A Revision of the Genera *Fumaria* and *Rupicapnos*. By HERBERT WILLIAM PUGSLEY, B.A. (Communicated by A. B. RENDLE, D.Sc. (Lond.), F.R.S., Sec.L.S.)

(PLATES 9-16.)

[Read 3rd May, 1917.]

INTRODUCTION.

IN the course of writing "The Genus *Fumaria* in Britain," published as Supplement I to the 'Journal of Botany' for 1912, it was found necessary to examine not only those Foreign Fumitories that were most closely connected with the British forms, but in a general way all the annual species of the genus of which material could be obtained; and remarks on the salient features of various non-British species are embodied in that work in the reviews of the generic subdivisions.

During the winter of 1912-13 several Foreign collections were received for examination, notably the fine sets of Mr. Charles Bailey and of Zürich University, the latter kindly sent by Professor Schinz; and with this material for reference (numbering over 2000 sheets), in addition to the herbaria at the British Museum and at Kew, where some important types are preserved, an opportunity presented itself to effect an appreciable advance in the study of the genus. About the same time valuable supplies of living plants were obtained from the Riviera and the neighbourhood of Gibraltar through the kindness of Mr. H. Stuart Thompson, Major A. H. Wolley-Dod, and Mr. E. G. Baker, and an opportunity was taken during the succeeding summer to visit the Boissier Herbarium at Geneva and examine the important types there.

The result of this work is the present paper, the completion of which has been seriously delayed owing to the pressure of other duties consequent upon the war. An attempt is now made to offer a general criticism of all the species of the genus, which it is thought may be useful for reference as a Supplement to the Latin edition of Olof Hammar's "*Monographia Generis Fumariarum*" (Nov. Act. Reg. Soc. Scient. Upsal. ser. 3. ii. fasc. post. p. 258), published at Upsala in 1857, taken in conjunction with C. Haussknecht's "*Beitrag zur Kenntniss der Arten von Fumaria, sect. Sphaerocapnos*," in '*Flora*,' lvi. (new series xxxi.) (1873), the writer's above-mentioned "*Genus Fumaria in Britain*," and certain other works wherein the *Fumariæ* are dealt with in more or less detail. Hammar's earlier Monograph ("*En Monografi öfver Släktet Fumaria*"), which was published at Lund in 1854 and considerably amended in his later work, is referred to only in a few special cases.

CLASSIFICATION OF THE GENUS *FUMARIA*.

In this Revision *F. spicata*, Linn. and its allies are omitted as they seem best referred to a separate genus *Platycapnos*, Bernhadi in 'Linnæa,' viii. 471 (1833); and *Discocapnos*, Cham. & Schlecht. in 'Linnæa,' i. 569 (1826), is similarly excluded.

The genus *Fumaria*, thus restricted, has been commonly regarded as comprising two sections, viz. :—(1) *Petrocapnos*, Cosson & Durieu in Bull. Soc. Bot. France, ii. 305 (1855), et Cosson, Comp. Fl. Atlant. ii. 80 (1883–1887); (= *Rupicapnos*, Pomel, Mat. Fl. Atlant. 16 (1860), et Nouv. Mat. Fl. Atlant. i. 240 (1874), as a genus); in which the species are usually perennial, nearly stemless, with leaves mostly radical, a subcorymbose inflorescence, and strongly tubercular-rugose fruits: and (2) *Sphaerocapnos*, DC. Syst. Nat. Veg. ii. 131 (1821); Cosson, Comp. Fl. Atlant. ii. 83 (1883–1887); consisting of the annual species, with elongate stems, cauline leaves, racemose flowers, and generally less tubercular fruits.

It was at first intended that this paper should deal only with the second of these sections, as indicated in the notice read before the Society on the 3rd May, 1917; but subsequently, on the expressed wish of the Council, an extension was decided upon in order to complete a review of the whole genus. An examination of the species of *Petrocapnos*, however, revealed that in addition to the points of distinction noted by Cosson and Pomel, there are other important floral and fruiting characters by which they may be separated as a group from the annual *Fumariæ*, and it is consequently felt essential to follow Pomel in treating them as a distinct genus. An account of these plants follows that of the true Fumitories.

With this view the genus *Fumaria* becomes synonymous with the section *Sphaerocapnos*, DC., and the classification followed is that already adopted for the British species, coinciding practically with that of Haussknecht's Revision in 'Flora,' lvi. (1873), with an emendation of the sequence of the subdivisions. It is only after considerable hesitation that this system has been preferred to that of the more finished Monograph of Hammar, and it is readily admitted that Haussknecht's two primary divisions of *Latisectæ* and *Angustisectæ* are unsatisfactory until their definitions are enlarged by the addition of floral characters and they become converted into *Grandiflora* and *Parriflora* respectively. A third classification, relying on the curvature of the fruiting pedicel or its absence as a primary basis of segregation, which was adopted by Boissier in the 'Flora Orientalis' owing to the ready obliteration of the corolla-characters in *exsiccata*, seems unreliable owing to the inconstancy of the recurved pedicel in the species in which it is commonly seen, and unnatural in its association of plants sometimes widely divergent in other characters.

It will be remembered that Hammar was led to write his Monograph from

seeing Fries' fine series of cultivated Fumitories at Upsala, and as a large proportion of his descriptions are taken from plants subsequently grown at Lund, he was evidently well acquainted with many of the living forms and his choice of the corolla-characters as the basis of generic sections cannot be lightly set aside. But, on the whole, the annual *Fumariæ* seem to fall naturally into two rather than three large groups. So far as the small-flowered species are concerned there is no real discrepancy between Hammar's arrangement and that of Haussknecht, for the *Officinales* and the *Angustisectæ* comprise practically the same species, one author relying on the floral features and the other on those of the foliage with which they are commonly associated. But while Hammar's sectional definitions of his *Officinales*, and also of his *Agrariæ*, fairly cover all the species placed under them (although in the former the margins of the upper petal are not often truly patent), it is not so with his third section, *Capreolatæ*, which show marked variations in the corolla. As instances of this, the spreading margins of the lower petal in *F. Bastardii*, Bor. (*F. media* β . *confusa*, Hamn.) may be cited, or the normally obtuse upper petal of *F. Gussonei*, Boiss. (Pl. 9, figs. 1-3). And when more recently discovered plants are included, a complete series of transitional forms may be traced through this section, connecting *F. capreolata*, Linn., to which Hammar's sectional diagnosis of the corolla correctly applies, with the species of the section *Agrariæ*. At the same time, neither the *Agrariæ* nor the *Capreolatæ* can be said to be similarly connected with the *Officinales*.

It may thus be argued, if the floral characters alone are considered, that the plants placed by Hammar in his section *Capreolatæ* differ from the *Agrariæ* in that the development of the margins of their outer petals is more or less arrested. In some other important features, such as size of flower and character of foliage, most of the *Capreolatæ* approximate to the *Agrarian* species and are plainly different from the *Officinales* or *Parvifloræ*. The fruiting characters cannot be similarly contrasted, for while a certain degree of uniformity prevails among the fruits of the *Agrariæ*, which are usually large and coarsely rugose, and also to a less extent among the *Officinales*, where they are very rarely large, coarsely rugose, or yet quite smooth, in the *Capreolatæ* of Hammar this organ is eminently variable, being in some species quite small and perfectly smooth, in others larger than in some *Agrarian* species or distinctly rugose. As the variations of the fruit in Hammar's *Capreolatæ*, therefore, give little indication of any group-affinity, it seems safest to rely chiefly on the foliage and the flowers, and to regard the section as related to the *Agrariæ* rather than a distinct group equal in rank to these and the *Officinales* or *Parvifloræ*.

The contention for two natural groups—*Grandiflora* or *Latisectæ* and *Parviflora* or *Angustisectæ*—is further supported by the geographical distribution of the species. The *Agrariæ*, especially *F. agraria* and

F. rupestris, bear a superficial resemblance in flower and fruit to the perennial *F. africana*, Lamk., of the section *Petrocapnos*, which Hammar, who probably had very scanty material before him, included among them. Like *F. africana* they are lovers of warmth, and some of them grow in native habitats on rocks in North Africa, whence they appear to have spread to cultivated land. Most of them flourish in North Africa, and while they extend round nearly the whole Mediterranean littoral, they are absent at any great altitude or distance from the sea. Away from the Mediterranean *F. agraria* alone spreads through Portugal, where rigorous winters are unknown, while *F. occidentalis* curiously occurs as an isolated outlier of the group in West Cornwall, where the mildness of the winters, considering the latitude, is proverbial.

The other large-flowered Fumitories, Hammar's *Capreolatae*, are likewise most abundant round the Mediterranean, especially towards the west, whence they extend over the islands of the North Atlantic. They also range through France and Britain, but are rare or absent east and north of a line drawn southwards along the Rhine and across the Eastern Alps and Balkans to the Black Sea. Their distribution thus agrees generally with that of the *Agrariae*, but is less restricted to the south, the *Capreolatae* forms being evidently less impatient of cold and able to maintain themselves about as far northwards as the isotherm of 32° F. for the month of January.

The large-flowered Fumitories, regarded as a whole, may thus be considered as primarily plants of the Mediterranean region, extending northwards in Western Europe, but practically absent from Central and Eastern Europe, and from Asia except in the vicinity of the Mediterranean. It is evident that they cannot exist where the winter climate is severe.

On the other hand, the *Parviflorae* or *Officinales* of Hammar have a different and much wider distribution and are very much hardier. While they inhabit almost the whole region occupied by the *Grandiflorae*, they occur in the greatest abundance and variety in Eastern Europe, and in Western and Central Asia, where they extend as far as India and Mongolia. In some of their habitats they maintain an existence under climatic conditions very severe for annuals. *F. Schleicheri* and *F. Vaillantii* are found in the Altai region, and both of these species grow at an altitude of nearly 2000 m. in the Swiss Alps. Four species, *F. parviflora*, *F. Vaillantii*, *F. Schrammii*, and *F. officinalis*, have a remarkably wide distribution, ranging from the Atlantic far into Asia; but most of the local species are Asiatic, although some rare outliers are found in the high mountains of Africa. It will thus be seen that the small-flowered Fumitories are plants of almost the whole Palearctic region outside the Arctic Circle and excluding China, with a tendency to predominate towards the east and with isolated species on certain African mountains.

From these considerations, morphological and geographical, it has been decided to follow Haussknecht in dividing the genus into two Sections, *Latisectæ* or *Grandiflora*, and *Angustisectæ* or *Parviflora*, based mainly on a combination of foliar and floral characters, as has been done in "*Fumaria* in Britain."

The Section *Grandiflora*, representing the *Agrariæ* and *Capreolatæ* of Hammar, is readily subdivided into three subsections, as is done by Haussknecht, by eliminating, as *Murales*, from the well-marked Agrarian and Capreolate species the more dubious and intermediate plants, some of which present distinct individual features, while one or two others show affinities with certain of the *Parvifloræ*.

