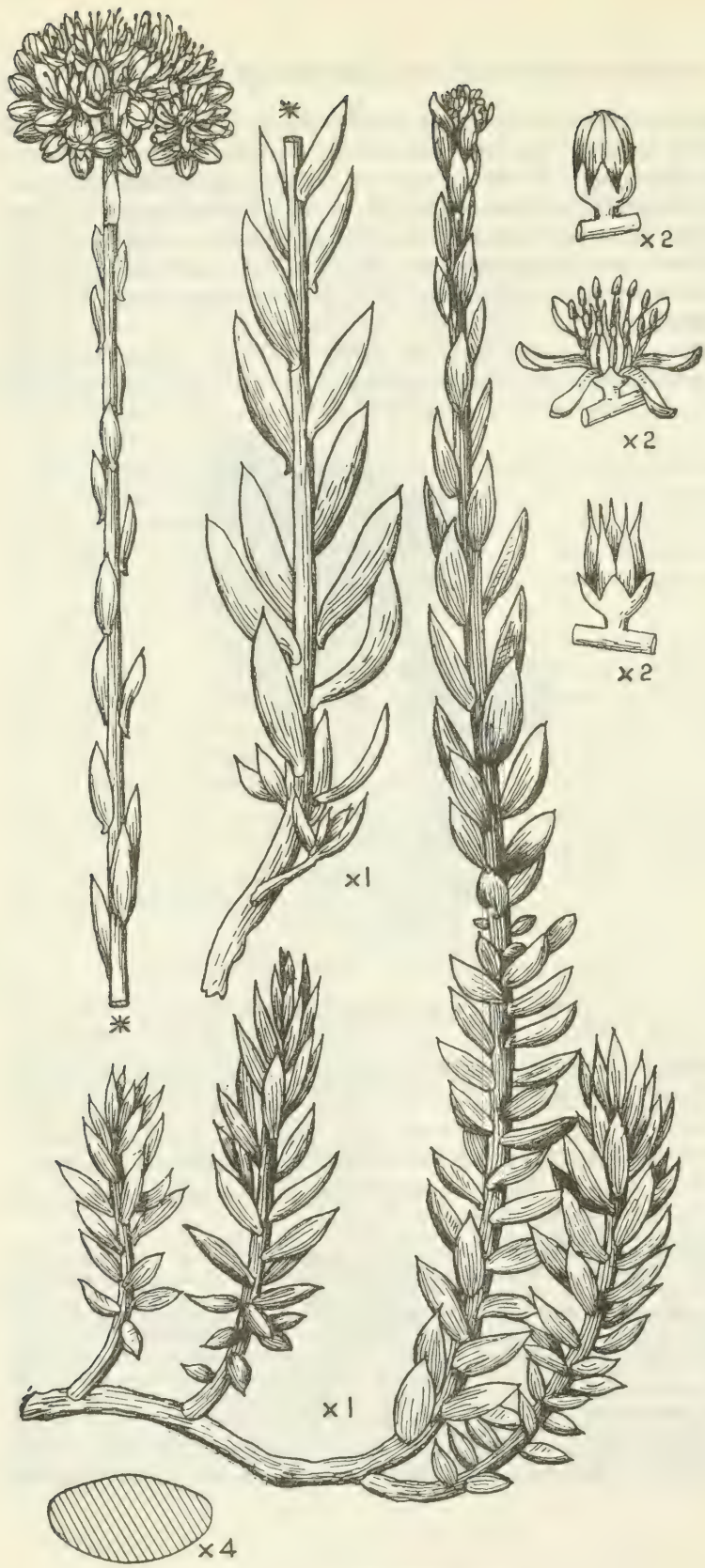


FIG. 159.—*S. altissimum* Poiret.

obtuse tip, greenish-white, wide-spreading. *Stamens* slightly exceeding the petals, spreading, filaments greenish, anthers yellow. *Scales* small, quadrate, greenish. *Carpels* erect, slender, greenish, equalling the petals.

Flowers July–August. Hardy.

HABITAT.—S. Europe, N. Africa, Asia Minor. A familiar plant round almost the whole of the Mediterranean basin.

It is suitably named *altissimum* (very tall), the flower-stems being usually longer than those of any other member of the *rupestre* group.

133. *Sedum anopetalum* DC. (figs. 160, 164, c).

S. anopetalum De Candolle "Rapports Voyages," 2, 80, 1808. Baker in *Gard. Chron.* 1877, ii. 462. Masters, *ibid.* 1878, ii. 626.

SYNONYMS.—*S. elongatum* of gardens (not of Wallich, for which see p. 41). *S. ochroleucum* of Chaix (not of Villar, which = *altissimum*, see p. 270).

ILLUSTRATIONS.—De Candolle, "Mém. Crassul.," pl. 8. Reichenbach, "Flor. German.," 23, tab. 59. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 33.

A species well marked when in flower, but without flower often impossible to distinguish from small forms of *S. reflexum*. In bud, flower, or fruit it may be known from all other species of the *rupestre* section by its long lanceolate sepals, which in fruit have the outer face concave. It differs from *rupestre* in its almost terete (not flat) leaves, and from both *reflexum* and *rupestre* in its inflorescence erect in bud. In this latter respect it agrees with *altissimum*, but that species has lanceolate (not linear), flattened, larger leaves. The flowers of *anopetalum* are usually whitish, like those of *altissimum*; but bright-yellow forms, as in *reflexum* and *rupestre*, are not uncommon. The inflorescence remains flat in bud, flower, and fruit, while in *reflexum*, *rupestre*, and *altissimum* it is very convex in bud and very concave in fruit.

DESCRIPTION.—A glabrous, evergreen perennial, creeping, forming a low green or glaucous mat often tinged red. *Stems* many, much branched and rooting below, with ascending barren and flowering shoots, the former 1 to 4 inches, the latter 6 to 9 inches high. *Leaves* of barren shoots crowded, ascending, $\frac{3}{8}$ inch long, linear, apiculate, slightly flattened above, slightly spurred at base, sometimes arranged in 6 or more rows; those of the flowering stems larger, $\frac{3}{4}$ inch long, more distant, more distinctly spurred. *Inflorescence* a flat compact cyme about 1 inch across, of about 5 forked branches with a central flower, leafy, flattish, and erect in bud and in fruit. *Buds* ovate-oblong, ribbed, acute. *Flowers* $\frac{3}{4}$ inch long. *Sepals* long, lanceolate, green, erect, acute, separate nearly to the base, persistent in fruit, when they have a median depression. *Petals* narrowly lanceolate, acute, keeled, grooved on face, erect or spreading, seldom widely open, whitish, rarely bright yellow, twice the sepals. *Stamens* yellow, equalling the petals. *Scales* small, whitish. *Carpels* shorter than the petals, slightly shorter than the stamens, erect, greenish, erect also in fruit; styles divergent.

Flowers June–July. Hardy.

HABITAT.—Central and Southern Europe from Spain eastward; Asia Minor.

Among some fifty selected plants of *anopetalum* in my garden, derived from as many sources, native and cultivated, the following variations are noticeable: (1) *size*, from small forms with barren

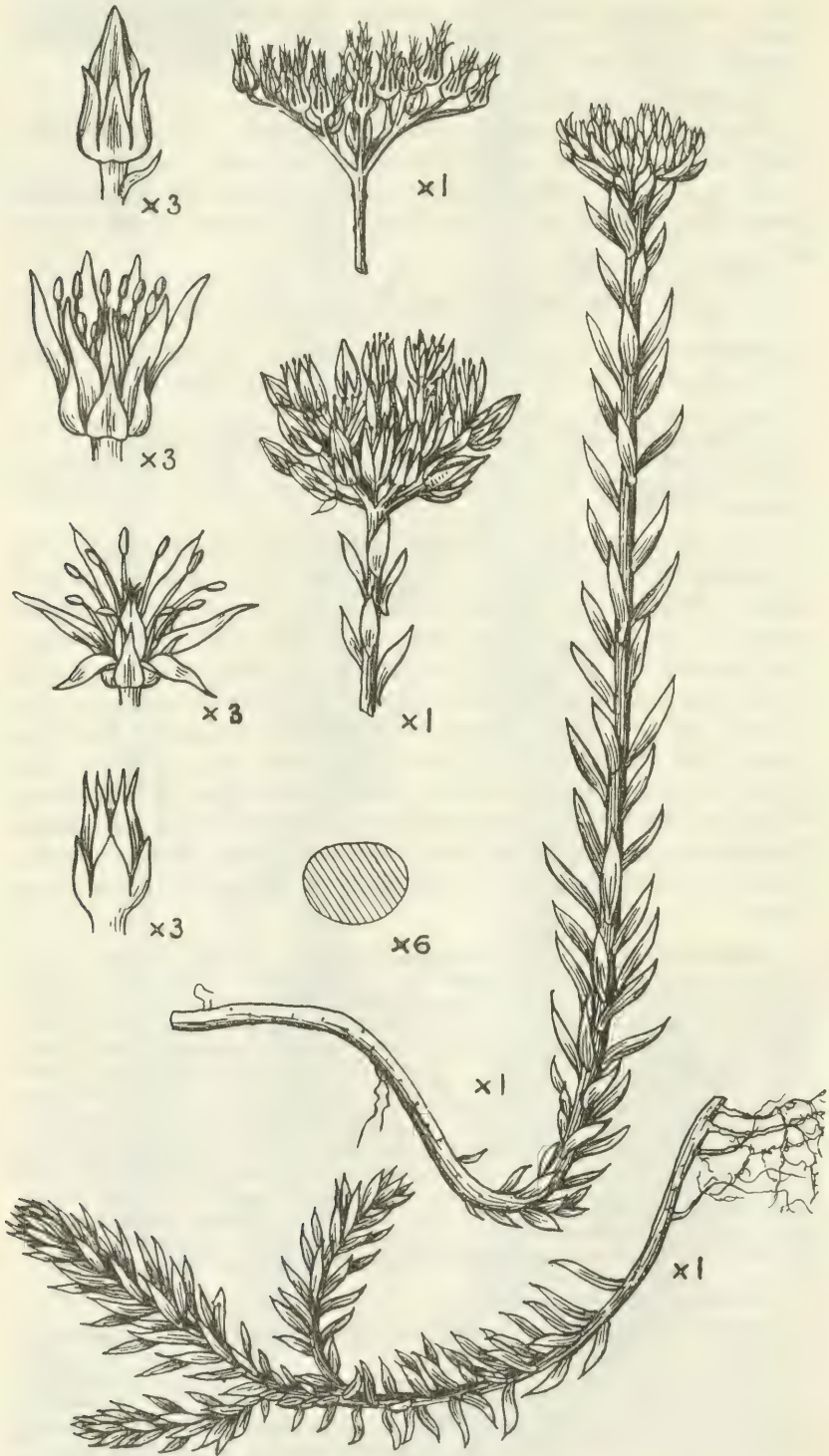


FIG. 160.—*S. anopetalum* DC.

shoots a couple of inches long and flower-stems three inches high to strong forms with shoots 9 inches long and flower-stems of a foot ; (2) *leaf-colour*, bright green, dark green flushed with red, or glaucous ; a form brought from Bulgaria by Sir JOSSLYN GORE-BOOTH is so glaucous as to be almost white ; (3) *flower-colour*, this varies less, being either of the typical whitish hue or else golden yellow. Among this variable set I have found it futile to attempt to distinguish varieties, of which several have been described, such as *chrysanthum* and *chloranthum* of JEANBERNAT and TIMBAL-LAGRAVE, and *S. Verloti* of JORDAN.

Frequent in cultivation but generally under erroneous names or synonyms, such as *collinum*, *elegans*, *elongatum*, *Forsterianum*, *montanum*, *ochroleucum*, *reflexum*, *stenopetalum*, *virens*.

Its name *anopetalum* is descriptive of the characteristic upward direction of the petals.

134. *Sedum stenopetalum* Pursh (figs. 161, 164, e).