Of the Section *Parviflora* (*Officinales* of Hammar) the most strongly marked species are *F. parviflora*, Lam. and its allies, which were distinguished in "*Fumaria* in Britain" as *Microsepalæ* from their very small sepals. Among the other species, *F. officinalis* with some allied forms seems to constitute a natural subsection (*Officinales*) owing to the peculiarly shaped and broad fruits, as well as the larger flowers with less minute sepals. The remaining species—all well-marked by relatively large sepals—fall into a homogeneous subsection *Latisepalæ*. In these plants the form of the corolla is less characteristic than in the other *Parvifloræ*, and some of them show affinities with a few species of the *Murales*.

With regard to the generic sequence of these subdivisions, the most natural arrangement appears to be a commencement with the subsection *Agrariæ*, followed by the *Capreolatæ* and the *Murales* respectively. As the *Murales* show affinities with the *Latisepalæ* these subsections are placed in juxtaposition, and after them the *Officinales*, with the *Microsepalæ*, comprising the most extreme small-flowered forms, completing the genus.

SPECIES OF *FUMARIA* AND THEIR DISTRIBUTION.

The number of species of *Fumaria* recognized in this Revision is 46—27 *Grandifloræ* and 19 *Parvifloræ*. Hammar's number of species in his final monograph is 24, including *F. Heldreichii* but without *F. corymbosa*; and Haussknecht gives 35, if *F. microstachys* and *F. microcarpa* are included. Twenty of Hammar's species are retained, three of the remainder, *F. affinis*, *F. vagans*, and *F. Gussonei*, being united with *F. media* β . *confusa* as one species *F. Bastardii*, and *F. Heldreichii* is reduced to a variety of *F. Thuretii*.

Of Haussknecht's species *F. gaditana* and *F. Pikermiana* are made varieties of *F. sepium* and *F. Thuretii* respectively, and *F. malacitana* is identified with *F. macrosepala*; the remaining 32 retain their specific rank excepting *F. Boravi*, which is reduced to a subspecies of *F. muralis*.

The 15 additional species are variously accounted for. *F. Gaillardotii* is segregated from the allied *F. major*, *F. apiculata* from *F. muralis*, and the Dalmatian *F. Petteri* from *F. Thuretii*. Haussknecht's varieties *F. capreola*'a

β. intermedia, *F. Vaillantii* γ. *indica*, and δ. *Schrammii* are raised to specific rank as *F. dubia*, *F. indica*, and *F. Schrammii* respectively. The Canary Islands plant referred to *F. montana*, Schmidt, is separated as a distinct species *F. coccinea*. *F. bicolor*, *F. Martinii*, *F. purpurea*, and *F. occidentalis*, described since the publication of Haussknecht's work, are admitted as new species. Two Moroccan plants, ranked by John Ball as *F. agraria* var. *atlantica* and subspecies *tenuisecta*, are described as new species *F. berberica* and *F. Ballii*. *F. micrantha* var. *Parlatoriana*, Boiss. is included as *F. bracteosa*, and *F. australis* is distinguished for the first time.

The continental distribution of these 46 species may be summarized as follows :—

Of the *Grandifloræ* 21 occur in Europe and 7 are peculiar to that continent.

	18	„	Africa	„	6	„	„
	5	„	Asia	„	0	„	„
Of the <i>Parvifloræ</i>	9	„	Europe	„	2	„	„
	9	„	Africa	„	4	„	„
	13	„	Asia	„	5	„	„

Of individual countries, the richest in Europe is Spain, where 17 species occur—11 *Grandifloræ* and 6 *Parvifloræ* : France has 12 species, 6 of each section ; Britain 10, 6 *Grandifloræ* and 4 *Parvifloræ* ; Italy 11, 7 *Grandifloræ* and 4 *Parvifloræ* ; Balkan Peninsula 16, 9 *Grandifloræ* and 7 *Parvifloræ* ; Germany 9, 2 *Grandifloræ* and 7 *Parvifloræ* ; Russia 9, 1 *Grandiflora* (introduced ?) and 8 *Parvifloræ*. In Africa, 14 species (10 *Grandifloræ* and 4 *Parvifloræ*) grow in Algeria, and 8 (3 *Grandifloræ* and 5 *Parvifloræ*) in Egypt. The number for Asiatic Turkey is 16, viz. : 5 *Grandifloræ* and 11 *Parvifloræ* ; and for Persia 5, all *Parvifloræ*. These figures indicate the predominance of the *Grandifloræ* in the Mediterranean region and Western Europe, and of the *Parvifloræ* towards the East and North, and in Asia, as pointed out on page 236.

While six species, *F. capreolata*, *F. micrantha*, *F. officinalis*, *F. Vaillantii*, *F. Schrammii*, and *F. parviflora*, are remarkable for their wide distribution, a considerable number of species are distinctly local. Some of these are endemic in insular habitats, such as *F. purpurea* and *F. occidentalis* in Britain, *F. coccinea* in the Canaries, and *F. montana* of the Cape Verde Islands. *F. bicolor*, of the islands of the Western Mediterranean, is almost a similar example, although it occurs also in Algeria. *F. Ballii*, *F. dubia*, *F. berberica*, and *F. Munbyi* all seem to be rare North African plants ; *F. amarysia* and *F. Petteri* are confined to Greece and Dalmatia respectively ; and among the *Parvifloræ*, *F. Jankæ* appears local in Hungary, *F. Boissieri* in Mesopotamia, *F. microstachys* in Egypt, and *F. australis* in East Africa. Three other scarce species, *F. rupestris*, *F. macrosepala*, and *F. sepium*, are notable as only occurring locally on both sides of the strait of Gibraltar ; and *F. apiculata* and *F. Reuteri* seem sparingly distributed in the Iberian Peninsula.

It is probable that in the Old World the range of the more widely spread species has been extended through human agency, as has obviously happened in America, where *F. agraria* and *F. capreolata* are extensively naturalized in the southern continent and *F. parviflora* in Mexico. The remarkable distribution of *F. muralis* from Western Europe round Africa to the East Indies and New Zealand is clearly due to the same cause.

NATURE OF HABITATS OF THE FUMARIÆ.

In north-western Europe, where the conditions of an open association and free soil such as the annual Fumitories require are now rarely to be met with in natural habitats owing to the spread of modern civilization, the plants of this genus are very generally found as weeds of cultivation; and owing to the moist summers that usually prevail, they may commonly be seen from spring to autumn according to the tillage of the ground, for the frequent rains afford continuously a sufficient degree of moisture for the germination of their hard-coated seeds. In these regions they show considerable variation in different situations and as the season progresses, and the diverse forms that they assume have been carefully diagnosed by Haussknecht in the case of the small-flowered species with which he was familiar in Germany.

In the Mediterranean region, however, as well as in Asia, where the summers are normally hot, and dry rather than wet, it is only after the winter rains that the seeds are able to germinate, and consequently *Fumariæ* are generally flowers of spring or early summer only and are liable to less vegetative change.

In these southern and eastern countries it is evident from the notes of collectors that they are by no means confined to disturbed or cultivated ground, for the conditions of environment which they need frequently exist in nature on an extensive scale. The following records of apparently natural habitats have been noted:—Among the *Grandifloræ*, *F. rupestris* from rock fissures and calcareous rocks; *F. atlantica* from shady rocks; *F. flabellata* from grassy hills and maritime pastures; *F. dubia* from “mountains” near Algiers; *F. macrosepala* from shady rocks, rock-slopes and among *Chamarops*; *F. coccinea* from moist rocks and mountain wood-edges; *F. bicolor* from bushy places and slopes near the sea; and *F. sepium* var. *gaditana* from stony slopes. Of the *Parvifloræ*, *F. montana* from mountain rocks; *F. Kralikii* on rocks in the Crimea (Pallas); *F. officinalis* var. *minor* on rocks and in stony places in the Crimea (Pallas & Bieberstein); *F. Vaillantii* from sandy hills of the desert in Songaria; *F. asepala* in stony, uncultivated places; *F. parviflora* in the desert near Bagdad; *F. parviflora* var. *latisepta* in shady places of Mt. Sinai; and *F. parviflora* var. *persica* on maritime sands of the Caspian.

From this list it may not unreasonably be assumed that clearly native localities for a large proportion of the known species will someday be traced, although in some countries, such as Britain, where very great natural changes have taken place, this may no longer be possible, the original stations for the endemic species being now lost and the plants compelled to maintain themselves entirely on ground periodically disturbed by cultivation.

The prevalence of the *Grandiflora* in the Old Red Sandstone districts of Great Britain, and of *F. Vaillantii* and *F. parviflora* on the Chalk was pointed out in "*Fumaria* in Britain," but it has not been found possible to determine the geological formations favoured by different species outside the British Islands.

THE GENUS *RUPICAPNOS*.

Of the plants treated by Cosson as a section *Petrocapnos* of *Fumaria* and by Pomel as a separate genus *Rupicapnos*, the earliest known is the large-flowered species discovered in Algeria by Desfontaines and described by Lamarek in 1788 as *Fumaria africana*. This fumitory was placed by De Candolle in Syst. Nat. Veg. ii. p. 132, with *Fumaria spicata*, L., to form a section *Platycapnos* of *Fumaria*, characterized by compressed fruits—an arrangement probably due to Desfontaines' description of the silicle as "comprimée" rather than to any actual knowledge of the plant.

In 1855 the section *Petrocapnos* was established by Cosson & Durieu in Bull. Soc. Bot. France, ii. p. 305, with four species, one of these being *F. africana*. The sectional diagnosis states that the group consists of rock-plants, mostly nearly stemless perennials, with long-petioled leaves exceeding the subcorymbose racemes of flowers, which are borne on very long pedicels, and with compressed, apiculate fruits. The resemblance of these plants to the genus *Sarcocapnos*, both in habit and in the flowers of one species, is duly noted.

Hammar, at the time of writing his Monograph of *Fumaria*, seems to have been unaware of this publication of the section *Petrocapnos*, and included the one species known to him, *F. africana*, in his section *Agrarie*.

A more adequate account of these plants, though embracing only the four species already described, appeared in 1860 in a small pamphlet entitled "*Matériaux pour la Flore Atlantique*," by A. Pomel. In this work the genus *Rupicapnos* is established, and in addition to the characters of *Petrocapnos* noted by Cosson & Durieu, the prevalent gibbosity at the base of the lower petal is pointed out, as well as the curious elongation and reflexing of the fruiting pedicels whereby the seeds are carried down to the clefts of the rocks in which the plants grow. The wholly adherent endocarp of the fruit, also, is contrasted with the apically separated and depressed endocarp of *Fumaria*, and it is demonstrated that while the amphitropous seed of this latter genus shows a bowl-shaped hollow on the upper side, into which the depressed

endocarp of the fruit fits, in *Rupicapnos* the upper part of the seed is simply rounded without any hollow. The absence of the strongly marked fold in the albumen below the micropyle, as seen in *Fumaria*, is also noted.

In a second work fourteen years later (Nouv. Mat. Fl. Atlant. i. p. 240, and ii. p. 379) a further account of these plants is given by Pomel, and fifteen species are described, seemingly from material collected by himself, except in the case of two species which are adopted from Cosson & Durieu. It is clear from this work that Pomel possessed a considerable detailed knowledge of the group, and he has left some accurate descriptions; but unfortunately he makes no reference to the various exsiccata that had already been distributed by other botanists.

The later works of Cosson and of other writers have not maintained Pomel's separate genus *Rupicapnos* despite the distinctive features ascribed to it by its author. The demonstrated differences of the fruit and seed, however, seem of the first importance, and not only does *Rupicapnos* lack the depressed endocarp and hollowed seed of *Fumaria* but—what is not so clearly stated by Pomel—the clefts in the mesocarp which give rise to the “apical pits.” On the other hand, the definition of the fruit of *Rupicapnos* as compressed, in contrast with the subglobose fruit of *Fumaria*, cannot be accepted though endorsed both by Pomel and Cosson. Except in the case of some of the annual species, the compression of the fruit in *Rupicapnos* is not appreciably greater than what usually obtains in *Fumaria*.

In addition to the fruiting differences it may be observed that the flowers of *Rupicapnos* seem to simulate those of *Sarcocapnos* rather than those of *Fumaria* in that the margins of the two outer petals, which are obsolete or nearly so in the bud stage in *Fumaria*, are considerably developed at that period and generally conceal entirely the inner petals. There appears further to be an essential difference in the structure of the upper petal, for while in *Fumaria* the margins or wings (often strongly reflexed upwards) of the apical gibbosity are truly marginal only for a short distance back from the apex of the petal, and further towards the base become extra-marginal and are prolonged in a blunt, lateral ridge, in *Rupicapnos* this prolongation is entirely wanting, the whole petal being more dorsally compressed and the margins themselves never strongly reflexed over the keel.

The presence of a gibbosity or rudimentary spur at the base of the lower petal renders this group of plants unique in the family *Fumariaceæ* in the possession of an unequally two-spurred corolla; and it is notable that the second spur is apparently never developed in the very small-flowered species and not invariably so in those in which it commonly occurs.

The consideration of these aggregate points of distinction renders it impossible to ignore the claims of *Rupicapnos* for recognition as a separate genus; and as there is a total absence of any connecting links between it and the annual species of *Fumaria*, it has been decided to follow Pomel rather

than Cosson, and to retain *Rupicapnos* as a genus. Its natural position in the family *Fumariaceæ* is between the genera *Sarcocapnos* and *Fumaria*, to both of which it approximates in certain features though possessed of other characters found in neither of them.

CLASSIFICATION OF THE GENUS *RUPICAPNOS*.

The genus *Rupicapnos* is a small group of plants of restricted geographical range. So far as can be judged from the sparse herbarium material available for examination, including, however, the important collection in Herb. Mus. Paris, kindly lent by M. Lecomte, it embraces under four well-marked sections a number of critical forms whose limitations are not always readily defined, just as happens with the better known and more widely distributed genus *Fumaria*. Pomel, in his second account of the genus, divides his species into three subgroups, viz. : perennials with large flowers, perennials with small flowers, and small-flowered annuals. These form natural subdivisions, unconnected, so far as is known, by intermediate forms, and have been adopted accordingly. The large-flowered species, with curved, purple-tipped corollas never very broadly winged, somewhat recall *Fumaria agraria* in their floral features (Pl. 9, figs. 4, 5). Their flowers are much more showy than in the other species of the genus, and the beauty of *F. africana* is commented on in Lamarck's original description. It is proposed to place these plants in a section *Callianthos*.

Pomel's second group, the small-flowered perennials, resembles the preceding section in habit and in fruit, albeit usually smaller in all its parts. Its flowers, however, are widely different, not only in size but in colour and form, and are quite unlike those of the *Fumariæ* (Pl. 9, figs. 6, 7). Their colouring is uniformly whitish, with a greenish or yellowish suffusion about the apex, and the apical purple colouring of the inner petals is practically confined to their interior. The two outer petals are considerably dilated towards the apex, with spreading margins, and the inner petals are apically winged, sometimes very broadly so. These wings of the inner petals spread horizontally between the patent margins or wings of the two outer petals in such a manner as to give to the flowers a triple winged aspect, and the name *Tripteryx* therefore suggests itself for the section.

In this second section *R. sarcocapnoides*, described by Cosson, is included by Pomel, with a note that the actual plant was unknown to him. An examination of Cosson's type in Herb. Mus. Paris shows that its flowers are quite unlike those of the other members of the section, the outer petals being conspicuously dilated towards the apex and much longer than the narrowly winged, purple-tipped inner petals. The corolla indeed resembles that of a *Sarcocapnos* in miniature, as stated by Cosson, and it seems necessary to place this plant in a separate section, for which the name *Sarcocapnoides* is proposed.

Pomel's last section, comprising the annual species, is readily distinguishable by its suberect, shortly branched habit and its few-flowered racemes. Its fruits are often more compressed than those of the other sections, with a thinner and peculiarly muricate pericarp. It is proposed to name this section *Muricaria* after one of the most strongly marked species.

The first-named of these sections, *Callianthos*, readily lends itself to a subdivision into two subsections, some of the species, like *R. africana*, showing more or less narrow leaf-segments and whitish flowers, while others have distinctly broader lobes and pale purple flowers. These two subsections are termed *Africanae* and *Pomelianae* respectively.

It will be observed that the sequence of sections adopted in the following account of these plants places *Callianthos* last in the series. This order is followed on the assumption that in an account of the family *Fumariaceae* the genus *Rupicapnos* follows *Sarcocapnos* and precedes *Fumaria*.

SPECIES OF *RUPICAPNOS* AND THEIR DISTRIBUTION.

In this Revision all of Pomel's fifteen species are retained (subject to two changes of name) although none of his types have been seen and synonyms are cited by him only in four cases. Herbarium material under different names, however, has been identified with six of his remaining species with some confidence, and with a strong degree of probability in the case of a seventh. The other four species have been adopted out of deference to Pomel's judgment and as the diagnoses themselves show an inherent probability of the plants being really distinct. In addition, five fresh species are described for the first time, four of these being unknown to Pomel and the fifth not distinguished by him. The total number of species of *Rupicapnos* thus becomes 20. Of these, eight belong to the large-flowered group *Callianthos*, five being *Africanae* and three *Pomelianae*; five are species of the section *Tripteryx*; two of *Sarcocapnoides*; and there are five known annual species or *Muricariae*.

The geographical distribution of the genus, which as a whole is confined to North Africa from Tunis to Morocco, with one species extending to Andalusia, is of some interest. The species of the section *Callianthos* prevail towards the west and are not known in the Sahara districts. They occur on mountain rocks in many places in the Algerian province of Oran north of the plain of Schott, and extend eastward at least as far as Milianah, in the province of Algiers. In the west they have been collected at Tetuan, near Tangiers, and will presumably be found in intermediate stations in the eastern half of Morocco when that country becomes more accessible. One species reaches Europe, inhabiting the Andalusian provinces of Malaga and Cadiz.

The range of the section *Tripteryx*, which is almost exclusively Algerian, lies to the east, and is nearly contiguous with though apparently not over-

lapping that of the section *Callianthos*. Species of *Tripteryx* are found in the district of Jebel Amour, in the south-east of the province of Oran; also near the Saharan border of the province of Algiers, as at Laghouat; and more extensively and generally in the province of Constantine, whence they extend across the Tunisian frontier in the neighbourhood of Kef.

Of the two species of the section *Sarcocapnoides*, of which little is yet known, one was collected near Batna, in the central part of the province of Constantine near the Aures Mountains, and the other at Bou-Taleb, a locality in the Algerian montane region that has not been accurately located by the writer.

Three of the annual species (*Muricarie*) occur near Biskra, in the south of the province of Constantine, and they apparently grow there in company. Plants of this group have also been reported from Beni-Souik, near the Aures Mountains, and from Elkantara, both localities slightly to the northward. *R. muricaria* grows in the Saharan region south of the province of Algiers, as at Metlili and Ghardaia; and *R. delicatula* apparently to the west of this region, in the country south-east of the province of Oran.

METHOD OF THE REVISION.

It has already been stated that the following account of the Fumitories, which includes all the known species with their well-marked varieties, and has been extended to embrace the plants referred to the separate genus *Rupicapnos*, is primarily intended for use as a supplement to the Latin edition of Olof Hammar's Monograph. A complete synonymy is therefore not printed, and it is to be understood that Hammar's synonyms are accepted unless, as happens in a few instances, they are definitely corrected. A reference is given to the original description of each species and variety, and if it exists, to an adequate Latin diagnosis. If this is not to be found, a fresh diagnosis in that language, with italicised contrasting characters after the pattern adopted in "*Fumaria* in Britain," is furnished. A number of Hammar's diagnoses, which seem satisfactory except perhaps in minor details, have been accepted, subject sometimes to some supplementary notes; but where the Monographer's descriptions are not considered satisfactory or where the constitution of his species has been altered, fresh Latin diagnoses have been written. The descriptions of the British species and varieties dealt with in "*Fumaria* in Britain" are cited, but, as a rule, have not been repeated. References are also given to other works (often to Haussknecht's revision in 'Flora') which throw light on various species and their distribution. The known hybrid-forms are mentioned, but as these are usually barren, evanescent annuals that do not perpetuate themselves, no new names for their designation have been introduced. The terms "*ex parte*" and "*pro parte*" are applied to synonyms in the usual sense, *i. e.* when the synonym includes more than the recognized species and less than that species respectively.

Figures are cited in all cases where they are thought good enough to be helpful in identifying the plants portrayed, but it must be acknowledged that in few genera are the existing plates so generally inadequate, and the number of really good drawings of *Fumarice* is extremely small. Some of the icones, such as Hammar's and most of those in the 'Journal of Botany,' show little more than detached flowers and fruits. The general poorness of the figures is no doubt due to the laboriously detailed work involved in depicting correctly the elaborately dissected foliage and the racemes of varying fantastic flowers of these plants.

Exsiccata are usually quoted throughout both genera except in the case of some British species where this has already been done in "*Fumaria* in Britain," and in certain British varieties of which no authentic material has yet been incorporated in any public herbaria. When the herbarium where the exsiccata has been seen is not mentioned, the plant will frequently be found either at the British Museum or at Kew. In some instances the herbarium is named owing to mixtures in sets having been noticed.

The measurements in the following descriptions are taken from dried specimens unless the contrary is stated. The length of the corolla is that of the finest flowers, and is reckoned from the apex of the upper petal to the end of its spur; the form and measurements of the fruit refer to that organ in the dry condition as seen in profile with its greatest breadth in view. In life, the flower is slightly larger than when dry, as is also the fruit, which is then likewise appreciably longer in some species owing to the presence of a distinct, fleshy neck which disappears by shrinkage as the fruit becomes dry.

The margins surrounding the green keel of the upper petal are uniformly referred to as wings in the genus *Fumaria*, and those, almost invariably smaller, similarly placed on the lower petal are simply termed margins. The wings are said to exceed the keel when they are more or less reflexed upwards and sufficiently developed to hide the keel when the flower is viewed laterally. Fruits are stated to be mucronate or mucronulate when the keel is produced at the apex into a short point bearing the deciduous style; they are described as apiculate when there is no projection of the keel and the style itself becomes detached more or less above its actual base, thus leaving a small apiculus of varying length.

It may be well to recall that although the size of the flowers is not stated in Hammar's monograph, a line depicting their actual length, and from which the size of the sepals can also be judged, is shown under each of his figures.

The sign ! implies that the plant mentioned has been seen either in life or in herbaria. Species and varieties admitted, of which no material has been seen, are marked "non vidi" (n. v.) and shown in square brackets [].