S. stenopetalum Pursh, "Flor. Amer. Septent.," 1, 324, 1814. S. Watson, "Bot. of Nevada, Utah, and Colorado," 101, 1871. "N. Amer. Flora," 22, 65. Baker in *Gard. Chron.* 1877, ii. 307. Masters, *ibid.* 1878, ii. 626.

ILLUSTRATIONS.—Britton and Brown, "Illustr. Flora Northern U.S.," 2, 166. Regel, "Gartenflora," tab. 741a. (Both poor.)

The only representative in America of the *rupestre* group which is so characteristic of the European *Sedum* flora. Most resembles *S. reflexum*, but the shoots, though sometimes elongate, do not creep, and are normally very short and erect. The leaves are blunter and of a duller surface ; under the microscope this is seen to be due to the surface being more distinctly cut up into polygonal spaces, in which hemispherical papillæ are often placed ; when the leaves are tinged purple, as is frequent, the colour resides in these prominences. In flower the species differs from *reflexum* in its shorter stem, more flattened leaf, inflorescence erect in bud and flattish in both bud and fruit, and the petals, which are uniformly 5 in number, are much more acute.

DESCRIPTION.—A tufted, glabrous, evergreen perennial. *Stems* few, erect or ascending, barren shoots short (about 1 inch long), leafy ; flowering shoots 4 to 6 inches. *Leaves* scattered, glaucous, or dull green, or flushed dull purple, minutely papillose, $\frac{1}{2}$ to $\frac{3}{4}$ inch long, somewhat flattened, linear-lanceolate, entire, blunt, curved upwards, very shortly spurred, imbricate around the growing point ; those of the flowering stem similar, rather larger, less crowded. *Inflorescence* 1 to 2 inches across, of several forked branches with flowers in the forks, flattish, compact ; in strong plants elongate (3 inches long or more), by production of axillary branches below the main inflorescence. *Buds* ovate-oblong, pointed. *Flowers* short-stalked, $\frac{1}{2}$ inch across. *Sepals* fleshy, lanceolate, rather blunt, pale green, flat on face, rounded on back, separate nearly to the base. *Petals* lanceolate, acute, patent in upper part, bright yellow, grooved on face, with a greenish keel on back, twice the sepals. *Stamens* spreading, shorter than the petals, filaments yellow, anthers orange. *Scales* very small, orange, notched, broader than long. *Carpels* slender, nearly erect, greenish yellow, the tips diverging in fruit.

Flowers early June. Hardy.

HABITAT.—Western and central North America.

Occurs in two forms: (1) the typical form with very short, tufted, barren stems and flower stems 4 or 5 inches long; and (2) with

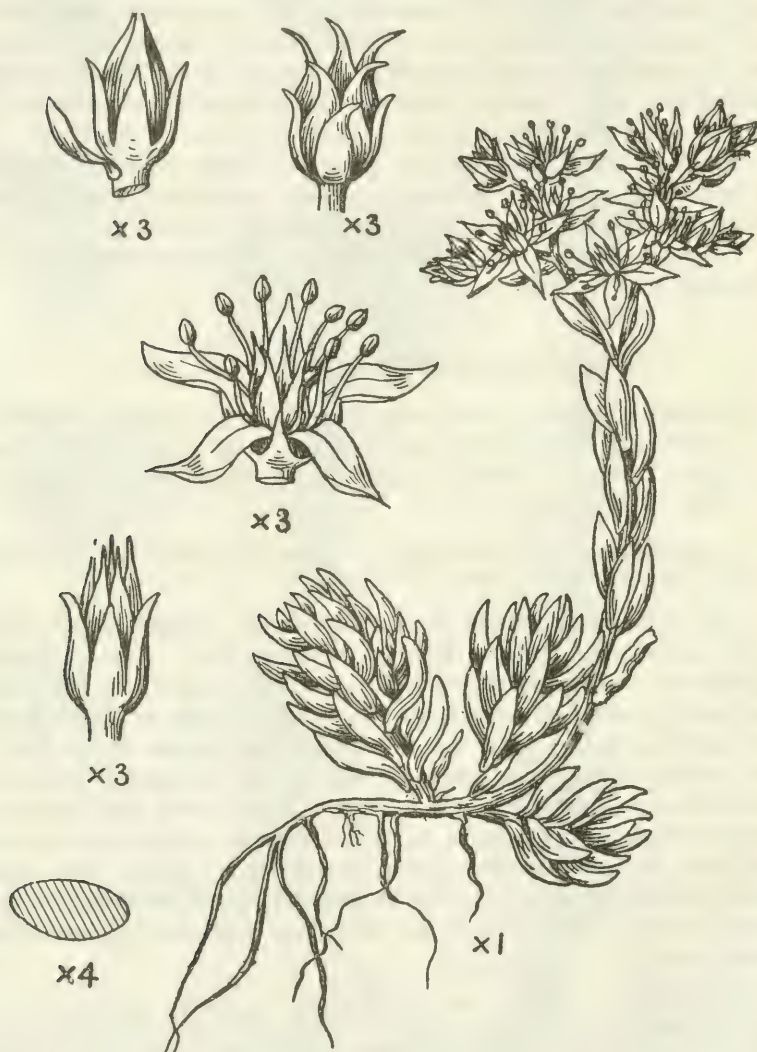


FIG. 161.—*S. stenopetalum* Pursh.

elongate, procumbent stems, barren shoots up to 6 inches long, flower-shoots up to 12 inches long, procumbent below, erect above; whole plant more vigorous, sometimes suffused with dark purplish red.

S. stenopetalum is rather rare in cultivation, but generally correctly named. Collected specimens from British Columbia and Colorado, and many others from gardens in England, Geneva, Lindau, Petrograd, and New York, belong to the typical form. The diffuse form I have

had from several English gardens, and Mrs. HENSHAW tells me she knows it in the wild state in British Columbia.

The name *stenopetalum* signifies narrow-petalled.

135. *Sedum pruinatum* Brotero (figs. 162, 164, f).

S. pruinatum Brotero, "Flor. Lusit.," 2, 209, 1804. Mariz in *Boletim Sociedade Broteriana*, 6, 1888, 21. R. P. Murray in *Journ. of Bot.*, 27, 141, 1889. Rouy, "Illustr. Plant. Europ. Rar.," fasc. 10, 77. Praeger in *Journ. of Bot.*, 55, 213, 1917. (Not *S. pruinatum* of most British and Continental authors, which is *S. rupestre* L. = *elegans* Lejeune.)

ILLUSTRATION.—Mariz, *loc. cit.* tab. 1. Rouy, *loc. cit.* pl. 231.

This interesting and distinct plant has long been confused with the well-known *S. rupestre* L. (= *S. elegans* Lej.), with which, though belonging to the same group, it has little affinity. In its leaves it comes nearest to *S. reflexum*, but in growth it is quite different, and its very distinct inflorescence and flowers place it close to *S. amplexicaule*. While resembling that species, particularly in its few-flowered, two-branched inflorescence and sepals with raised edges and a median depression, it differs widely in its leaves, which have not a broad, clasping base and do not dry up in summer. The very glaucous colour, curious whip-like shoots, rooting only at the tips and dying off behind in autumn, and large straw-coloured flowers distinguish *S. pruinatum* at a glance when it is growing among its nearest allies.

DESCRIPTION.—A very glaucous, slender, evergreen perennial, with erect, sparingly leafy, flowering stems about 6 inches high, and very long (6 to 9 inches) slender prostrate barren ones, at first leafy, which perish in autumn save for the very leafy tip, which roots. *Leaves* of the different parts similar, alternate, very glaucous, linear, acute, to $\frac{3}{4}$ inch long, subterete, flattish above, rounded below, with a short adpressed whitish spur; distant, and withering at about flowering-time save at the tips of the barren shoots, where they are crowded, forming a slender, erect, winter bud. *Inflorescence* lax, 5- to 7-flowered, of two wide-spreading branches with a flower in the fork. *Buds* oblong, lanceolate, acute. *Flowers* $\frac{5}{8}$ to $\frac{3}{4}$ inch across, 6- to 7-parted, straw-coloured, on very short pedicels. *Sepals* tapering from a short tube to a rather acute point, glaucous, slightly recurved, edges somewhat raised on the back. *Petals* twice the sepals, wide-spreading, linear, acute, strongly keeled on back and channelled on face, $\frac{3}{8}$ inch long, paler on back. *Stamens* equalling the petals, pale yellow, anthers oblong. *Scales* very small, bright yellow. *Carpels* nearly white, erect, slightly shorter than the stamens, tapering into the slender styles.

Flowers July. Hardy.

HABITAT.—Portugal, very rare, chiefly about the Serra de Gerez.

Rev. R. P. MURRAY had it in cultivation in England some thirty years ago. By the kindness of Prof. J. A. HENRIQUES of Coimbra, I received a good gathering of the wild plant in 1914, and about the same time Miss LUCKHAM sent to the Royal Horticultural Society for identification a plant collected by her a few years previously.

Named from the *pruina* or "bloom" (literally hoar-frost) which gives the plant its distinctive glaucous colour.

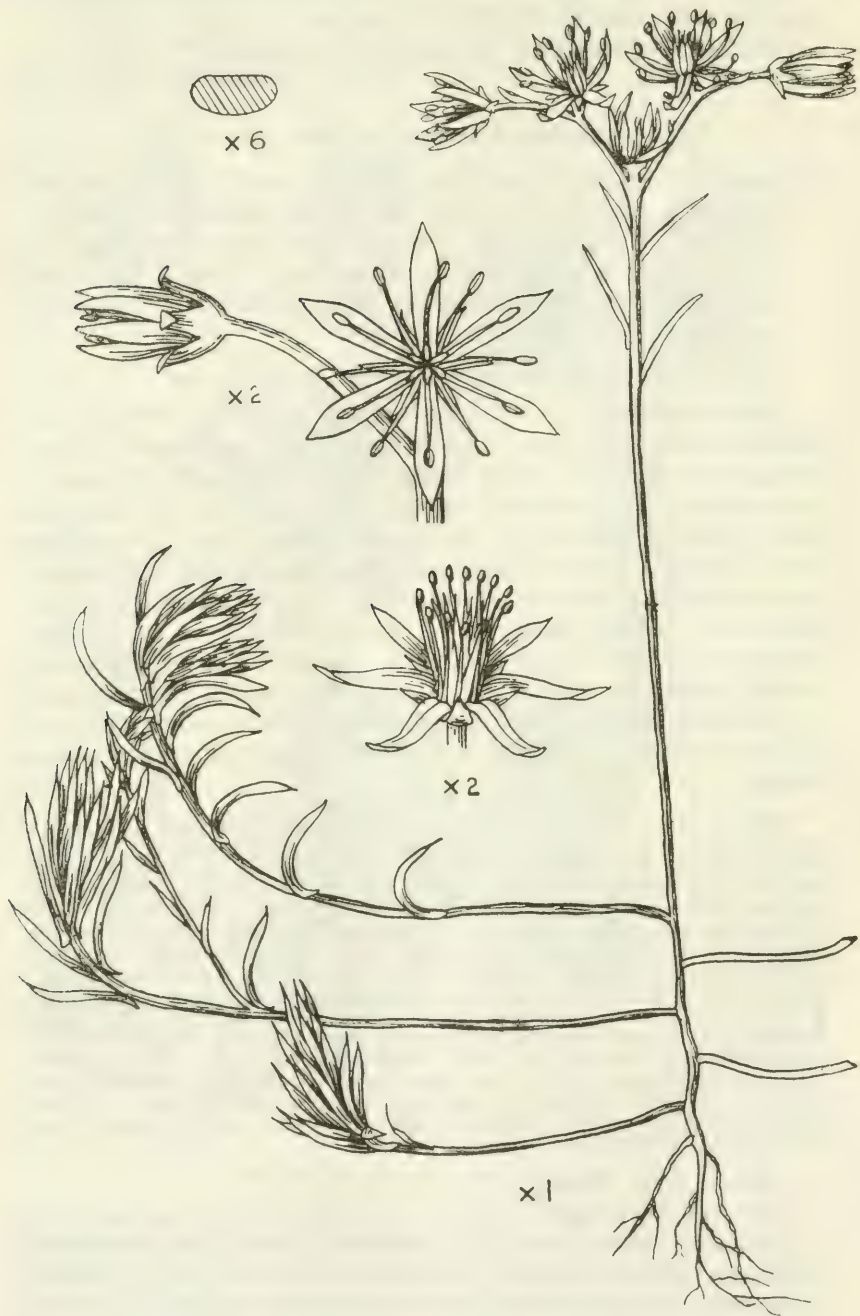


FIG. 162.—*S. pruvinatum* Brotero.