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FUMARIA.

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Plantæ annuæ caulibus elongatis ramosis diffusis vel scandentibus. *Folia* caulina, primordia longe petiolata, reliqua breviter petiolata vel sessilia, *foliolis* plerisque longe petiolatis et segmentis secundariis vulgo petiolatis rarius decurrentibus irregulariter 2-4-pinnatisecta; petioli sæpe cirrhusi. *Inflorescentia pedicellis* etiam fructiferis omnibus brevibus nec elongatis racemosa. *Bractæ* pedicellos fructiferos sæpe subæquantes nunquam multoties breviores. *Corolla unicalcarata*; petalorum exteriorum margines apicem versus in statu juvenili parum explicati vel obsoleti; *petalum superius* fere semi-cylindricum, calcaratum, superne gibbum apicem attingentem format qui *alas* basin versus in *jugum* rotundatum *laterale productas* sæpe atropurpureas habet; *petalum inferius* angustum, plus minusve canaliculatum, *haud calcaratum*, inferne gibbum apicem attingentem marginibus patentibus vel erectis circumdatum efficit; petalorum interiorum nervus medius apice modice alatus est. *Fructus* monospermus, indehiscens, nuciformis, muticus rarius mucronatus vel apiculatus, *apice* per duas rimas quæ mesocarpium perforant *bifoveolatus* est; exocarpium interdum læve vel sublæve interdum tuberculis in sicco videndis rugosum; *endocarpium sub stylo a mesocarpio disjunctum*, in hemisphæræ formâ *depressum*; *semen superne in crateris formâ excavatum*, rugâ longâ infra micropylam notatum.

Annual plants, often climbing, with long stems and cauline leaves. Inflorescence racemose with short pedicels. Lower petal never spurred. Fruit, when dry, with apical pits.

Although Hammar, in his monograph, gives a generic diagnosis of some length, a few criticisms are necessary, as well as some notes on the importance of the variations of the different organs in considering specific characters. In the first place, it is to be remembered that Fumitories, like some other weeds of cultivation, are very susceptible, especially in the

vegetative organs, to the influences of environment. This is often seen in the general habit, which, while perhaps normally markedly characteristic, is readily modified and sometimes quite obscured under abnormal conditions.

The foliage of many species shows distinct inherent differences, but throughout the genus it is exceedingly responsive to surrounding influences, always tending to become dwarfer and more compact, with narrower, thicker and more channelled segments under exposure, and larger and laxer in form, with more ample and flatter segments, in shade or in damp situations. In some species the lowest pair of leaflets is always shortly petioled, and in a few others the leaves are notable for long-mucronate or aristate segments. Both among the *Grandiflorae* and the *Parviflorae*, however, there are several species in which the leaves are not readily distinguishable. Hammar defines the leaves as bipinnatisect in the annual species, but in most of them they are irregularly 3- or occasionally even 4-pinnatisect in normal individuals.

The relative length of the raceme and its peduncle (*i. e.* the part of the rachis below the lowest flower) is usually more or less constant in the different species, but it should be recollected that the two or three earliest racemes of a plant frequently show longer peduncles than any that follow them, and the later ones sometimes become less floriferous.

The length of the pedicels, as seen in fruit, and their direction or curvature, are generally characteristic, but in the case of species where this organ is arcuate-recurved in normal plants, it commonly becomes straight and divaricate in shade.

The form of the bracts and their length as compared with the fruiting pedicels are fairly constant and important as affording specific characters. It generally happens, however, that the two or three lowest bracts in a raceme are somewhat longer than those above them; and occasionally plants of various species will be met with in which the pedicels throughout are abnormally short and the bracts relatively more than usually long.

The sepals are valuable for diagnostic characters, for in form, size, and marginal dentation they usually show little variation in the same species, except that in shade an elongate condition sometimes obtains in which the margin may be either more or less cut than usual.

The features of the corolla are of the first importance, but they are often obscured and have proved the greatest source of confusion in the genus. This confusion is largely due to the prevalence, especially in the section *Grandiflora*, of a tendency under unfavourable environment to produce cleistogamous flowers with more or less depauperate corollas (Pl. 9, figs. 8-10). Such flowers always tend to be pale or whitish in colour, and are sometimes reduced to less than half their normal size; their outer petals remain coherent till the corolla falls, and the margins of these petals are often quite undeveloped. Possessing no nectary, they are regularly self-fertilized, the sexual organs remaining

tightly enclosed within the connate petals. As in this rudimentary condition the characteristic features of the flower are more or less lost, it is desirable in the consideration of species to have regard to perfect flowers, with the corolla fully coloured and winged, and provided with a nectary. In these perfect flowers the lower petal is generally deflexed and free, so that the two outer petals are apically distant, in nearly every species. Hammar's definition that this is so only among the *Agrariæ*, while in the *Capreolatae* and the *Officinales* the lower petal coheres to the others until separated at the base by the swelling fruit, cannot be accepted, for apically distant outer petals are frequently to be seen in good flowers in all three classes, as may be inferred from the observations of Jordan and other authors; and in all of them the lower petal eventually becomes detached at the base as the fruit develops. In some of the *Agrariæ*, however, the lower petal seems more caducous than in most other species.

A feature of the upper petal, not noticed by Hammar, but apparently constant throughout the genus, is that while the apical wings are formed by the margins of the petal at the very apex and for the greater part of their length, towards the base of the petal they leave the margin and are finally produced in a blunt lateral ridge. The tube of the upper petal may be regarded as laterally or dorsally compressed in proportion as this lateral ridge is distant or close to the edge of the petal.

When good flowers are present in exsiccata, a difficulty sometimes arises owing to the form of the corolla being obliterated in the process of drying, so that its dorsal or lateral compression, the shape of its spur, and the direction of the margins or wings surrounding the apical keels of the outer petals are not readily seen. In the living plant these differences are often very marked, the acute, laterally compressed corolla, with large, curved spur and narrow, strongly reflexed wings to the upper petal, seen in such a species as *F. capreolata*, being widely divergent from the obtuse, dorsally compressed corolla, with smaller, straighter spur and broad, erect-spreading wings, of *F. agraria*. In adequate exsiccata the direction of the wings and the form of the spur can usually be fairly judged after some experience, but pressed flowers are often misleading respecting the compression of the corolla-tube.

A feature of the corolla that does not appear to have been sufficiently appreciated is the constancy of its colour and of the dark marking about its apex in almost every species throughout the genus. So far as is known, there is no *Fumaria* (with the possible exception of *F. parviflora*, one variety of which (*indicoides*) seems to possess essentially pink corollas) in which the colour of fully developed flowers may be either pink or white, although pink flowers may become whitish when depauperate or shade-grown, and white ones eventually entirely suffused with pink or red after fertilization. But the essential colour, which is best seen in the later bud stage or as the flower opens, seems to be invariably constant.

The dark red or purplish markings about the apex of the corolla vary greatly in different species, being occasionally quite absent, sometimes confined to the inner petals and sometimes spreading thence, either partially or entirely, over the wings of the upper one. This marking is uniform in every species (in perfect flowers) excepting *F. Bastardii* and a few of the *Parvifloræ*. Attention is drawn to these variations under the diagnoses of the generic subsections, and they may generally be clearly seen in well dried *exsiccata*. A well-known peculiarity of this purplish colouring is its tendency to disperse towards the base of the corolla after fertilization and as the flower fades.

The characters of the fruit are of course among the most important, and those which are visible in the dry state are usually recognized without difficulty. A slight emendation of Hammar's diagnosis of this organ is, however, necessary, for although the apical separation of the endocarp is alluded to, no mention is made of its depression in a hemispherical form fitting the hollowed upper side of the amphitropous seed. In a few species that are widely distributed, like *F. capreolata*, *F. muralis* and *F. parviflora*, the shape of the fruit varies considerably, but otherwise there is a general uniformity in each species. The fleshy neck-like base, particularly conspicuous in the subsection *Capreolatae*, disappears by shrinkage as the fruit dries, and the apical profile is liable to change in some species at maturity or in the dry state owing in some cases to the subsidence of a small mucronulus, or, in others, where this is larger and more beak-like, to its splitting and thus becoming retuse or emarginate. The rugosity referred to in the descriptions, and also the apical pits, are only seen when the fruit is dry, and the former is sometimes ill-marked even then in fruits that have not reached maturity. A monstrous condition of the fruit, in which it becomes swollen to more than twice its natural size, occasionally occurs. This has been noticed especially in *exsiccata* of *F. muralis* from Madeira and in Spanish specimens of *F. parviflora*.

From the regularity with which the more or less cleistogamous flowers in this genus develop fruit, it may be concluded that self-fertilization regularly takes place and that Fumitories are not dependent on insect visitors for their pollination. In the more northern regions of their range, such as Britain, insect visitors are apparently rare; but the flowers of *F. Bastardii* and *F. muralis* have been observed to attract the humble-bee. As might be expected under these conditions, the occurrence of hybrids is not common, and such as have been observed are almost invariably isolated individual plants that are entirely barren and evanescent.

CONSPECTUS OF SPECIES.

SECTION I. GRANDIFLORA.

Leaf-segments flat and relatively broad, from broadly oval to oblong or lanceolate (except in *F. Ballii*, *F. Thuretii* (partim), and *F. Reuteri*). Normal flowers large, at least 9 mm. long, exceeding those of *F. officinalis*, with the wings of the upper petal reflexed upwards and the lower petal not spathulate (subspathulate in *F. macrocarpa* and obscurely so in *F. Reuteri*).

Subsection I. AGRARIÆ.

Peduncles rarely long; pedicels usually stout. Sepals small or, more rarely, fairly large. Lower petal with spreading, more or less broad margins. Fruit usually large, coarsely rugose when dry.

Series EU-AGRARIÆ.

Fruit distinctly keeled (except in *F. Ballii*), shortly beaked, mucronate or mucronulate.

* Flowers white or rosy-white.

1. *F. agraria*. Sepals small and narrow; inner petals only tipped with purple; fruit with subemarginate beak.
2. *F. atlantica*. Sepals small; inner petals only tipped with purple; wings of outer petals very broad; fruit mucronate.
3. *F. occidentalis*. Sepals fairly large; inner petals purple-tipped and wings of upper one similarly blotched; fruit with subemarginate beak; peduncles rather long.

** Flowers pink.

! Wings of upper petal not clearly purple; inner ones purple-tipped.

4. *F. rupestris*. Sepals long, lanceolate; outer petals with narrow margins; fruit shortly beaked, rather large or of moderate size.
5. *F. Ballii*. Sepals very small, oblong; outer petals with broader margins; fruit strongly mucronate, of moderate size; leaf-segments small and narrow.

!! Wings of upper petal clearly purple like the tip of the inner ones.

6. *F. major*. Sepals small; upper petal obtuse with broad wings; fruit subrotund-obovate, mucronulate.
7. *F. Gaillardotii*. Sepals larger; corolla smaller and paler, with upper petal subacute; fruit subrotund-quadrate, submucronulate.

Series ORIENTALES.

Fruit obscurely keeled, quite obtuse.

* Fruiting pedicels arcuate-recurved.

8. *F. flabellata*. Flowers white; sepals fairly large; tip of inner petals and wings of upper one purple; fruit of moderate size; peduncles long.