136. *Sedum amplexicaule* DC. (figs. 163, 164, g).

S. amplexicaule De Candolle, "Rapports Voyages," 2, 80, 1808. Baker in *Gard. Chron.* 1877, ii. 462. Masters, *ibid.* 1878, ii. 626.

SYNONYM.—*S. tenuifolium*, DC., "Prodromus," 3, 407.

ILLUSTRATIONS.—De Candolle, "Mém. Crassul.," pl. 7. Sibthorp, "Flor. Graeca," tab. 474. Tenore, "Flor. Nap.," 1, tab. 139, fig. 2. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 35. *Gard. Chron.* 1876, ii. fig. 46.

A very peculiar and interesting species, more closely related to *S. pruinautum* of Portugal than to any of its allies found with it along the Mediterranean. The leaves of the barren shoots fade at about the flowering time in early summer, leaving only the peculiar, broad sheathing bases (fig. 163, c), which enwrap the shoot and presumably form a protection against drought; in this condition the plant looks dead. With the rains of autumn, growth is resumed at the tip of the shoot, and during winter the clump is again covered with small glaucous leaves. Fig. 163, b, shows a shoot in its summer condition, and a, the same shoot when growth is resumed. In the shape and history of its leaves the species is unique. In its flowering parts especially it shows its affinity to *pruinautum*. In both we find the same few-flowered, two-branched inflorescence with large flowers and sepals with a peculiar median furrow; but in *pruinautum* the flowers are usually straw-coloured, not golden, and the furrow less marked than in *amplexicaule*. Wild specimens are sometimes a foot in height when in flower, but in gardens the plant is mostly much smaller, and sometimes minute.

DESCRIPTION.—Small perennial, withering in summer, green for the rest of the year. *Stem* procumbent, wiry, much branched, dying off behind and forming many rooted shoots. *Barren shoots* ascending, 1 to 3 inches long. *Flower-shoots* 2 to 6 inches high, ascending, unbranched. *Leaves* of barren shoots imbricate, glaucous, linear, terete, apiculate, recurved in the upper part, widening at base into a broad, clasping, membranous wing; leaves of flowering shoots linear-lanceolate, apiculate, nearly terete, rather distant, sessile, with a short, narrow, adpressed spur. *Inflorescence* lax, few-flowered, mostly of two wide-spreading branches, each bearing 2 to 6 flowers with a flower in the fork. *Flowers* large, $\frac{5}{8}$ to $\frac{1}{2}$ inch across, 6- to 10-parted. *Buds* nearly $\frac{1}{2}$ inch long, ovate, acute, strongly ribbed. *Sepals* green, ovate-lanceolate, very acute, with a deep median groove, raised edges, and recurved tip. *Petals* golden-yellow, linear-lanceolate, acute, grooved on face, keeled on back, $\frac{3}{4}$ inch long, thrice the sepals. *Stamens* yellow, $\frac{3}{4}$ the petals. *Scales* small, yellow, broader than long. *Carpels* yellow, erect; in fruit erect and large, surrounded by the persistent, erect sepals.

Flowers June–July. Hardy.

HABITAT.—Southern Europe from Portugal eastward, Asia Minor, Algeria. Not uncommon in gardens.

The specific name signifies "stem-clasping," and emphasizes the peculiar character of the leaves.

SECTION VIII.—SEMPERVIVOIDES.

Section SEMPERVIVOIDES Boissier, "Flor. Orientalis," 2, 776.

Annual or biennial. Leaves flat, root-leaves forming a rosette. Inflorescence corymbose or racemose-paniculate. Hardy or tender Eurasian plants.



FIG. 163.—*S. amplexicaule* DC.

A rather small group of wide range, its most remarkable members being a few striking biennials from the Caucasus region. The species,

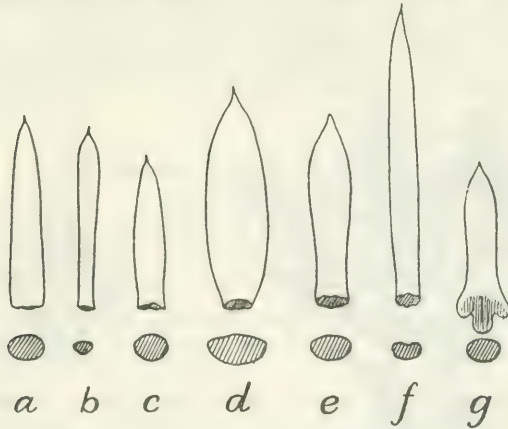


FIG. 164.—Leaves of the *rupestre* group. *a*, *reflexum*; *b*, *rupestre*; *c*, *anopetalum*; *d*, *altissimum*; *e*, *stenopetalum*; *f*, *pruinatum*; *g*, *amplexicaule*. All $\times 2$.

at least those in cultivation, divide themselves into two well-marked sub-groups.

- A. *SEMPERVIVOIDES sensu restricto*. Rosettes *Sempervivum*-like, inflorescence dense, leaves sessile, flowers red or reddish:—
sempervivoides Fischer *indicum* Hamet
pilosum M. Bieb.
- B. *CEPAEA sensu restricto*. Rosettes lax, inflorescence very lax, leaves stalked, flowers white or yellow.
Cepaea L. *viscosum* Praeger.

While the *Sempervivoides* group is almost confined to the Asia Minor area, the *Cepaea* group is mainly Chinese and includes several well-marked plants in both the white-flowered and the yellow-flowered sections.

A. *SEMPERVIVOIDES* S.S.

137. *Sedum sempervivoides* Fischer (fig. 165).

S. sempervivoides Fischer ex M. von Bieberstein, "Flora Taurico-Caucas.," 3, 313, 1819. Masters in *Gard. Chron.* 1878, ii. 750. Hamet in *Trd. Bot. Sada* (Tiflis), 8, pt. iii. 26.

SYNONYM.—*S. sempervivum* Ledebour ex Sprengel "Systema," 2, 434. Boissier, "Flor. Orient.," 2, 786.

ILLUSTRATIONS.—*Gard. Chron.* 1898, i. fig. 7. *Bot. Mag.* pl. 2174. *Garden*, 19, 354, 1881. Regel, "Gartenflora," tab. 551, 1155. Link "Icones," 1, 57. *Revue Horticole*, sér. 2, 5, 5.

A beautiful and remarkable *Sedum*, allied to the equally remarkable *S. pilosum*, from which it differs in its much laxer leaf-rosette,

broader leaves marked with dark red, scarlet (not rose-coloured) flowers, &c. Like *pilosum*, it is a biennial and comes from the Caucasus. The crimson flowers are unique among cultivated Sedums.

DESCRIPTION.—Biennial, pubescent, with the habit of a *Sempervivum*. First-year stems very short, producing a single leaf-rosette, 1 to 2 inches across

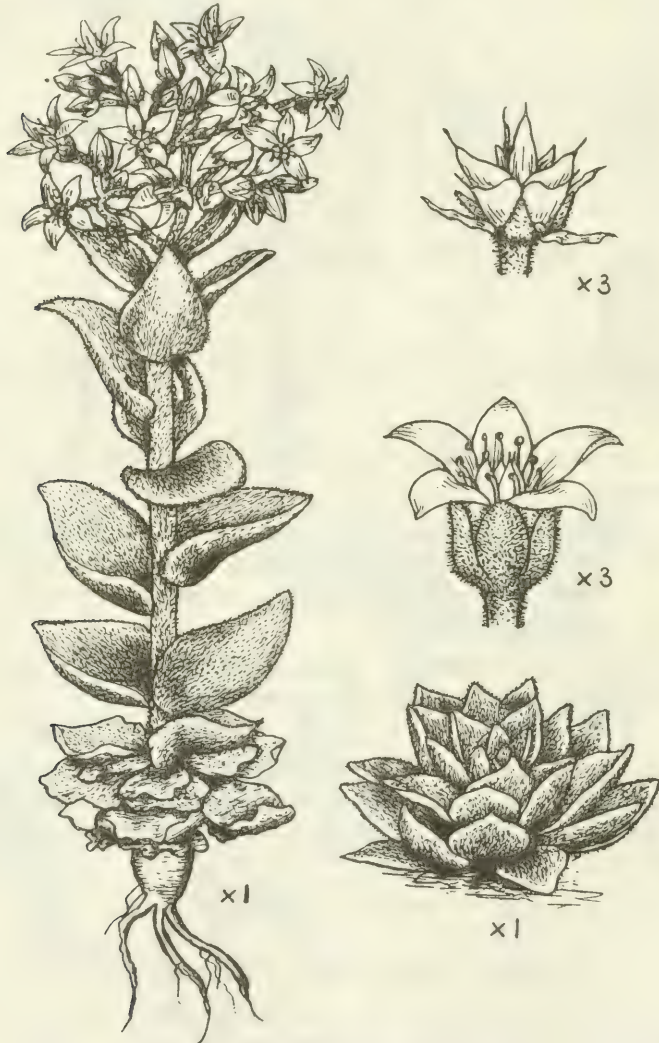


FIG. 165.—*S. sempervivoides* Fischer.

in second year lengthening to 6 to 12 inches and flowering, stout, downy, red, leafy, unbranched save at top. *Leaves* ovate, acute, sessile, very fleshy, purplish, pubescent, ciliate, densely imbricated on the first-year stems, alternate and distant on the flowering stems. *Inflorescence* a large, rather loose, leafy panicle, 2 to 4 inches across, with bracts resembling the leaves. *Flowers* $\frac{1}{4}$ inch long, $\frac{1}{2}$ inch across, 5-parted, pedicels equalling the flowers. *Sepals* erect, red, fleshy, hairy, ovate, acute, separate nearly to the base. *Petals* bright crimson, lanceolate, acute, erect below, curving outwards above, hairy on back, $2\frac{1}{2}$ times the sepals. *Stamens* erect, crimson, nearly twice the sepals. *Scales* small,

reddish, broader than long. *Carpels* crimson, erect, equalling the stamens; spreading in fruit.

Flowers June–July. Hardy.

HABITAT.—Asia Minor and Caucasus. Now found in most good collections.

The specific name emphasizes the plant's resemblance to a *Sempervivum*.

138. *Sedum pilosum* M. B. (fig. 166).

S. pilosum Marschall von Bieberstein, "Flor. Taurico-Caucas." 1, 352, 1808. Boissier, "Flor. Orient.," 2, 786. Hamet in *Trd. Bot. Sada* (Tiflis), 8, pt. iii. 28.

SYNONYM.—*S. Regelii* (a *nomen nudum*) of gardens.

ILLUSTRATIONS.—M. von Bieb., "Cent. Plant." tab. 40. *Bot. Mag.*, pl. 8503. *Gard. Chron.* 1911, i. fig. 160.

A remarkable and showy little biennial plant, with a wealth of rose-pink blossoms. The dense, hairy rosettes of the first year's growth closely resemble those of a *Sempervivum*, but in the second and final year the five-parted flowers with free petals and ten stamens, though in shape recalling those of a *Crassula*, show where its affinities lie.

DESCRIPTION.—Biennial, forming in the first year a dense subglobular rosette of downy, incurved leaves. *Flower-stem* erect, 2 to 4 inches long, leafy, much branched above. *Leaves* of rosette linear-spathulate, bluntly pointed, hairy, sessile, very fleshy, dark green, densely imbricate, about $\frac{1}{2}$ inch long; those of the flowering stems larger, $\frac{3}{4}$ inch long, $\frac{1}{2}$ inch broad, oblong-obovate. *Inflorescence* a dense, much-branched, paniced cyme, $1\frac{1}{2}$ to 3 inches across, surface convex. *Flowers* $\frac{3}{8}$ inch long, $\frac{1}{2}$ to $\frac{3}{8}$ inch across, longer than the pedicels. *Sepals* erect, linear, acute, not contiguous, downy, dark green, separate nearly to the base. *Petals* erect below, wide-spreading above, oblong, acute, rose-coloured, downy on back, $\frac{1}{2}$ longer than the sepals. *Stamens* equalling the sepals, anthers reddish or yellowish. *Scales* minute, oblong, colourless. *Carpels* erect, green, equalling the stamens, styles red. *Fruit* stellate-patent.

Flowers May–June. Hardy.

HABITAT.—Asia Minor, Caucasus.

Though described as long ago as 1808, the plant only recently came into cultivation, and was unknown in our own country until 1910, when seeds were distributed by REGEL and KESSELRING of Petrograd. The species is, unfortunately, only biennial, but the seeds germinate freely. A dry niche suits it well.

The name *pilosum* refers to the hairy nature of the plant.

139. *Sedum indicum* Hamet (figs. 167, 168).

S. indicum var. *genuinum* Hamet in *Notes R. Bot. Gard. Edinb.*, 5, 115, 1912.

SYNONYMS.—*Crassula indica* Decaisne in Jacquemont, "Voyage dans l'Inde," 4 (Botanique), p. 61, tab. 61, fig. 1. Hooker fil. and Thompson in *Journ. Linn. Soc. (Bot.)*, 2, 90. Clarke in Hooker, "Flora Brit. India," 2, 413. *Sedum paniculatum* Wallich Cat., No. 7227.

ILLUSTRATION.—Jacquemont, *loc. cit.*

A very variable plant, inconstant as regards size, hairiness, colour, and the shape of its leaves, and to a less degree all parts of its flowers; but always recognizable by its biennial duration, Sempervivum-like leaf-rosettes, large, paniculate inflorescence, and numerous small flowers with five stamens and erect petals having reflexed tips. It comes nearest the *Sempervivoides* group of *Sedum* from the Caucasus

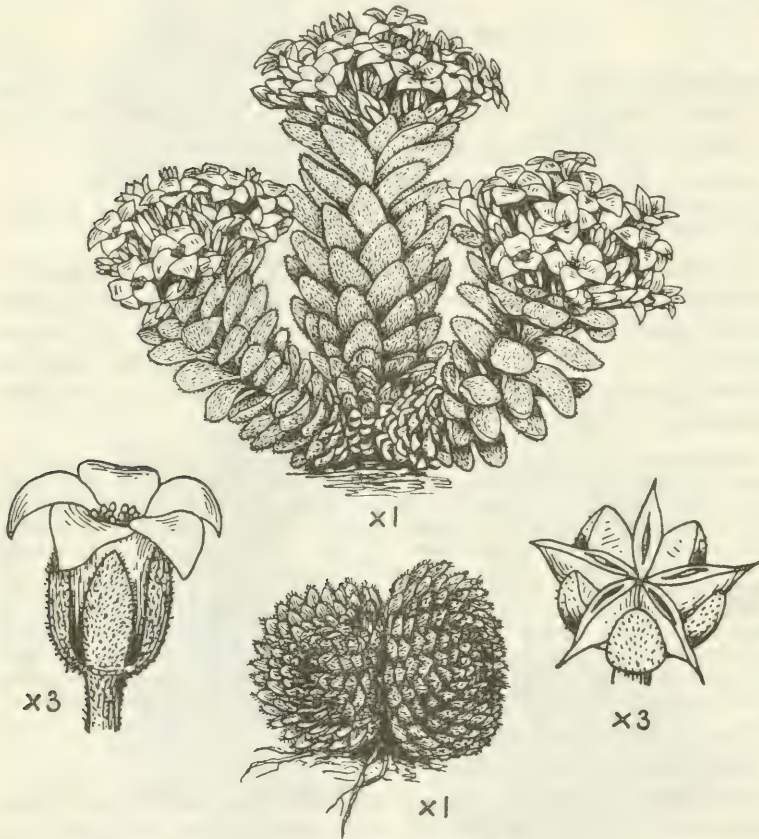


FIG. 166.—*S. pilosum* M. B.

region, and is best placed there, though the flowers are different, especially as regards the number of stamens. I have discussed some of its forms in *Journ. of Bot.*, 57, 55, 1919.

DESCRIPTION.—Biennial, usually glabrous. *Roots* fibrous. *Stem* in first year extremely short, densely leafy, in second year elongate (6 to 12 inches), erect, more or less distantly leafy, round, smooth, usually unbranched below, emitting above alternate, sub-erect or spreading, simple or once or twice forked branches with a few small bracts resembling the leaves, each ultimate branch bearing a simple raceme of flowers without bracts, and lengthening more or less as flowering proceeds. Branches all attaining about the same level, their upper parts smooth or finely papillose. Pedicels $\frac{1}{8}$ to $\frac{1}{4}$ inch long, erecto-patent, rarely patent, often papillose. *Inflorescence* 2 to 4 inches broad, 2 to 4 inches long from the lowest branching. *Leaves* alternate, in first year forming a rather lax rosette about as long as broad, the outer ones patent, the inner erect; very fleshy, $\frac{1}{8}$ to $\frac{1}{10}$ inch thick,



FIG. 167.—*S. indicum* Hamet.

glabrous, rather glaucous, densely red-dotted when old, sessile, spatulate-acuminate to oblong-acuminate, tapered below, broadest $\frac{2}{3}$ way up, ending in a spine $\frac{1}{16}$ inch long, $1\frac{1}{2}$ to $2\frac{1}{2}$ inch long, $\frac{3}{8}$ to $\frac{5}{8}$ inch broad, flat above, convex below ;

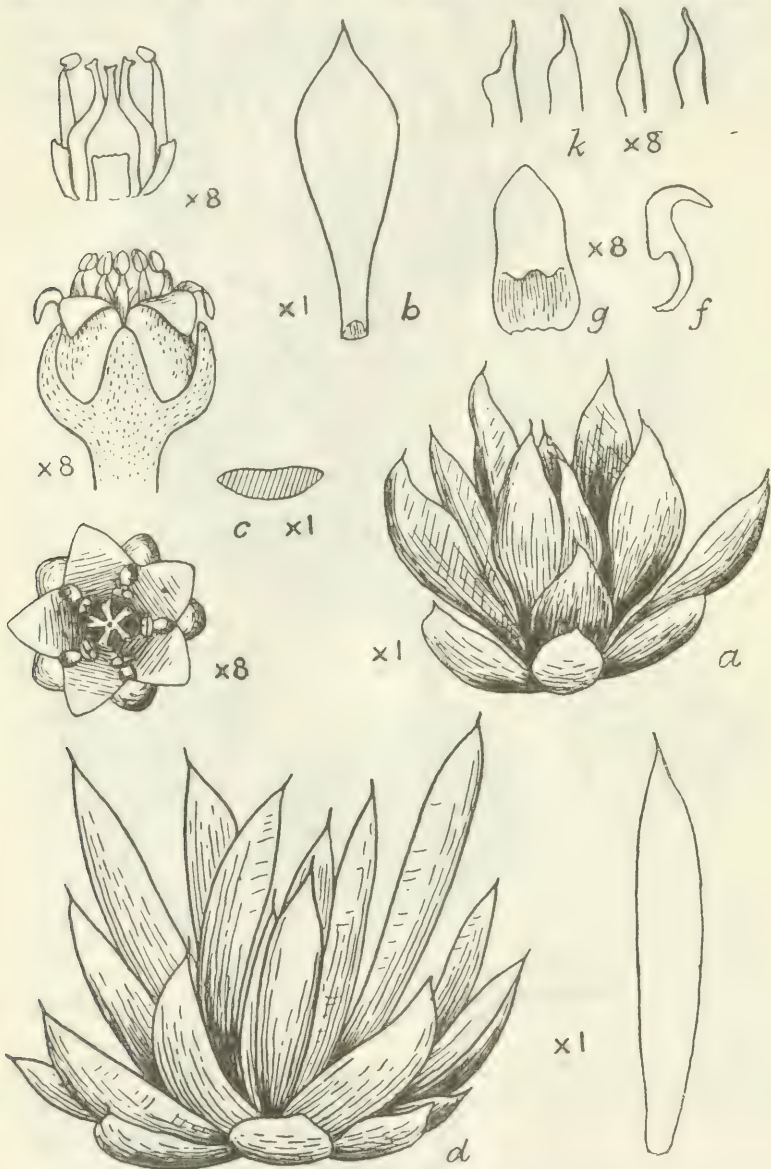


FIG. 168.—*S. indicum* Hamet.

stem-leaves similar or narrower, longer than the internodes, very fleshy, upper bracts linear. *Buds* ovoid. *Flowers* roughly globular, $\frac{2}{16}$ to $\frac{3}{16}$ inch long and broad. *Calyx* in outline hemispherical, $\frac{1}{3}$ inch long, very fleshy, smooth or finely papillose, green dotted with purple, segments 5, triangular to oblong, blunt, much exceeding the tube. *Petals* erect, $1\frac{1}{2}$ times the sepals, oblong, broadest at base, bluntly pointed, inserted almost horizontally, tips recurved, flat ; almost S-shaped in vertical section, concave inwards in cross-section, very fleshy

in upper half, the inner face hollowed out in the lower half (fig. 168, *f*), the lower edge of the thickened portion forming in front view a two-lobed lip (fig. 168, *g*); whitish in the lower part, crimson above, especially on the recurved tip; smooth or finely scabrid on the back, $\frac{1}{2}$ inch long (measured along the curve), $\frac{1}{16}$ inch broad. *Stamens* 5, erect, slightly exerted owing to the petals being recurved, $\frac{1}{2}$ inch long, filaments stout, tapered, contracted and abruptly bent inwards at the apex, white; anthers yellow on face, crimson on back. *Scales* quadrate, curved, emarginate, pink, orange, or whitish. *Carpels* pale green, dotted red in upper part, slightly shorter than the stamens, erect, the inner edge straight or nearly so, the outer edge in its lower half parallel to the inner, or convex, in its upper half contracted, often rather abruptly, into the tapering style (fig. 168, *h*), which is at first erect, later divergent; stigmas capitate.

Flowers September–October. Not hardy.

HABITAT.—Himalayan region, W. China.

The above description is taken from a good series of plants grown at Kew, Glasnevin, and my own garden, from seed sent by Rev. E. E. MAIRE from Tong-tchouan, Yunnan, in 1915. It differs in some minor respects from the descriptions and figures of the plant hitherto published (which were mostly prepared from dried specimens), and in other respects it supplements them. It is clear that we have to deal here with a polymorphic species, and identity of description need not be expected. On fig. 168, *a*, *b*, *c* represent the first-year rosette and one of its leaves, in plan and section, of what may be taken as type; *d*, the rosette and leaf of a narrow-leaved form.

Two varieties have been previously described—var. *Forresti* Hamet with very broad ovate-suborbicular leaves, mostly opposite, and var. *yunnanense* Hamet, a hairy form, of which I am able to amplify the description, as it was well represented among the plants raised from MAIRE's seed.

Another distinct form, deserving of varietal rank, appeared in some numbers among the plants grown from MAIRE's seed, and has been described as var. *densirosulatum*.

Var. *yunnanense* Hamet (fig. 169).

S. indicum var. *yunnanense* Hamet, in *Notes R. Bot. Gard. Edinb.*, 8, 147, 1913. *Crassula yunnanensis* Franchet, in *Journ. de Bot.*, 10, 284, 1896.