** Fruiting pedicels straight.

9. *F. judaica*. Flowers white; sepals small, oblong-lanceolate; inner petals only shortly tipped with purple; fruit large.
10. *F. amarysia*. Flowers pink; sepals small, ovate-lanceolate; inner petals only obscurely tipped with purple; fruit smaller.
11. *F. macrocarpa*. Flowers pinkish, entirely without purple markings; sepals small, nearly linear; fruit very large, almost globular.

Subsection II. CAPREOLATÆ.

Peduncles long; pedicels usually stout with long bracts. Sepals large or of moderate size. Corolla generally narrow with acute upper petal (tip of inner petals and wings of upper one purple, except in *F. dubia* and *F. coccinea*), and lower petal with erect and narrow margins. Fruit small to large, usually, when fresh, with a distinct fleshy neck narrower than the dilated tip of the pedicel, and smooth to rugose when dry.

Series EU-CAPREOLATÆ.

Fruiting pedicels arcuate-recurved or patent. Fruit smooth or nearly so, not large.

12. *F. capreolata*. Sepals usually large; corolla narrow, white (often flushed with pink); fruit obtuse or truncate.
13. *F. dubia*. Sepals smaller; corolla narrow, pink; fruit subacute.
14. *F. purpurea*. Sepals usually large and blunt; corolla broader and more broadly winged, pink; fruit broader and truncate.

Series MACROSEPALÆ.

Fruiting pedicels suberect. Fruit rugose.

15. *F. macrosepala*. Sepals very large; corolla rather narrow, white, dorsally flushed with red; fruit large, mucronulate.
16. *F. berberica*. Sepals large; corolla broader and more broadly winged, white; fruit rather large, mucronulate.
17. *F. coccinea*. Sepals of moderate size; corolla very narrow, almost wingless, red; fruit rather small, obtuse or subacute.

Subsection III. MURALES.

Peduncles short or of moderate length, long only in *F. bicolor* and *F. sepium*. Pedicels usually less thickened above than in Subsections I and II (except in *F. Thuretii*). Flowers pink, except in *F. bicolor* and *F. sepium*; tip of inner petals purple. Sepals small to fairly large. Lower petal with narrow, erect or spreading margins. Fruit small or of moderate size, smooth to rugose when dry.

Series SUB-AGRARIÆ.

Sepals not large. Margins of lower petal spreading. Fruit rugose.

18. *F. bicolor*. Sepals oval, very small; corolla white, becoming pink; inner petals only tipped with purple; fruit small, densely rugose; racemes few-flowered on slender peduncles.
19. *F. Bastardii*. Sepals oval, less small, serrate; wings of upper petal purple or not; fruit larger, less densely rugose; racemes many-flowered on shorter peduncles.

Series EU-MURALES.

Sepals mostly of moderate size. Upper petal with purple wings, lower one with erect or more rarely spreading margins. Fruit smooth or rugulose.

* Margins of lower petal spreading; flowers large in many-flowered racemes.

20. *F. Munbyi*. Sepals ovate, dentate; fruit very small, nearly smooth.
21. *F. Martinii*. Sepals oval, subentire; fruit of moderate size, nearly smooth.

** Margins of lower petal usually erect; flowers in shorter racemes (except in *F. muralis* subsp. *neglecta*).

22. *F. sepium*. Sepals ovate or oval, subentire, fairly large; corolla rosy-white, large; fruit smooth, very obtuse.

23. *F. muralis*. Sepals ovate, dentate below (or in subsp. *neglecta* subentire); corolla of moderate size or sometimes large in subsp. *Boræi*; fruit smooth or nearly so, very obtuse or more rarely subacute.
24. *F. apiculata*. Sepals narrow, ovate-lanceolate, subentire; corolla of moderate size; fruit smooth, shortly apiculate; leaf-segments narrow and peduncles very short.
25. *F. Petteri*. Sepals sub-rhombic, rather large, toothed mostly about the middle; corolla of moderate size; fruit rugulose, subacute-elongate; racemes subsessile.

Series SUB-LATISEPALÆ.

Sepals fairly large. Wings of upper petal purple; margins of lower one very narrow, erect or more rarely spreading with obscurely dilated apex. Fruit very small, rugulose. Leaf-segments narrower than in the preceding species, and flowers smaller in subsessile racemes.

26. *F. Thuretii*. Sepals ovate, obscurely repand-dentate; fruit ovate, subacute; fruiting pedicels usually arcuate-recurved.
27. *F. Reuteri*. Sepals broader, subentire; corolla paler pink, with longer spur; fruit narrower, stipitate; fruiting pedicels patent; leaf-segments smaller.

SECTION II. PARVIFLORA.

Leaf-segments flat or channelled, relatively narrow, from oblong or lanceolate to linear or setaceous (except in *F. montana*). Peduncles usually short. Flowers not large, not exceeding 9 mm. in length, very rarely larger than those of *F. officinalis* and generally smaller, with the wings of the upper petal less reflexed upwards than in Section I and occasionally even patent; and the lower petal more or less spatulate.

Subsection IV. LATISEPALÆ.

Bracts longer than the normally stout fruiting pedicels (except in *F. rostellata*). Sepals large, at least one-third as long as the corolla and fairly broad. Fruit very small to rather large, subrotund, nearly smooth to rugose when dry.

* Flowers white, without purple tip; peduncles rather long.

28. *F. montana*. Sepals ovate-lanceolate; fruit rather large, rugose; leaf-segments broad.

** Flowers pink, with tip of inner petals and wings of upper one purple; peduncles short.

! Fruiting pedicels arcuate-recurved.

29. *F. Kralikii*. Sepals oval; fruit very small, nearly smooth; leaf-segments narrow.
!! Fruiting pedicels normally erect-spreading.
30. *F. micrantha*. Sepals nearly orbicular, more rarely ovate; fruit of moderate size, finely rugose; leaf-segments narrow.
31. *F. bracteosa*. Sepals ovate; fruit of moderate size, rugose; leaf-segments setaceous and flowers minute.
32. *F. rostellata*. Sepals broadly oval; outer petals rostellate or at least acute; fruit rather small, rugulose; leaf-segments rather narrow.

Subsection V. OFFICINALES.

Peduncles more or less short. Bracts shorter than the fruiting pedicels (except in *F. microstachys*). Flowers pink; sepals usually fairly narrow and not more than one-third as long as the corolla; tip of inner petals and wings of upper one more or less purple. Fruit of moderate size or very large, broad, truncate or retuse, rugose or rugulose when dry.

* Racemes usually long, many-flowered; pedicels not short; fruit of moderate size.

- 33. *F. officinalis*. Racemes 10-40 fld.; sepals ovate or ovate-lanceolate; spur of upper petal rather short; fruit at most very shortly apiculate.
- 34. *F. cilicica*. Racemes 30-80 fld.; sepals lanceolate; spur of upper petal longer and more curved; fruit shortly but conspicuously apiculate.
- 35. *F. Boissieri*. Racemes very dense, with longer peduncles; sepals lanceolate; spur as in *F. cilicica*; fruit with longer apiculus.

** Racemes short, few-flowered; pedicels short; fruit very large.

- 36. *F. microstachys*. Sepals ovate; flowers smaller than in preceding species; fruit without apiculus.

Subsection VI. MICROSEPALÆ.

Peduncles short or obsolescent (except in *F. australis*). Fruiting pedicels stout or slender, with variable bracts. Sepals very small or even obsolete, rarely one-fourth as long as the corolla and always narrower than its tube. Tip of inner petals purple except in some forms of *F. asepala* and *F. parviflora*. Fruit small or of moderate size, mostly subrotund, very rarely broad, rugose or rugulose when dry.

Series AMBIGUÆ.

Flowers pink, 5-7 mm. long; sepals 1.5-2 mm. long; wings of upper petal reflexed upwards, except in *F. australis*.

- 37. *F. abyssinica*. Bracts fully equalling the short fruiting pedicels; wings of upper petal obscurely purple; fruit subacute or obtuse, apiculate.
- 38. *F. australis*. Bracts broad, much exceeding the short pedicels; wings of upper petal obsolescent, deflexed; fruit subacute, apiculate; racemes dense, long-peduncled.
- 39. *F. Jankæ*. Bracts rather shorter than the longer pedicels; wings of upper petal purple; fruit acuminate.

Series EU-MICROSEPALÆ.

Flowers pink or white, rarely exceeding 6 mm. long; sepals minute (5-1.5 mm. long) or absent; wings of upper petal variable.

* Flowers pink, with wings of upper petal reflexed upwards.

- 40. *F. Schleicheri*. Bracts less than half as long as the long, slender pedicels; flowers deep rose, with wings of upper petal purple; fruit rather small, apiculate; plant slender.
- 41. *F. microcarpa*. Bracts more than half as long as the short pedicels; flowers very small, lighter pink, with wings of upper petal purple; fruit very small, apiculate; plant dwarf.
- 42. *F. indica*. Bracts about as long as the pedicels or longer; flowers purplish pink, with wings of upper petal at most obscurely purple; fruit of moderate size, subtruncate, rarely apiculate; plant robust with very decom-pound foliage.

** Flowers pink, with erect-spreading or patent (rarely clearly purple) wings to the broad upper petal.

- 43. *F. Vaillantii*. Upper petal emarginate with ascending spur; fruit of moderate size or rather small, obtuse, rugose; plant usually rather slender with linear-oblong leaf-segments and shortly peduncled racemes.
- 44. *F. Schrammii*. Flowers smaller and paler, with emarginate upper petal and deflexed spur; fruit smaller, apiculate, rugulose; plant usually slender with narrower leaf-segments and mostly sessile racemes.

*** Flowers white (sometimes flushed with pink), with erect-spreading, patent or deflexed wings to the broad upper petal.

45. *F. asepala*. Sepals usually wanting; outer petals both emarginate, with no purple marking; fruit apiculate, rugulose; plant slender, with flat, linear-oblong leaf-segments.
46. *F. parviflora*. Sepals usually present; outer petals not emarginate, the wings of the upper usually with a purple blotch; fruit often subacute, rugose; plant robust, usually with channelled, linear leaf-segments.

SECTIO I. GRANDIFLORA.

Grandiflora, Pugsley, *Fumaria* in Britain, 5 (1912). *Capreolata* et *Agraria*, Hammar, Mon. 24 & 37 (1857); *Latisecta*, Haussknecht in Flora, lvi. (new series xxxi.), 513 (1873).

Foliorum laciniae planae, late ovales usque ad anguste oblongae vel lanceolatae (in *F. Ballii*, *F. Thuretii* (partim) et *F. Reuteri* angustiores), saepius mucronatae. Flores normales quam in *F. officinali*, L. majores, plus 9 mm. longi; petalum superius apice superne gibbum efficit, cujus margines, sicut alae, valde sursum reflexi (raro erecto-patentes) sunt; petalum inferius apice inferne gibbum format, qui margines erectos vel patentes nunquam apice abrupte dilatatos habet. Petala interiora angusta apicem versus plus minusve sursum curvata.

SUBSECTIO I. AGRARIAE.

Agraria, Haussk. in Flora, lvi. 550 (1873); Pugsley, *Fum.* in Brit. 42 (1912); Hamm. Mon. 37 (1857), ut sectio.

Pedunculi breves aut longi pedicellis plerumque apice multo incrassatis praediti. Bractae longitudinis variabilis, saepe tenuiter acuminatae. Sepala plus minusve dentata, raro corollae tertia parte longiora vel ejus tubo latiora. Petala exteriora obtusa vel subacuta; inferius marginibus patentibus latiusculis qui superne nonnunquam paulum dilatati apicem attingunt. Fructus saepissime quam in aliis subsectionibus majores, nonnunquam maximi, semper siccitate plane tuberculato-rugosi.

In this subsection the varied development of the purple colouring about the apex of the corolla is characteristic of the different species. *F. major*, *F. Gaillardotii*, and *F. flabellata* have the tips of the inner petals and the wings of the upper one entirely purple. *F. occidentalis* is similarly marked, except that the purple wings show clear, white margins; in *F. rupestris* the colouring of these wings is obscure and inconstant. In *F. agraria*, *F. atlantica*, *F. Ballii*, *F. judaica*, and *F. amarysia* the inner petals only are purple-tipped, although in the first-named species the wings of the upper petal often become suffused with a dull rose-colour. In *F. judaica* this dark tip is distinctly contracted towards the apex, and in *F. amarysia* it becomes both short and obscure. Finally, the purple colour is entirely absent in *F. macrocarpa*.

With the exception of *F. flabellata*, the plants of this subsection generally show somewhat narrower leaf-segments than the *Capreolatae* and the series *Eu-Murales* of the *Murales*.

* Series **Eu-Agrariæ**.

Fructûs plane carinati (*F. Ballii* exceptâ), breviter rostrati, mucronati vel mucronulati.

1. FUMARIA AGRARIA, Lagasca, Elenchus Pl. Hort. Matrit. et Gen. Spec. Pl. Nov. 21 (1816); Hamm. Mon. 38, excl. var. *major* (1857); Haussk. in Flora, lvi. 555 (1873); Willkomm & Lange, Fl. Hisp. iii. 881 (1880). (Pl. 9, fig. 1.)

Icon. Hamm. *l.c.* tab. iv.

Exsicc. Porta & Rigo, Iter II Hispanicum, 1890, No. 228, Cartagena! Bourgeau, Pl. d'Espagne, 1849, No. 21, Seville! Bourgeau, Pl. d'Esp. et de Portugal, 1853, No. 1756, Algarve! Balansa, Pl. d'Algérie, 1852, No. 628, Mostaganem!

β. mauritanica, Haussk. *l.c.* 555.

Exsicc. Bourgeau, Pl. d'Algérie, 1856, Tlemcen, in Hb. Boissier, ut *F. agraria*!

Bracteis pedicellos breves (circa 3 mm. longos) subæquantibus, sepalis angustis (5 mm. longis, 1 mm. latis), lanceolatis, integriusculis, longe acuminatis a typo differt.

Wolley-Dod, Fl. Calpensis, No. 240, from Algeciras, seems to approach this variety.

γ. chilensis, Parlatore, Mon. Fum. 73 (1844); Haussk. *l.c.* 556.

This variety, which seems scarcely separable from the specific type except for its smaller and more markedly beaked fruits, occurs occasionally in Spain, as may be expected, as well as in Chili and Peru. Judging from herbarium material, it is by no means the prevalent form of the species in South America.

There is a Portuguese example of *F. agraria* in the Sloane Collection in Herb. Mus. Brit. (H.S. 326/1549) labelled "*F. latiore folio spica laxiore e Lisbon.*"

Lagasca's diagnosis of this species is meagre and unsatisfactory, but Jordan, in dealing with *F. major*, Bad. (Pugillus, p. 6), describes an authentic specimen in De Candolle's Herbarium which leaves no doubt respecting its identity. It is to be regretted that this fine fumitory has apparently never been adequately figured.

F. agraria is almost unique among the *Grandifloræ* in the form of its upper petal which, while much dorsally compressed and very broad about the apex with erect spreading wings, is remarkably narrowed towards the base and terminates in a relatively small and laterally compressed spur. Another notable feature, only seen in the fresh state, is the yellow colour which pervades the base of the corolla almost till maturity. This peculiarity is

correctly noted in Hammar's diagnosis as "lutescentia," and the relatively dull tints characterizing the flowers of this species are probably due to this yellow suffusion of the rosy-white corolla.

A further distinctive feature of *F. agraria* is the polished surface of the dried fruits and their extremely shallow apical pits.

Of other described forms of this plant Haussknecht's var. *algerica*, as represented in Herb. Kew, belongs to *F. major*, Bad., as might be expected from the remarks respecting the sepals.

An authentic specimen, also at Kew, of var. *elata*, Ball in Journ. Linn. Soc. xvi. 315 (1878), which the author suggests may be identical with *F. rupestris* var. *laxa*, Boiss., has the aspect of a distinct, small-flowered variety of *F. agraria*, but as its fruit is now missing, further confirmation is desirable before this can be established.

F. agraria subsp. *Merinoi*, Pau ap. Merino, Fl. Galicia, Suppl. iii. 508 (1909), seems from its description to differ essentially from the type only by its linear-lanceolate sepals; and hence it is perhaps a form of Haussknecht's variety *mauritanica*.

Material of *F. agraria* has been observed from Spain, Portugal, Morocco, Algeria, Tunis, and Sicily, as well as from South America, where it seems to be extensively naturalized.

2. *FUMARIA ATLANTICA*, Cosson & Durieu ap. Haussk. in Flora, lvi. 558 (1873).

F. agraria γ. *atlantica*, Cosson, Comp. Fl. Atlant. ii. 90 (1883-1887), non Ball.

Exsicc. Bourgeau, Tizi Tsennt, Alger, 1856, et cult., in Hb. Boissier ! E. G. Paris, Iter Boreali-Africanum, 1869, No. 205, Sidi Mecid, in cultis, Constantina, ut *F. agraria* ! Cosson, Djebel Zaghouan, Tunis, 1883, in Hb. Kew !

Fumaria annua, robusta, foliis irregulariter 2-3-pinnatisectis, foliolis in lobos oblongos acutos vel mucronatos fissis. *Racemi laxiusculi*, sub-20-flori, *pedunculos* mediocres vix superantes. *Bractee* lineari-oblongae, cuspidatae, *pedicellos* 5-6 mm. longos erecto-patentes paululum incrassatos subaequantes. *Sepala* 3-4 mm. longa, 1.5-2 mm. lata, ovato-lanceolata, acuminata, parce irregulariter serrato-dentata, albida, nervo dorsali angusto rubicundo, corollae tubo angustiora. *Corolla maxima*, 14-16 mm. longa, roseo-albida; *petalo superiore obtuso, lato, alis albidis latissimis* brevibus patenti-reflexis apicem attingentibus et calcare breviusculo praedito; *petalo inferiore obtuso marginibus latissimis* (4-4.5 mm. lato) patulis albidis apicem attingentibus subspathulato; *petalis* interioribus sursum curvatis apice atropurpureis. *Fructus maximi*, 3.5 mm. longi, 3 mm. lati, subrotundo-obovati, carinati, cum mucrone distincto persistente obtusiusculi et inferne angustati, in sicco apicis foveolis latis obscuris dense tuberculato-rugosi.

β. p atyptera, var. nov.

Exsicc. Reverchon, Plantes d'Algérie, 1898 (Kabylie), No. 3, ut *F. vagans*, Jord.!

A typo differt bracteis brevioribus pedicellos dimidios vix superantibus, floribus paulo minoribus, et præsertim *fructibus multo minoribus* circa 2·75 mm. longis ac latis cum mucrone brevissimo *obtusissimis*.

Hæc species, quæ Algeriam et Tunisiâ habitat, per flores pallidos maximos et petalorum exteriorum (præsertim inferioris) alas latissimas notabilis est. A *F. agrariâ* sepalis tenuibus anguste carinatis, corollis latoribus, fructuque plus minusve mucronato densius rugoso differt. *F. major*, Bad. corollâ angustiore alis atropurpureis reflexis rosâ et fructibus minoribus obtusioribus præcipue distinguitur, sed quod ad fructum pertinet, varietati *platyptere* simillima est.

The diagnosis of this fumitory, the finest-flowered of all the genus, is based on Boissier's specimens, together with Cosson's plant at Kew, the E. G. Paris example in Herb. Mus. Brit., which shows extremely fine flowers but unfortunately no fruit, and Reverchon's plant in Mr. C. Bailey's collection. The last-named bears fruit more like that of *F. major* than of Boissier's type, but the remarkably broad wings and the colouring of its corolla render it impossible to mistake its closest affinity, and it is therefore placed as a variety under *F. atlantica*.

3. FUMARIA OCCIDENTALIS, Pugsley in Journ. Bot. xlii. 217 (1904); Fum. in Brit. 43 (1912).

Icon. Journ. Bot. *l.c.* tab. 462.

Exsicc. Dörfler, Herb. Norm. No. 4814!

This species is perhaps the *F. vulgaris corubensis alba* (sic) of Parkinson (Theat. Bot. 287 (1640)), noted as growing in cornfields in Cornwall.

In addition to the characters already given whereby this plant may be distinguished from *F. agraria*, Lag., it may be remarked that the colour of its corolla is a clear rosy-white, quite without the yellow and greyish tints which mar the brightness of the flowers of Lagasca's plant, and its upper petal is less obtuse with the wings distinctly reflexed upwards as in *F. major*, Bad.

4. FUMARIA RUPESTRIS, Boissier & Reuter, Pugillus, 4 (1852); Hamm. Mon. 40 (1857); Haussk. in Flora, lvi. 556 (1873).

Icon. Hamm. *l.c.* tab. 6 (mala).

Exsicc. Boissier & Reuter, Iter Algeriensi-hispanicum, 1849, Tlemcen, in Hb. Kew! Warion, Pl. Atlant. Sel., 1878, No. 112, Tlemcen! Reverchon, Pl. de l'Andalousie, 1890, No. 569, Ronda, ut *F. agraria*!

Boissier's var. *laxa* (*F. arundana*, Boiss. ap. Willkomm & Lange, Fl. Hisp. iii. 880 (1880)) appears to have been described from a shade-form,

Specimens collected at Ronda by Mr. C. Bucknall in 1907 do not accord with Boissier's diagnosis and seem indistinguishable from well-grown African examples.

Haussknecht's forms *diffusa* and *umbrosa* (Flora, l.c.) also appear to be shade-forms, and it may indeed be doubted whether Boissier's original account of the species was taken from a normal plant.

In well-grown individuals, the corolla of *F. rupestris* is pale pink, with an occasional suffusion of purple in the wings of the upper petal. When shade-grown, it becomes whitish, with the purple colour confined to the tips of the inner petals as in *F. agraria*.

F. rupestris is remarkable among the *Agrariae* for the narrowness of its corolla and the wings of the outer petals, and on this ground alone might be placed with almost equal propriety with the *Murales* near *F. Bastardii*. Its fruit, however, although not very large, is of markedly Agrarian form.

F. rupestris var. *maritima*, Battandier in Bull. Soc. Bot. Fr. xxxii. 336 (1885), is apparently referable to *F. bicolor*, Sommier.