Rosettes much smaller than in type, 1 to 1½ inch across, lax. *Leaves* not glaucous, green or brown (owing to dense purple mottling on the green surface), with dense, short, white pubescence (especially on the young leaves) over both surfaces, or at least in the upper part and on the edges; hairs linear-deltoid, patent or slightly deflexed; leaves $\frac{1}{2}$ to 1 inch long, $\frac{1}{10}$ to $\frac{1}{8}$ wide, extremely thick (up to nearly $\frac{1}{4}$ inch), oblanceolate, spatulate, acute or acuminate, convex on face, very convex on back, rounded on edges. *Stem* 2 to 4 inches long, hairy, densely leafy, the leaves oblanceolate, pubescent. *Inflorescence* small, (1 inch across), rather dense, flattish, of few branches; branches and pedicels very short, shortly pubescent or papillose; bracts few, obovate-lanceolate, shortly pubescent or papillose. *Flowers* rather larger than in the type, up to $\frac{1}{4}$ inch long. *Calyx* narrower in proportion to its length, papillose. *Petals* papillose on back, oblong-lanceolate (not broadly oblong), devoid of thickening on the face, more erect at base (so that the flower is narrower), and less reflexed at apex, making the whole petal much straighter and the flower longer (fig. 169, *c*). *Papillæ* of bracts, inflorescent branches, sepals, and petals conical. *Stamens* not abruptly bent at apex, anthers red. *Carpels* lanceolate.

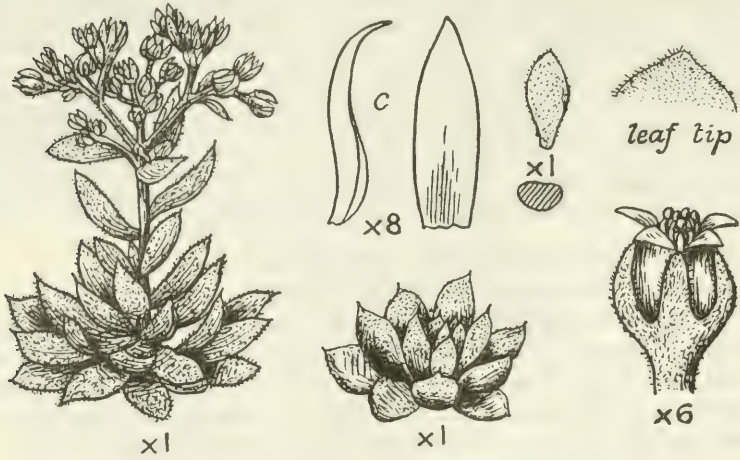


FIG. 169.—*S. indicum* var. *yunnanense* Hamet.

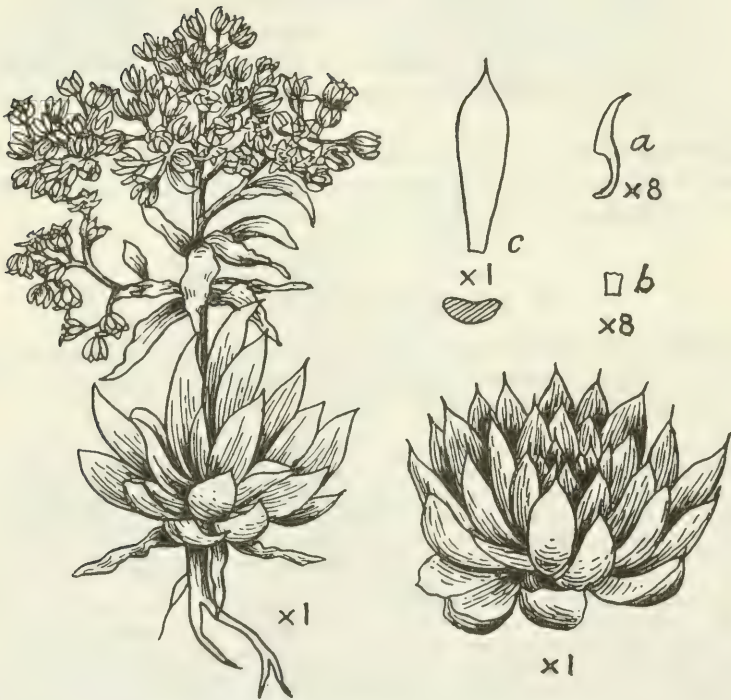


FIG. 170.—*S. indicum* var. *densirosulatum* Praeger.

Var. *densirosulatum* Praeger in *Journ. of Bot.*, 57, 57, 1919 (fig. 170).

Rosettes dense, twice as broad as long. *Leaves* smaller than type (1 by $\frac{5}{16}$ inch by $\frac{1}{8}$ inch), spatulate, acuminate, very glaucous, tipped purple. *Stem* much shorter (2 to 3 inches), branched almost from the base; ultimate racemes short ($\frac{1}{2}$ inch), flowers crowded, on shorter pedicels; whole inflorescence rounded, dense, about 2 inches long and broad. Calyx and corolla more mottled with red. *Petals* straighter, less thickened in upper part, so that the cavity in the lower part is less pronounced (fig. 170, a). *Scales* narrower (fig. 170, b).

B. CEPAEA S.S.

140. *Sedum Cepaea* Linn. (fig. 171).

S. Cepaea Linn., "Species Plantarum," 431, 1753. Masters in *Gard. Chron.* 1878, ii. 750.

SYNONYM.—*S. galloides* Allioni, "Flor. Pedemont.," 2, 120.

ILLUSTRATIONS.—Reichenbach, "Flor. German.," 23, tab. 50. Sibthorp, "Flor. Graeca," 5, tab. 448. Waldstein and Kitaibel, "Descr. Plant. Hungar.," tab. 104 (as *S. spathulatum*). Saunders, "Refug. Bot.," tab. 243. *Bot. Register*, 16, 1391. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 10.

A winter annual, appearing in summer or autumn and flowering early the following summer. The tallest of the annual Sedums, growing sometimes a foot in height, and the most branched, its slender pyramidal growth and starlike white flowers separating it from any other cultivated species. Where introduced, it often maintains itself by self-sown seedlings.

DESCRIPTION.—Annual, or occasionally biennial, tall, slender, much-branched, usually hairy; young plants lowly, forming a loose rosette of stalked leaves $\frac{3}{4}$ inch long; petiole $\frac{1}{8}$ inch, flat, nearly linear, lamina $\frac{1}{8}$ inch long, ovate, very blunt. *Stem* a foot or less, erect, hairy, dotted red, with wide-spreading, ascending lateral branches. *Leaves* alternate or opposite, or in whorls of 3 or 4, flat, fleshy, smooth, linear-obovate, sessile, red-spotted; the root-leaves obovate, with a distinct petiole. *Inflorescence* a loose paniced cyme, occupying the whole plant. *Buds* slender, ovate, acute, ribbed. *Flowers* 5-parted, $\frac{3}{8}$ inch across, on long pedicels. *Sepals* green, linear-lanceolate, hairy, separate nearly to the base. *Petals* white, wide-spreading, keeled, lanceolate, with an attenuate acute point, hairy on back, thrice the sepals, nerve red, depressed on face. *Stamens* $\frac{3}{8}$ the petals, spreading, filaments white, anthers purple. *Scales* small, yellowish, quadrate, emarginate. *Carpels* spreading, greenish, tinged red, equalling the stamens; slightly spreading in fruit.

Flowers June–July. Hardy.

HABITAT.—Central and Southern Europe, on shady rocks, &c. Naturalized in Buckinghamshire (Sowerby, "Engl. Bot." ed. 3, 4, 63).

Known in cultivation as early as 1610, but only occasionally found in gardens. I saw it at Leipzig, and with Mr. E. A. BOWLES at Waltham Cross, and received it from Oxford and Wisley. Of late years, *S. stoloniferum*, a very different plant (see p. 196), has been sold under the name of *S. Cepaea* by some nurserymen in England.

Cepaea is a pre-Linnean name for the plant.

141. *Sedum viscosum* Praeger (figs. 172, 173).

S. viscosum Praeger in *Journ. of Bot.*, 57, 57, 1919.

A distinct annual Chinese species, remarkable for the coating of glandular hairs tipped with a very viscid secretion which covers every



FIG. 171.—*S. Cepaea* Linn.

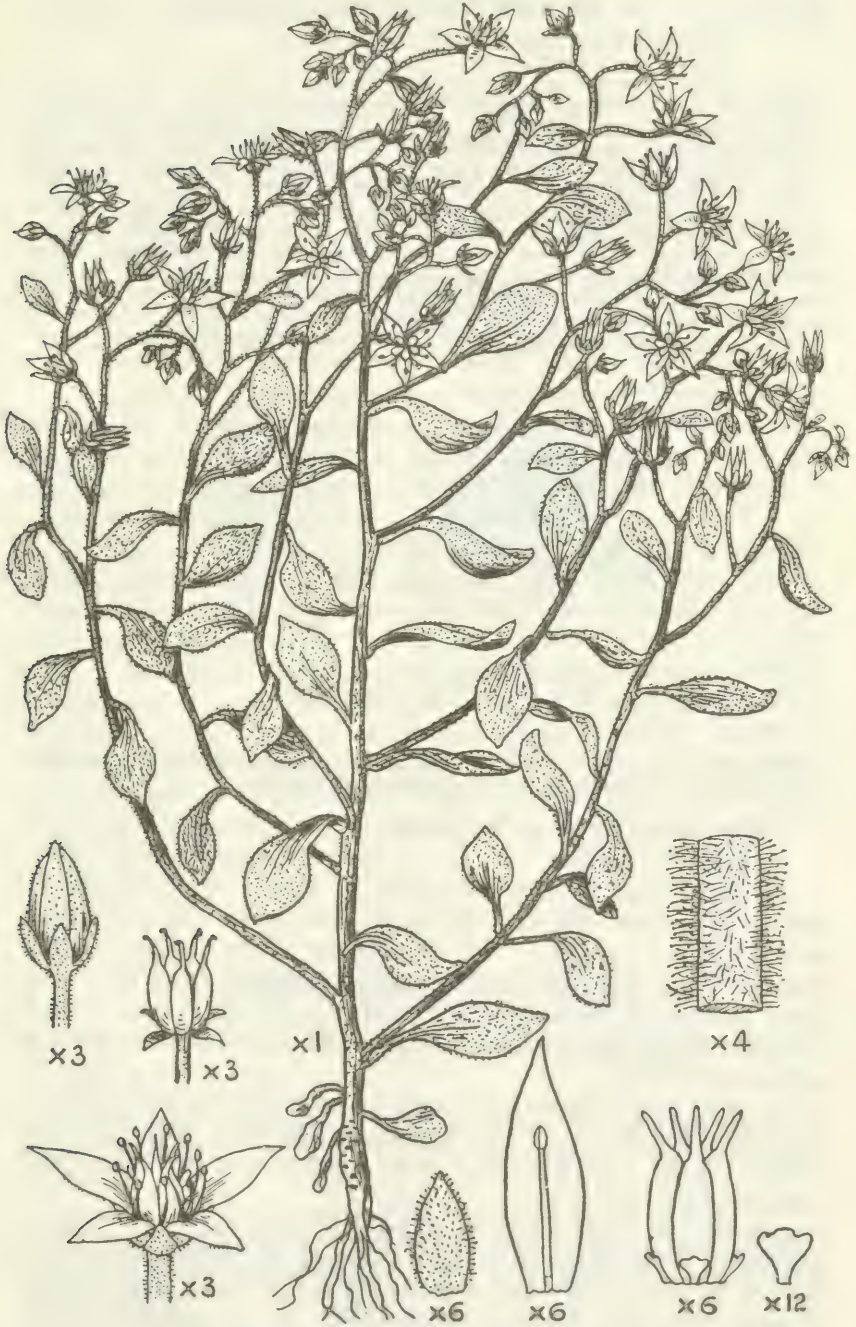


FIG. 172.—*S. viscosum* Praeger.

part of the plant except the stamens and the face of the petals. This character and its flat, entire, rather rhomboid stalked leaves and long-stalked yellow flowers readily distinguish it.

DESCRIPTION.—Annual or biennial, soft, downy, very viscid. *Stem* slender, erect, with many axillary ascending branches, dark red, densely clothed with patent viscid hairs, 4 to 8 inches high. *Leaves* alternate, rosulate in young plants, in flowering plants equalling or longer than the internodes, stalked, soft, fleshy, viscid-hairy on both sides; petiole $\frac{1}{4}$ inch long, lamina obovate-trapezoidal, $\frac{1}{2}$ inch long, $\frac{3}{8}$ inch broad, bluntly pointed, mostly tipped with a small purple dot. *Flowers* many, yellow, subopposite the leaves or more rarely axillary, pedicels slender up to $\frac{1}{2}$ inch long. *Buds* ovate, bluntly pointed, viscid-hairy, green or streaked with red. *Sepals* lanceolate, acute, fleshy, green, viscid-hairy, wide-spreading, not spurred. *Petals* linear-lanceolate, acute, $\frac{3}{5}$ inch long, on face smooth, yellow, on back viscid-hairy and greenish dotted with purple, wide-spreading, 2 to 2 $\frac{1}{2}$ times the sepals, erect, and persisting after flowering. *Stamens* 10, yellow, $\frac{3}{8}$ the petals, spreading. *Scales* small, broadly cuneate, minutely emarginate, pale orange-yellow. *Carpels* slender, oblong, greenish yellow, erect,

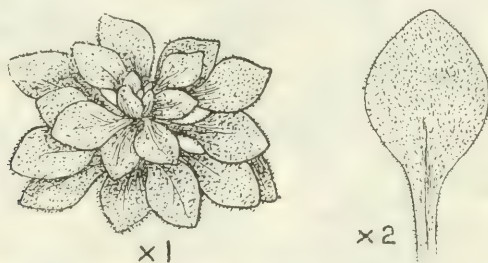


FIG. 173.—*S. viscosum* Praeger.

viscid-hairy, free, save at the very base; styles greenish, glabrous, spreading, about as long as the stamens, nearly erect after flowering.

Flowers June–August. Not hardy.

HABITAT.—Yunnan.

My knowledge of this little plant is due to Rev. Père E. E. MAIRE, who sent me seed in 1915. His label runs:—“*Sédum* annuel, gluant, rameux étalé-tomenteux, fleurs jaunes. Murs humides, ombragés, de Kin-tchong-chan, altitude 2,990 m.” The plant flowered at Kew, Glasnevin, and in my own garden in 1916 and 1917, behaving often as a biennial, but it is, no doubt, normally annual in duration.

It appears to resemble in many respects the northern race of *S. drymarioides* Hance, as described by MAXIMOWICZ (*Bull. Acad. St. Pétersbourg*, 29, 155), but differs in its much larger, flat flowers and other points.

Similar differences separate it from *S. stellariaefolium* Franch. Specimens of *S. viscosum* in the Edinburgh Herbarium have been labelled *S. drymarioides* var. *stellariaefolium* by HAMET, and possibly it may prove best to treat *drymarioides* as an aggregate, with *stellariaefolium*, *Esquirolii*, and *viscosum* as segregates.

Named after its viscid character, which is a very unusual feature in the genus.

SECTION IX.—EPETEIUM.

Section EPETEIUM Boissier, "Flor. Orientalis," 2, 776.

Annual, rarely biennial. Inflorescence cymose, 2- or many-branched, or corymbose. Leaves semiterete or cylindrical (rarely flat), not rosulate. Hardy or tender.

- A. PLANIFOLIA . . . *stellatum, formosanum, Someni.*
 B. TERETIFOLIA.
 a. Flowers white, red, or blue *hispanicum, villosum, coeruleum, rubens.*
 b. Flowers yellow . *annuum, Leblancae.*

There is a considerable number of annual species of *Sedum* which come under the above definition, and they are widely distributed. Very few are in cultivation or worth growing. A few are European, but they are much more abundant in the nearer East and in China, and some are American (chiefly Mexican).

S. rubens, and one or two allies, are usually placed in a separate section, *Procrassula* Schönland (= *Aithales* Webb and Berth.) characterized especially by possessing only five stamens. But the discovery in China in recent years of several *Sedums* (e.g., *S. Scallanii* Diels, *S. Schoenlandi* Hamet, *S. Seelemanni* Hamet, *S. Someni* Hamet, *S. ambiguum* Praeger) possessing, like the *Procrassulas* (which are a European group) only five stamens, but not otherwise related to them, tends to discount the value of *Procrassula* as a natural group. The suppression of the alternate stamens appears to be an abortion occurring irregularly throughout the genus, and not characteristic of any natural group or groups.

A. PLANIFOLIA.

142. *Sedum stellatum* Linn. (fig. 174).

S. stellatum Linn., "Species Plantarum," 431, 1753. Masters in *Gard. Chron.* 1878, ii. 751.

ILLUSTRATIONS.—Sibthorp, "Flora Graeca," tab. 446. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 9. Camerarius, "Icones," 2, 1598.

A small annual of no merit so far as gardens are concerned. Easily recognized among the annual species by its comparatively large spatulate leaves and purplish petals, eventually only half as long as the sepals.

DESCRIPTION.—A glabrous winter annual, appearing in autumn and flowering in June. *Stems* usually branched below, decumbent at base, ascending or spreading, stout, leafy, 2 to 6 inches long. *Leaves* alternate, spatulate, cuneate at base, rounded at apex, sometimes with a blunt deflexed point, shortly stalked,

often obscurely and distantly toothed, fleshy, green, shining, up to 1 inch long by $\frac{3}{8}$ broad, smaller above, merging into the bracts. *Inflorescence* generally of two leafy branches with a flower in the fork; bracts similar to the leaves. *Buds* small, ovate, acute, hidden in the large, leafy, nearly erect sepals. *Flowers* purplish,



FIG. 174.—*S. stellatum* Linn.

short-stalked or sessile, pedicels very thick, $\frac{1}{2}$ inch long. *Sepals* large ($\frac{1}{2}$ inch or more long), sub-erect, linear-lanceolate, green, very fleshy, often very unequal, at first slightly shorter than the petals, but often twice as long as them before the petals fade, tube short, thick. *Petals* erect, oblong-lanceolate, $\frac{1}{2}$ to $1\frac{1}{2}$ the sepals, purplish above, white at base, with a strong greenish keel. *Stamens* $\frac{1}{2}$ the petals, erect, filaments white, anthers rose to purple, the epipetalous ones adnate to petals near base. *Scales* small, inconspicuous, whitish, about as broad as long. *Carpels* about equalling the stamens, white, erect, soon spreading widely, stellate-patent in fruit; styles very short.

Flowers early June. Hardy.

HABITAT.—Southern Europe, from S.E. France to Crete.

Rare in cultivation. Has long maintained itself in the gardens of the late Canon ELLACOMBE, and of Mr. E. A. BOWLES. Sent to Wisley by Mr. CORREVON.

A very woody little plant, and the old stems bearing the star-shaped fruits may often be seen standing up among the flowering plants of the following season. The leaves are stated to be sometimes opposite or verticillate.

The specific name has reference to the star-like fruit.

143. *Sedum formosanum* N. E. Brown (fig. 175).

S. formosanum N. E. Brown in *Gard. Chron.* **34**, 134, 1885.

A floriferous annual allied to the Japonica series, which in its spathulate leaves and yellow flowers recalls *S. Alfredi* Hance. It may be distinguished from its allies by its erect carpels, and very large, loose inflorescence.

DESCRIPTION.—A glabrous annual, about 6 to 9 inches high. *Stem* procumbent at base or erect, repeatedly forked di- or trichotomously, round, smooth, succulent, reddish; branches divergent, ultimate branches recurved, indistinctly tetragonal with a groove down two opposite faces. *Leaves* alternate (occasionally opposite), bright green, paler below, softly succulent, recurved, pimply on face and edges when young, flat, spathulate, entire, very blunt, tapered below but scarcely stalked, midrib depressed on face, 1 inch long by nearly $\frac{1}{2}$ inch wide, smaller above, merging into similar bracts. *Inflorescence* very large, loose, leafy, of many dichotomous or trichotomous branches with flowers in the forks, and a leaf or bract at each fork and below each flower. *Buds* ovate, blunt or apiculate. *Flowers* $\frac{1}{2}$ inch across, sessile or nearly so, bright yellow. *Sepals* spreading, green, unequal, spathulate, shortly-stalked, leaf-like, slightly spurred. *Petals* oblong-lanceolate, mucronate, yellow, $\frac{3}{16}$ inch long, patent, $1\frac{1}{2}$ times the longest sepal, twice the shorter ones. *Stamens* slightly shorter than the petals, spreading, filaments yellow, anthers reddish. *Scales* pale yellow, cuneate, rounded at the apex. *Carpels* greenish yellow, erect, equalling the stamens, styles short, slightly recurved; carpels erect in fruit.

Flowers April–May–June, or September–October (sown in May). Not hardy.

HABITAT.—E. China, Formosa, Korean Archipelago.

Originally described from specimens raised at Kew from Formosa seed in 1885. Grown at Kew, Edinburgh, Glasnevin, and Wisley in 1916 from seed kindly sent me by Mr. W. J. TUTCHER, Superintendent of the Forestry Department, Hong-Kong.

N. E. BROWN describes it as "exceedingly pretty," but, though very floriferous, the blossoms are rather small and the plant straggling, and, though pleasing, it does not deserve such high praise.

144. *Sedum Someni* Hamet (figs. 176, 177).

S. Someni Hamet in *Journ. of Bot.*, **54**, App. I., p. 18, 1916.

SYNONYM.—*S. Mairei* Praeger in *Journ. of Bot.*, **57**, 53, 1919.

Allied to the Japonica series, but annual or biennial, somewhat resembling, in its rosettes of leaves, the *spathulifolium* group from



FIG. 175.—*S. formosanum* N. E. Brown.



FIG. 176.—*S. Somem Hamet*.

western North America. Easily distinguished by its usually annual duration, persistent white, membranous, old leaves, tall branched growth, small flowers, beaded upper leaves and sepals, and peculiar scales.

DESCRIPTION.—A loosely tufted, glabrous, sub-deciduous annual or biennial. *Stems* branched, decumbent or ascending, round, smooth, finely striate, shining, dark brownish purple; the barren ones short (2 to 4 inches), with axillary branches above, each bearing a lax rosette of leaves, the fertile ones 6 to 8 inches, leafy, with terminal cymes. *Leaves* of barren stems alternate, entire, sessile, fleshy, flat, oblong-obovate, broad at the base but scarcely clasping, rounded or very bluntly



FIG. 177.—*S. Someni* Hamet.

pointed at the apex, scarcely spurred, 1 by $\frac{1}{2}$ inch, bright green; those of the flowering shoots half as large, obovate, margins beaded, decreasing upwards into similar bracts, the lower ones at flowering time dry, membranous, and white. *Inflorescence* of 3 erecto-patent, forked branches with flowers in the forks, rather flat-topped, 1 to 2 inches across, lowest flower shortly stalked, the rest sessile. *Buds* ovate, bluntly pointed. *Flowers* rather small and inconspicuous, $\frac{5}{16}$ inch across, greenish yellow. *Sepals* unequal, obovate-oblong, obtuse (Hamet) or apiculate, beaded on the edges, shortly spurred, bright green, about equalling the petals, wide-spreading in bud. *Petals* yellow, wide-spreading, ovate, subacute to acuminate, $\frac{3}{16}$ inch long. *Stamens* 5 (sometimes 10), $\frac{3}{4}$ as long as the petals, yellow, the epipetalous ones inserted near the base of the petals. *Scales* small, greenish, narrowly linear in lower half, almost cordate in upper half. *Carpels* green, erect, equalling the stamens, narrowing into short styles, stigmas capitellate.

Flowers July–August (cold frame and gentle heat). Not hardy.

HABITAT.—Yunnan. Grown from seed collected in 1915 by Rev. E. E. MAIRE about Tong-tchouan, 2,900 mètres elevation, and flowered at Glasnevin in 1916 and 1917.

Of the plants raised, one flowered in the first year and then died. In this the flowers had only five stamens, and the inflorescence proved abnormal, being very lax and leafy, with large flowers. The rest flowered in the following season, and the flowers examined had ten stamens. Misled by this, I described the plant as new (as above). Further examination of this material shows that the number of stamens in the flowers is not constant. As the stamens in the type material and in other gatherings in the Edinburgh Herbarium (which like the type are of MAIRE's gathering about Tong-tchouan) are five, it appears that my specimens were exceptional.