5. FUMARIA BALLII, sp. nov. (Pl. 10.)

F. agraria subsp. *tenuisecta*, Ball in Journ. Bot. xi. 297 (1873); Spic. Fl. Maroc. in Journ. Linn. Soc. xvi. 316 (1878).

Exsicc. J. Ball, Iter Maroccanum, Ait Mesan, 1871, in Hb. Kew!

Fumaria annua, ut videtur, *habitu laxiusculo et satis robusto*. *Folia* pallide virentia, irregulariter 3-4-pinnatisecta, foliolis in lacinias parvas planas angustas lineari-oblongas acutas vel mucronatas fissis prædita. *Racemi* laxiusculi multiflori (15-25-flori), *pedunculos* breves multo superantes. *Bractee* lineari-lanceolatae, obscure serratae, tenuiter acuminatae, *pedicellis* fructiferis erecto-patentibus longiusculis apicem versus modice incrassatis dimidio breviores, sed infimæ interdum paulo longiores. *Sepala minima*, circa 2 mm. longa, 1 mm. lata, oblonga, acuminata, obscure dentata, præter nervum angustum viridiusculum rosea, in fructu juniore persistentia. *Corolla* 12-14 mm. longa, rosea, ut in *F. rupestri* angusta; *petalo superiore* alis roseis reflexis carinam vix superantibus sed apicem attingentibus et calcar tenue versus longe productis obtuso; *petalo inferiore* obtusiusculo marginibus latiusculis patulis apicem attingentibus; *petalis* interioribus sursum curvatis apice purpureis. *Fructus* modici, sine mucrone 2.5 mm. longi, 2 mm. lati, subrotundi, obsolete carinati, obtusiusculi et persistenter grosse mucronati, inferne multo angustati, siccitate apicis foveolis obscuris sed latiusculis dense sed tenuiter tuberculato-rugosi.

Hæc *Fumaria* distinctissima quæ subsectionis *Agrariarum* flores fructusque habet, per folia decomposita eis *F. Kralikii* et *F. micranthæ* similia mirabilis est. Inter affines *F. rupestri* proxima est, sed præter foliorum differentiam bracteis brevioribus, sepalis minimis et fructibus minus rugosis, grosse mucronatis potius quam rostratis, facile distinguitur.

F. Ballii in Mauritaniâ habitat, ubi cl. J. Ball in regione inferiore Atlantis Majoris in convalle Aït Mesau ad 1400 m. specimen unicum legit.

This remarkable and very rare Fumitory has been named after its discoverer to avoid confusion with *F. tenuisecta* Syme, Eng. Bot. ed. 3, i. 113 (1863).

The accompanying plate has been drawn from the single known specimen in Herb. Kew.

6. FUMARIA MAJOR, Badarro in Moretti, Bot. Ital. i. 10 (1826) ; Jordan, Pugillus, 6 (1852) ; Haussk. in Flora, lvi. 552 (1873), ex parte ; Rouy & Foucaud, Fl. France, i. 176, ut forma *F. agrariæ* (1893). *F. agraria* β . *major*, Hamm. Mon. 38 (1857).

F. major floribus dilute purpureis, Magnol. Hort. Monspel. 82 (1697). The Sloane Herbarium contains, under Magnol's name, two specimens of this species, H.S. 58/146 & H.S. 166/322, the former from Montpellier.

Icon. Reichb. Plantæ Criticæ, i. 1-113, No. 1222.

Exsicc. Billot, Fl. G. & G. No. 3308 ! Société Dauphinoise, 1880, Nos. 2354 ! et bis !

Fumaria annua, *robusta*, basi ramosa, internodis longis laxa et diffusa, raro petiolis cirrhosis scandens. Folia irregulariter 2-3-pinnatisecta, foliolis in lobos oblongos acutos vel mucronatos fissis prædita. *Racemi* plus minusve *laxi*, 10-20- (raro plus 15-) *flori*, *pedunculos* sæpiissime breviusculos *superantes*. *Bractear* lineari-oblongæ, apice interdum serrulatæ, cuspidatæ vel acuminatæ, *pedicellos* fructiferos apice incrassatos *suberectos* vel patenti-erectos *subæquantes*. *Sepala* eis *F. officinalis* similia, 3-3.5 mm. *longa*, 1.5-2 mm. *lata*, *ovato-lanceolata* vel *ovata*, vix *peltata*, *acuminata*, irregulariter *inciso-dentata*, præter nervum dorsalem rubicundum rosea, corollæ tubo angustiora. *Corolla magna*, 12-14 mm. *longa*, *rosea* ; *petalo superiore obtuso*, *lato*, dorsum compresso, calcar deflexum versus sulcato, *alis* intense *atropurpureis* reflexis brevibus apicem attingentibus et carinam multo excedentibus prædita ; *petalo inferiore marginibus latis patulis* roseis apicem attingentibus obtuso et sæpe subspathulato ; *petalis* interioribus sursum curvatis apice atropurpureis. *Fructûs magni*, 2.5-3 mm. *longi* ac *lati*, *subrotundo-obovati*, *obtusissimi* vel *subtruncati*, cum *mucronulo* interdum obsoleto *carinati* et paululum compressi, in vivo inferne in stipitem obsoletum *pedicelli* apicem subæquantem angustati, siccitate apicis foveolis latis obscuris *dense tuberculato-rugosi*.

β . *spectabilis*, Rouy, Suites à la Fl. de France, i. 31 (1887). *F. spectabilis*, Debeaux, Recherches Fl. Pyr.-Orient. i. 20 (1878) ; Rouy & Foucaud, Fl. Fr. i. 176, ut forma *F. agrariæ* (1893).

Exsicc. Magnier, Fl. Selecta No. 2387 !

A typo differt *foliorum segmentis angustioribus* lanceolatis vel lineari-oblongis ; *racemis densioribus* ; *corollis pallidioribus minoribus* (circa 12 mm.

longis) petalo superiore angustius alato apiculato ; fructibus obsolete mucronulatis.

Of *F. spectabilis*, Bischoff, Del. Sem. Hort. Bot. Heidelberg, p. 4 (1849), no authentic specimen has been seen, but plants raised from seed received from Jordan under this name seem identical with the narrow-leaved Pyrenean form described by Debeaux and other French authors.

Although Bischoff says of his *F. spectabilis* "patria ignota," Jordan (Pugillus, p. 6) states that it is indigenous in Istria and South Italy—an assertion copied by later writers. The examples seen from these countries, however, appear distinct from the French *F. spectabilis* and identical with the allied forms inhabiting Greece and Syria. These are separated as a species under the name of *F. Gaillardotii*, Boissier.

γ. algerica, var. nov.

F. agraria var. *algerica*, Haussk. l.c. 555 (1873).

Esicc. Bourgeau, Pl. d'Algérie, 1856, Maison Carrée, Alger, Cosson, 1854, ut *F. agraria*! Reverchon, Pl. d'Algérie, Kabylie, 1896, No. 3, ut *F. muralis*! [The sheet of this in Herb. Zurich is a mixture of the true plant with *F. flabellata*, Gasp.] Société Dauphinoise, 1879, No. 286 bis, ut *F. agraria*!

Foliorum segmenta quam typi paulo angustiora. Racemi primo densi tandem elongati, multiflori (sæpius plus 20-, nonnunquam 40-flori). Bracteæ pedicellis longiusculis (5–6 mm. longis) breviores. Sepala 3–4 mm. longa. Corolla speciosa, 13–15 mm. longa, petalo inferiore marginibus quam in typo latioribus usque ad 3 mm. lato. Fructus obtusiusculi potius quam obtusissimi mucronulati.

It is not easy to understand why Haussknecht placed this showy African plant under *F. agraria*. Not only by its pink, dark-tipped flowers, but through its toothed sepals and its densely tubercular-rugose fruits it is closely related to the plant of Badarro.

Of the specific type two forms, perhaps varietally distinct, seem to be widely distributed in the Riviera: one a dwarf, compact plant, with relatively small flowers and fruits, the former very deeply coloured; the other a stronger, laxer form, with larger but lighter-coloured flowers in laxer racemes, and larger fruits.

When growing, the rich pink, almost black-tipped flowers of *F. major* are very handsome.

Hybrid individuals between this species and *F. capreolata*, apparently quite barren, have been collected and distributed from the South of France under the name of *F. Burnati*, Verguin in Rouy, Rev. Bot. Syst. ii. 122 (1904).

The range of *F. major* extends from Western Liguria across the South of France into Catalonia; the var. *spectabilis* grows in Narbonne and the Eastern Pyrenees, also in South Russia (Astrakan, Becker, 1876!); the var. *algerica* in Algeria.

7. FUMARIA GAILLARDOTII, Boissier, Fl. Orient. i. 139 (1867). *F. major*, auct., ex parte, non Badarro; *F. spectabilis*, auct., ex parte, non Bischoff? *F. drepanensis*, Lojacono Pojero in Malpighia, fasc. ii.—iii. 110 (1906).
Exsicc. Neugebauer; Fl. Exsicc. Austro-Hungarica No. 2898, ut *F. major*! Heldreich, Herb. Fl. Hellenicæ No. 68, ut *F. major*! Todaro, Fl. Sicula Exsicc. No. 222, ut *F. major*!

Fumaria annua, *robustissima*, internodis longis parce ramosa, diffusa vel petiolis cirrhosis scandens. Folia irregulariter 2–3-pinnatisecta, foliolis in lobos cuneiformes mucronatos, oblongos obtusos vel rarius lanceolatos acutos fissis. *Racemi laxiusculi*, 10–16- (sæpius 10–12-) flori, *pedunculos* crassos *superantes*. *Bractew oblongæ*, cuspidatæ, præter nervum viridiusculum albidæ, *pedicellos* fructiferos *suberectos* apice valde *incrassatos suberquantes*. *Sepala* 3–4 mm. *longa*, *circa* 2 mm. *lata*, *ovata*, peltata, acuta, plus minusve *incisodentata*, præter nervum dorsalem obscurem albidâ, corollæ tubo æquilata. *Corolla* 10–12 (rarius 13) mm. *longa*, *pallide rosea*; *petalo superiore obtusiusculo*, calcare adscendente et *alis atropurpureis* reflexis apicem attingentibus carinamque paulo excedentibus prædito; *petalo inferiore marginibus latiusculis patulis* roseis apicem vix attingentibus subacuto; petalis interioribus sursum curvatis apice atropurpureis. *Fructûs magni*, 2.5 mm. longi et paululum latiores, *subrotundo-quadrati* vel subrotundi, *obtusissimi* truncati vel raro subemarginati, *obsolete mucronulati* et carinato-compressi, in vivo, ut videtur, in stipitem quam pedicelli apex multo angustiore abrupte angustati, siccitate apicis foveolis mediocribus obscuris *dense tuberculato-rugosi*.

Hæc species *F. majori*, Bad. valde affinis est, sed differt habitu etiam robustiore, pedunculis pedicellisque crassioribus, bracteis sepalisque latioribus, corollis pallidioribus minoribus petalo superiore angustius alato calcareque majore præditis, et fructibus subrotundis potius quam obovatis magis carinato-compressis foveolisque minoribus notatis.

F. agraria, Lag. præter floris majoris colorem formamque sepalis plus minusve lanceolatis apice subintegris diu persistentibus et fructûs valde compressi carinâ in rostrum emarginatum productâ facile dignoscitur.