Named after Dr. SOMEN.

B. TERETIFOLIA.

145. *Sedum hispanicum* Linn. (fig. 178).

S. hispanicum Linn., "Cent. Plant.," 1, 12, 1755; "Amen. Acad.," 4, 273, 1759.

SYNONYMS.—*S. glaucum* Waldstein and Kitaibel, "Plant. Rar. Hungar." Boissier, "Flor. Orient.," 2, 789. Masters in *Gard. Chron.* 1878, ii. 685. *S. sexfidum*, M. von Bieberstein, "Flor. Taurico-Caucas.," 1, 354.

ILLUSTRATIONS.—Reichenbach, "Flor. German.," 23, tab. 51. Sibthorp, "Flora Graeca," 5, tab. 449. Jacquin, "Flor. Austriac. Icones," 5 (appendix), tab. 47. Waldst. and Kit. *loc. cit.* tab. 181. Hallier, "Flor. Deutschland," 26, pl. 2643.

The type is well marked by its annual duration, pinkish-glaucous colour, and pinkish-white flowers with the parts in sixes. The plant, however, is polymorphic, and varies as regards size, duration, hairiness, and the number of the floral parts—see below.

DESCRIPTION.—Generally annual, appearing in autumn or spring and flowering in June; sometimes biennial; two varieties perennial. A small, pinkish-glaucous plant, 2 to 6 inches high. *Stems* branched below, branches ascending, leafy, more or less hairy. *Leaves* sessile, linear to oblong-lanceolate, rather acute, glaucous, often reddish, fleshy, flattened, sometimes subterete, $\frac{1}{2}$ to 1 inch long by $\frac{1}{8}$ inch broad. *Inflorescence* a loose, leafy, flattish cyme. *Buds* ovate, acute, ribbed. *Flowers* $\frac{1}{2}$ inch across, usually 6-merous, sometimes 4-, 5-, or up to 9-merous. *Calyx* short, green, teeth triangular, acute. *Petals* white, very acute, wide-spreading, 4 times the sepals, keeled on back, nerve red. *Stamens* shorter than the petals, filaments white, anthers purple. *Scales* whitish, cuneate, strongly emarginate. *Carpels* erect, often red, smooth or hairy; style long, curving outwards; fruit stellate-patent.

Flowers June. Hardy.

HABITAT.—From Switzerland eastward to Persia.

Carpels sometimes glabrous (var. *leiocarpum* Boissier, "Flor. Orient.," 2, 789), sometimes more or less hairy (var. *eriocarpum* Boissier, *loc. cit.*). If starved, as when grown on a wall, it tends to produce barren shoots and to lose its annual character, thus approaching var. *bithynicum* Boissier, *loc. cit.*

Var. *polypetalum* Boissier, "Flor. Orient.," 2, 789 (fig. 178, a).

Petals 7 to 9, and other floral organs in proportion; sepals lanceolate.

BOISSIER describes the anthers as usually yellowish, and the carpels as glabrous; in my plants, which I received from the Cambridge



FIG. 178.—*S. hispanicum* Linn. and varieties.

Botanic Garden, the anthers are purple and the carpels hairy; but the latter character is so variable in this species that the Cambridge plant may reasonably go under BOISSIER'S name. Resembles the type in its size and annual character.

Var. *minus*, var. nov.* (fig. 178, b).

Perennial. Smaller in all its parts, with many crowded barren shoots densely clothed with glaucous leaves $\frac{1}{4}$ inch long, flowering stems about 2 inches high, floral parts in sixes, carpels hairy.

This is the small, glaucous form long used for carpet-bedding under the name of *S. glaucum* or *S. Lydium glaucum*. The latter name, though erroneous, is apt, as out of flower the plant much resembles a glaucous *S. Lydium*. Quite perennial. There is a form of it with yellowish foliage, known in gardens as *S. Lydium aureum*. Though long in cultivation and most distinct, this plant appears to be undescribed. I have no information as to its native habitat.

Regarding the "*S. Wightmannianum*, or *S. Whitmanni* of gardens," of which an incomplete description is given by Masters (*Gard. Chron.* 1878, ii. 751), I have no information; the names do not appear to be found in gardens now. His "*S. Witmanni* of some gardens" (p. 685) refers to *S. hispanicum*; and as in the index to his paper *Witmanni* is corrected to *Whitmanni*, the presumption is that all three names represent that species.

Not infrequent in gardens, mostly as *S. glaucum*. The oldest name, *hispanicum*, is not an appropriate one, as the plant does not occur in Spain, though originally believed to do so.

146. *Sedum villosum* Linn. (fig. 179).

S. villosum Linn., "Species Plantarum," 432, 1753.

ILLUSTRATIONS.—Sowerby, "English Bot." ed. 3, pl. 538. Reichenbach, "Flor. German.," 23, tab. 52. De Candolle, "Plantae Grasses," tab. 70. Hallier, "Flor. Deutschland," 28, pl. 2644. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 16. Zenker, "Flor. Thuringen.," 8, tab. 876.

A small downy biennial, with fleshy, linear-oblong leaves and small pink flowers, and stems usually much branched near the base.

DESCRIPTION.—Biennial, downy. *Stem* erect, red, downy, leafy, 2 to 6 inches high, usually emitting ascending branches below, some of which flower. *Leaves* alternate, linear-oblong, blunt, downy, sessile, not spurred, fleshy, flat above, rounded below, $\frac{1}{4}$ to $\frac{1}{2}$ inch long. *Inflorescence* a lax, corymbose cyme with erect branches. *Buds* ovate, blunt. *Flowers* $\frac{1}{4}$ inch across, shorter than the pedicels. *Sepals* very fleshy, lanceolate, blunt, hairy. *Petals* pale purple, ovate, apiculate, twice the sepals, with a hairy back and often a purple keel, concave longitudinally and transversely. *Stamens* shorter than the petals, filaments white, anthers dull purple. *Scales* small, yellowish, emarginate. *Carpels* bright green, oblong, erect, shorter than the stamens; styles short.

Flowers June–July. Hardy.

HABITAT.—From Greenland and Iceland across Europe to Serbia and Algeria. Frequent on damp roadsides in many districts in Scotland and N. England.

A little biennial plant of no horticultural interest, and seldom seen in gardens. It is very exceptional among Sedums in inhabiting

* *Planta perennis, in omnibus partibus quam typo minor; caules steriles plurimi, conferti, foliis glaucis 6 mm. longis dense tecti; caules floriferi 5 cm. alti. Flores 6-meri, carpellis hirsutis.*

damp ground. In the Botanic Garden at Leipzig, it maintains itself in marshy soil on the edge of tanks used for aquatic plants. Sent to Wisley by M. CORREVON, and also seen at Kew. I have had specimens from Ben Lawers in cultivation, by the kindness of Dr. W. G. SMITH.

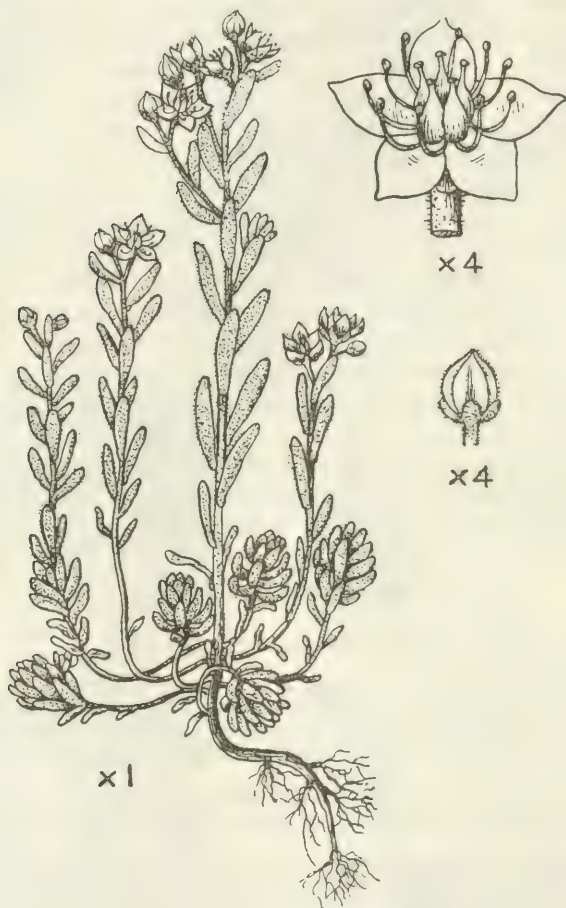


FIG. 179.—*S. villosum* Linn.

The name is descriptive of its hairy character. According to KERNER, the plant is a partial carnivore, capturing insects by means of its glandular hairs.

147. *Sedum coeruleum* Vahl (fig. 180).

S. coeruleum Vahl, "Symbolae Botan.," 2, 51, 1791. Masters in *Gard. Chron.* 1878, ii. 751.

SYNONYM.—*S. heptapetalum* Poiret.

ILLUSTRATIONS.—*Bot. Mag.*, pl. 2224. *Bot. Register*, 6, 520. Moris, "Flor. Sardoia," tab. 73, figs. 5-6. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 17.

Quite the most valuable of the annual Sedums. Its mass of small, sky-blue flowers (in which it stands unique) renders it most attractive, and in sun the leaves and stems assume a bright-red colour, providing a striking contrast.

DESCRIPTION.—A small, bushy annual, a few inches high, green or, in exposure, suffused with red. *Stem* round, smooth, finely hairy above, with many lateral branches. *Leaves* alternate, ovoid or oblong, sessile, not spurred, subterete, slightly flattened above, up to $\frac{1}{2}$ to $\frac{3}{4}$ inch long, smaller upward. *Inflorescence* lax, paniculate, occupying the whole plant. *Flowers* 7- to 9-parted, $\frac{1}{4}$ inch across, on



FIG. 180.—*S. coeruleum* Vahl.

long pedicels, deflexed after flowering. *Buds* ovate, blunt. *Calyx* cup-shaped with short, blunt teeth. *Petals* lanceolate, acute, wide-spreading, 3 times the sepals, blue with a white base. *Stamens* wide-spreading, nearly as long as the petals, filaments white, anthers purple. *Scales* small, white. *Carpels* erect, white, turning red in fruit.

Flowers July–August. Hardy.

HABITAT.—S. Europe and N. Africa from Algeria and Corsica to Malta.

Not infrequent in cultivation. In some gardens it maintains itself freely by self-sown seedlings which appear in early autumn; in others a damp, peaty, or gritty soil is found to suit it best. The specific name refers to the colour of the flowers.

148. *Sedum rubens* Linn. (fig. 181).

S. rubens Linn., "Species Plantarum," 432, 1753.

SYNONYMS.—*Crassula rubens* L. *Procrassula pallidiflora* Jord. and Fourr. *Atthales rubens* Webb and Berth.

ILLUSTRATIONS.—De Candolle, "Plantes Grasses," tab. 55. "Flora Danica," 1, tab. 82. Sturm, "Deutschlands Flora," 8, tab. 22. Rochel, "Plantae Banatus



FIG. 181.—*S. rubens* Linn.

Rar.," tab. 15. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 11. "Refug. Botan.," tab. 242. Jord. and Fourr., "Icones Plant. Eur.," tab. 80.

A rather dull little annual, a few inches high, with semi-cylindrical leaves and reddish flowers, which differs from most *Sedums* in having only five stamens. In general appearance it comes near *S. hispanicum*.

DESCRIPTION.—Annual, sometimes biennial, glandular-hairy and sticky. *Stem* erect, 2 to 4 inches high, simple or branched, hairy above. *Leaves* oblong-linear, sessile, very fleshy, flat on face, rounded on back, glabrous, blunt, $\frac{3}{4}$ inch long, turning red. *Inflorescence* of 2 to 4 leafy ascending branches 1 to 2 inches long. *Buds* ovate-lanceolate, acute, strongly ribbed, hairy, ribs red. *Flowers* sessile or nearly so, $\frac{1}{2}$ inch across. *Sepals* green or reddish, hairy, fleshy, triangular, acute, tube short. *Petals* white or reddish, with a red, depressed nerve,

lanceolate, acuminate, wide-spreading, hairy on the outside, 3 to 4 times the sepals. *Stamens* 5, slightly shorter than the petals, filaments white, anthers red. *Scales* small, white, cuneate. *Carpels* white or reddish, compressed, glandular-hairy or smooth, equalling the stamens, at first erect, wide-spreading in fruit.

Flowers July. Hardy.

HABITAT.—Europe, N. Africa, Canaries.

Rarely seen in cultivation. My specimens came from Wisley, where they were raised from seed supplied by M. CORREVON (as *S. litoreum*).

In the rock-garden at Wisley a curious plant sows itself annually, which has all the characters of *S. rubens* except that the flowers have usually six petals and twelve stamens. In these characters it agrees with *S. hispanicum*; but its stouter, more woody stems, stouter carpels not patent in fruit, and shorter styles, as well as its general appearance, belong to *S. rubens*. It may possibly be hybrid, and its carpels and styles sometimes vary towards *hispanicum*; but on the whole its characters are those of a hexapetalous dodecandrous *S. rubens*.

149. *Sedum annuum* Linn. (fig. 182).

S. annuum Linn. "Species Plant.," 432, 1753.

SYNONYM.—*S. saxatile* De Candolle, "Flore de France," 4, 394.

ILLUSTRATIONS.—De Candolle, "Plant. Succ.," tab. 119. "Flora Danica," tab. 59. Sibthorp, "Flora Graeca," tab. 450. Reichenbach, "Flor. German.," 23, tab. 54. Cusin and Ansberque, "Herb. Flor. Française, Crassul.," tab. 54. Mutel, "Flor. Française," tab. 19.

A tiny yellow-flowered annual of no horticultural value, recognizable by its much-branched habit.

DESCRIPTION.—A small, much-branched annual (sometimes biennial). *Stem* smooth, round, greyish, much branched, the branches bifid or trifid half-way up or more, 1 to 3 inches long, with a flower in the forks. *Flowers* many, small, yellow, borne laxly along the branches. *Buds* ovate, blunt. *Leaves* oblong-linear, $\frac{1}{4}$ inch long, alternate, smooth, blunt, sessile, slightly spurred, pale green, in section elliptic, straight or recurved, crowded on the young shoots, distant on flowering shoots. *Sepals* resembling the leaves, oblong-lanceolate, very fleshy, very blunt, unequal, not spurred, fused in the lower half. *Petals* broadly lanceolate or oblanceolate, acute, yellow, twice the sepals. *Stamens* yellow, wide-spreading, $\frac{3}{4}$ the petals. *Scales* oblong, greenish. *Carpels* at first erect, soon spreading, equalling the stamens, greenish yellow, in fruit stellate and surrounded by the persistent, fleshy sepals.

Flowers June–July. Hardy.

HABITAT.—Europe, Asia Minor, Greenland.

Received from Mr. E. A. BOWLES, collected in the Alps in 1914. Seen also at Kew (seed from Lund Botanic Garden, 1916) and at Wisley (seed from CORREVON, 1916).

150. *Sedum Leblancae* Hamet (figs. 183, 184).

S. Leblancae Hamet in Fedde, "Repertorium Sp. Nov.," 8, 311, 1910.

A Chinese biennial (or annual), and one of the few Sedums which possess only five stamens. This, and its linear-spathulate,

4-verticillate leaves, bushy growth, branches densely mammillate above, and yellow flowers with blunt linear sepals as long as the petals, will distinguish it from any other *Sedum*.

DESCRIPTION.—A deciduous, bushy, glabrous biennial, forming in flower a rather dense rounded mass 4 to 6 inches in height and breadth. *Roots* fibrous. *Stem* in first year short (2 to 3 inches), smooth, erect or inclined, simple, or with a few short patent branches, clothed with leaves which fall in autumn; in second year becoming $\frac{1}{2}$ inch thick, with marked constrictions at the nodes, branches often thicker at their apices than at their bases, bearing many slender (1 mm. diameter), erect or ascending, slightly grooved, reddish branches which branch many times and become densely mammillate above, the mammillae forming close, longitudinal rows. *Leaves* variable in arrangement, mostly



FIG. 182.—*S. annuum* Linn.

4-verticillate, sometimes (especially above) ternate, opposite or alternate, narrowly linear-spathulate, blunt, sessile, smooth, fleshy, flat above much rounder below, the lower about $\frac{1}{2}$ inch by $\frac{1}{16}$ inch, diminishing upwards into similar spurred bracts, spur very short, rounded. *Cymes* terminal, very many, each of a central flower surrounded by three short ($\frac{1}{2}$ inch), erecto-patent, leafy dichotomous branches, each bearing a flower in the fork and a few flowers on either side; pedicels shorter than the flowers, the upper ones very short. *Buds* ovate, acute. *Flowers* small, yellow, not opening widely, $\frac{1}{16}$ inch across. *Sepals* resembling the leaves, green, often flushed red, slightly unequal, linear to linear-spathulate, blunt, very fleshy, shortly spurred, up to about $\frac{1}{4}$ inch long, erect or spreading in bud. *Petals* erecto-patent, yellow, equalling the longest sepal, ovate-lanceolate, grooved on face, with a reddish keel on back, nearly $\frac{1}{4}$ inch long, with a short mucro behind and exceeding the blunt tip. *Stamens* 5, episepalous, yellow, equalling the carpels. *Scales* small, cuneate, emarginate, greenish-translucent. *Carpels* erect, ovate-oblong, green, $\frac{1}{2}$ the petals, narrowing rather abruptly into the short styles, which are at first erect, later spreading.

Flowers September–October. Not hardy.

HABITAT.—Yunnan. Seed was received from Rev. E. E. MAIRE



FIG. 183.—*S. Leblancae* Hamet.

in 1915, from Tong-tchouan, labelled "Rochers et murs humides, 2,990 mètres." Flowered at Glasnevin and in my own garden, 1917.

A species of peculiar and characteristic growth-form, unlike any other *Sedum*, so far as descriptions go. Described in 1910 by

HAMET from specimens collected among rocks on the Yo-lin-chan, Yunnan, by DELAVAY (No. 6726), and preserved in the Paris Herbarium. Also collected in Yunnan by DUCLOUX and others. Described as annual; but numerous plants, raised both in heat at Glasnevin and in the open in my own garden, were biennial. The cultivated

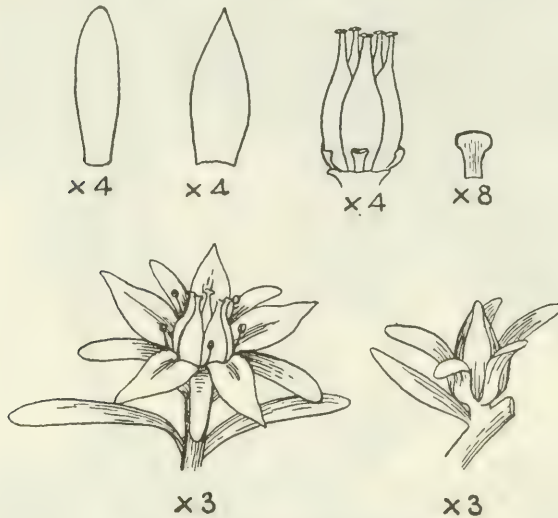


FIG. 184.—*S. Leblancae* Hamet.

plants agreed well with the description, save that they were larger in most of their parts—leaves half again as long and broad, and sepals, petals, and carpels about $\frac{1}{3}$ longer and broader.

Hamet considers it allied to *S. Aliciae* Hamet, *indicum* Hamet (*paniculatum* Wallich), *perpusillum* Hooker fil., *Przewalskii* Maximowicz, and *Schoenlandi* Hamet, and gives the points of difference.

SPECIES INCOMPLETELY KNOWN.

151. ? *Sedum polyrhizum* Praeger, sp. nov. (fig. 185).

At once separated from all other species in cultivation by its curious stems, densely armed with rough scales arranged in rings, and shaggy with short aerial roots almost to the tips. *S. oaxacanum* Rose, which resembles it in habit more than do most of the Mexican species, has its stems somewhat similarly roughened, but to a very much less extent, and *oaxacanum* is a much stouter plant with broader leaves and no aerial roots. The present species much resembles in habit and leaf a small *S. album*.

The plant came from New York Botanic Garden labelled *S. oaxacanum*, and is probably Mexican. Though it grows freely, all efforts to get it to flower have been unsuccessful both at Glasnevin and in my own garden, so that its reference to the genus *Sedum* must

remain for the present unproved. However, I name it tentatively, and describe it so far as the material goes.

DESCRIPTION.—A small, slender, diffuse, evergreen, creeping perennial. *Roots* fibrous. *Stem* procumbent, rooting below, ascending at the tips, slender, $\frac{1}{10}$ inch thick throughout, much branched, bright red above, grey when old, very rough with whitish, asperous, spreading, scale-like projections arranged in crowded rings

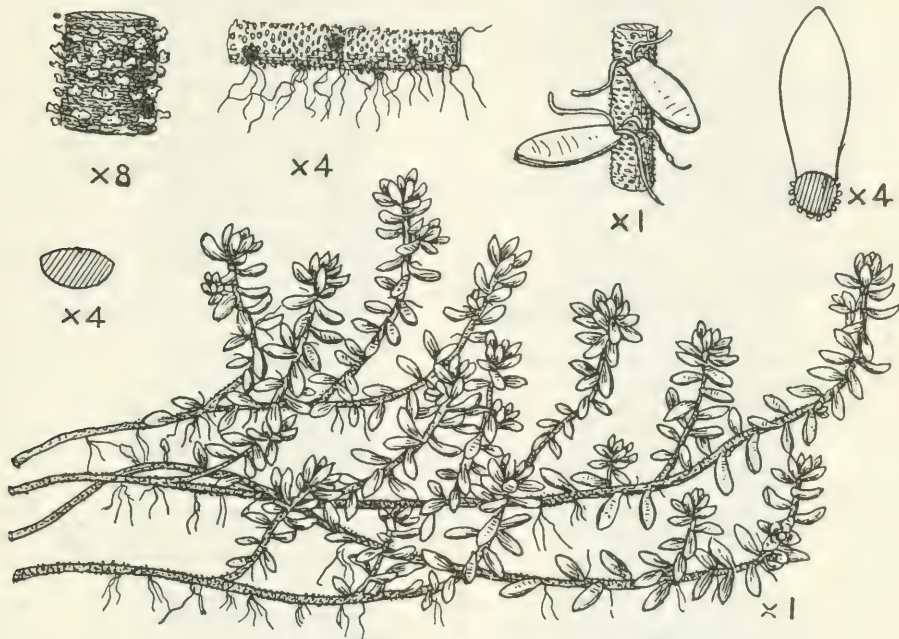


FIG. 185.—? *S. polyrhizum* Praeger.

throughout its length. *Aerial roots* very many, axillary, borne throughout the stem save for about $\frac{1}{2}$ inch at the apex, 5 or less at each axil, $\frac{3}{8}$ inch long, the upper ones alive, bright red, tortuous, the lower ones mostly dead, forming shaggy tufts at the swollen leaf-scars. *Leaves* alternate, crowded, patent or deflexed, longer than the internodes, glabrous, dark green, sessile, oblong-obovate, blunt, flattish on face, much rounded on back, $\frac{1}{4}$ inch long, $\frac{3}{8}$ inch broad, $\frac{1}{10}$ inch thick.

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[Synonyms and erroneous names in *italics*. Genera in SMALL CAPITALS.
Principal references in heavy type, thus—206.]

(In order to render this Index a more complete guide for garden purposes I have included in it the collection of erroneous garden names which I published in *Gardeners' Chronicle*, 3rd Ser., 56, p. 334, 1914. These are distinguished by the reference G.C.)

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