Floris colore et magnitudine, sepalis majoribus, fructibus retuse rostratis *F. occidentalis*, Pugsley, etiam diversa est.

F. rupestris, Boiss. floribus angustis, sepalis longissimis et fructibus acutiusculis minoribus cum *F. Gaillardotii* confundi non potest.

F. Gaillardotii in Syriâ, in Egypto, in Cretâ (Heldreich, Heracleum, 1846, ut *F. flabellata*!), in Græciâ, in Dalmatiâ, in Istriâ, in Siciliâ et forsan in Italiâ australi invenitur.

F. Gaillardotii, although obviously near *F. major* and generally united with it by recent authors, seems to be a more Eastern plant which is specifically distinct owing to several minor but constant points of divergence, and especially by its different sepals and corolla. In spite of its wide distribution it appears to show little variation, except in the breadth of the leaf-segments,

and its general aspect is that of a coarse and rampant *F. major* with remarkably poor flowers. It is notable that neither Boissier nor Halácsy recognizes the identity of the Greek with the Syrian form.

There is a specimen of this plant in Herb. Mus. Brit. "*F. agraria*, Lag.—In arvis prope Nebi-Seidone, circa Sidonem Syriæ, d. 13 Martii, 1860, coll. Gaillardot."

** Series **Orientales**.

Fructûs obscure carinati, omnino obtusi.

8. *FUMARIA FLABELLATA*, Gasparrini in Rendic. Accad. Scien. Napoli, i. 51 (1842); Hamm. Mon. 41 (1857); Haussk. in Flora, lvi. 542 (1873). *F. alexandrina*, Gasp. in Rendic. Accad. Scien. Napoli, i. 50 (1842), non Ehrbg. ex Hammar, pro parte; *F. capreolata* var. β , Parlature, Mon. Fum. 77 (1844); *F. Gasparrinii*, Bubani, Fl. Pyr. iii. 276 (1901)?

Icon. Hamm. *l. c.* tab. 5.

Exsicc. Todaro, Fl. Sicula Exsicc. No. 221, Palermo! Reverchon, Pl. d'Algérie, 1896 (Kabylie), No. 103, ut *F. capreolata*!

This beautiful fumitory, which bears a resemblance to *F. capreolata* owing to its long-peduncled racemes of white, dark-tipped flowers borne on recurved pedicels, is included by Haussknecht with his *Capreolatae*. Since the corolla, however, is distinctly Agrarian in form, it seems preferable to follow Hammar in placing it here. As in *F. capreolata*, the pedicels are frequently straight in shade-grown plants.

F. flabellata is very finely represented in the exsiccata "Reverchon, Pl. d'Algérie, 1896 (Kabylie), No. 103," as *F. capreolata*.

F. alexandrina, described by Gasparrini, seems to be a rampant form of this species, as identified by Parlature. Gasparrini, whose type of *F. flabellata* appears to be a dwarf form from a native habitat, did not recognize that the two plants were conspecific.

F. ambigua, Lojacono Pojero, Fl. Sicula, 62 (1888), is reduced by Nicotra in Le Fum. Ital. p. 60, to a variety β . *ambigua* of this species, differing from the type by its rosy flowers and larger fruits. Authentic material of this plant has not been examined.

Examples of *F. flabellata* have been noted from South Italy, Sicily, and Algeria, but none from Spain. The specimens met with under this name from Istria and Dalmatia have proved referable to *F. capreolata*, *F. Gaillardotii* or *F. judaica*, but a Dalmatian example (Botteri, Cazziol!) exists in Herb. Mus. Brit. under the name of *F. speciosa*.

An unnamed, fragmentary plant in Herb. Kew, collected by Miss R. A. Bainbridge in South Morocco in 1907, resembles *F. flabellata* in its large, white, dark-tipped flowers, but its pedicels are straight and such fruits as it shows nearly smooth. This may prove to be an undescribed species.

9. FUMARIA JUDAICA, Boissier, Diag. Pl. Or. ii. No. 8, p. 15 (1849) ; Haussk. in Flora, lvi. 551 (1873). *F. alexandrina*, Ehrbg. ex Hamm. Mon. 43 (1857).

Icon. Hamm. l. c. tab. 5, ut *F. alexandrina*.

Exsicc. Bornmüller, Iter Syriacum, 1897, No. 46, Jaffa ! Letourneux, Pl. Ægyptiacæ, No. 231, Mariout !

B. insignis, var. nov.

Exsicc. K. Untchj, Kaiserwald, Pola, 1904, ut *F. flabellata* ! Pichler, Dalmatia, in agris circa Spalato, 1870, ut *F. agraria* (partim) !

Racemis paucifloris pedunculos subæquantibus, floribus multo majoribus (12–13 mm. longis) petalo superiore latius alato subacuto et breviter rostellato, fructibus subrotundis apice abrupte truncatis obsolete foveolatis sine maculis nigris a typo differt.

Hæc pulchra varietas habitat in Istriâ, prope Polam, et in Dalmatiâ, circa Spalato, ubi ex Egypto aut Palestinâ forsân introducta est.

F. flabellata longe distat pedunculis longioribus, pedicellis fructiferis arcuatis recurvis nec erecto-patentibus, sepalis magnis ovatis, et petali superioris alis atropurpureis nec albidis.

In the case of *F. judaica*, Hammar's description, though taken from the living plant, seems unsatisfactory respecting the calyx and the fruit. All the specimens examined show very small, oblong-lanceolate sepals, as described by Boissier and Haussknecht, and while the fruit varies in the development of its keel, no mucronulus has been observed in any dried example that has reached maturity. A feature of the fruit hitherto unnoticed is the conspicuous tubercle at the base of the inner apical pit. Good flowers are very frequently lacking in herbarium material of this species (especially of the Egyptian plant), and it is probable that the Syrian and Egyptian forms are not exactly identical, the fruiting pedicels in the latter (the form described by Hammar) being distinctly shorter. It may also prove that *F. judaica* occurs in Greece and has been confounded with the following species.

An example in Herb. Mus. Brit. from Central Africa (Oudney, Denham & Clapperton, 1822–4, as *F. officinalis* !) is seemingly referable to *F. judaica*.

10. FUMARIA AMARYSIA, Boiss. & Heldr. in Fl. Orient. i. 138 (1867) ; Haussk. in Flora, lvi. 550 (1873).

Exsicc. Heldreich, Herb. Græc. Norm. No. 817 !

Fumaria annua, parce ramosa, lara, diffusa vel petiolis cirrhosis scandens. Folia irregulariter 2–3-pinnatisecta, foliolis in lobos oblongos mucronatos vel lanceolatos acutos fissis, infimis breviter petiolatis. Racemi laxiusculi, sæpius 10–15-flori, pedunculos subæquantes. Bractearum lineari-lanceolatæ, acuminatæ, pedicellis mediocribus apice aliquanto incrassatis fructiferis suberectis paulo breviores. Sepala 1.5–2 mm. longa, 1 mm. lata, ovato-lanceolata, acuta, vix peltata, plus minusve dentata, præter nervum dorsalem rubicundum rosea,

corollæ tubo multo angustiora. *Corolla* 9–10 mm. *longa, pallide rosea; petalo superiore alis roseis reflexis carinam superantibus apicem attingentibus et calcar versus longe productis obtuso; petalo inferiore marginibus latis patulis roseis apicem vix attingentibus subacuto, sæpe libero deflexo; petalis interioribus sursum curvatis, breviter et obscure apice atropurpureis. Fructûs majusculi, 2.5 mm. longi et paululum angustiores, breviter subrotundo-obovati, superne subtruncati et inferne angustati, carinâ obscurâ paululum compressi, in sicco apicis foveolis obscuris tuberculato-rugosi.*

Hæc species proxima est *F. judaica*, cujus forsitan mera varietas sit, sed *F. judaica* differt habitu robustiore, pedicellis vulgo longioribus apice magis incrassatis, sepalis oblongo-lanceolatis acuminatis basi solum dentatis, corollâ majore albidâ nec roseâ, fructibus majoribus nitidis evidentius tuberculato-rugosis.

F. macrocarpa, Parl. cujus corolla ei *F. amarysiæ* subsimilis est fructibus maximis globosis longe recedit.

F. Bastardii, Bor. subsectionis *Muralium*, pro quâ cl. Boissier primo *F. amarysiæ* habuit, petali inferioris marginibus angustis præsertim sed etiam bracteis brevioribus, sepalis majoribus serratis, fructibus subacutis vel obtusis nec vero subtruncatis plane differt.

Hæctenus *F. amarysia* in Græciâ solâ inventa est.

11. *FUMARIA MACROCARPA*, Parlatores, Pl. Novæ, 5 (1842), et Mon. Fum. 143 (1844); Hamm. Mon. 45 (1857); Haussk. in Flora, lvi. 559 (1873).

F. megalocarpa, Boiss. & Sprunn, Diag. Pl. Or. i. No. 1, p. 68 (1843).

Icon. Hamm. l. c. tab. 6.

Æsicc. Orphanides, Fl. Græca Æsicc. No. 20, Athens, ut *F. megalocarpa* ! Heldreich, Herb. Græc. Norm. No. 1002, ut *F. megalocarpa* ! Balansa, Pl. d'Orient, 1854, No. 128, Smyrna !

This species, recognizable at a glance by its very large, globular fruits, is remarkable also for its extremely narrow sepals and the complete absence of purple colouring from its corolla. In well-grown examples the pale, rosy flowers attain a length of 11 mm., with the linear-lanceolate sepals nearly 3 mm. long. The distant and curiously recurved lower petal depicted in Hammar's figure was noticed by Boissier as characteristic of this species, and its spreading margins are more spatulate in outline than in any other member of the *Grandifloræ*.

F. oxyloba, Boiss. Diag. Pl. Or. ii. No. 8, p. 14 (1849), appears to be a shade-form rather than a true variety of *F. macrocarpa*.

SUBSECTIO II. **CAPREOLATÆ.**

Capreolata, Haussk. in Flora, lvi. 539 (1873); Pugsley, Fum. in Brit. 5 (1912); Hamm. Mon. 24 (1857), ut sectio, ex parte.

Pedunculi longi pedicellis sæpissime apice multo incrassatis præditi. Bracteæ raro quam pedicelli fructiferi multo breviores. Sepala plerumque magna, apicem versus integriuscula, raro quam corollæ tertia pars breviora

ejusque tubum latitudine sæpissime superantia. Corolla sæpius angusta ; petalo superiore alis apicem haud attingentibus acuto ; petalo inferiore acuto marginibus erectis angustis apicem haud attingentibus. Fructus parvi, mediocres vel magni, in vivo plerumque stipite carnosio distincto quam pedicelli apex incrassatus angustiore præditi, siccitate læves usque ad rugosi.

The wings of the upper petal, as well as the tips of the inner ones, are dark purple in *F. capreolata*, *F. purpurea*, *F. macrosepala*, and *F. berberica*. In *F. dubia* and *F. coccinea* this dark colour is obscure or wanting, and in the last-named the wings themselves are obsolescent.

* Series **Eu-Capreolatae**.

Pedicelli fructiferi arcuato-recurvi aut saltem patentes ; fructus læves vel rugulosi.

12. FUMARIA CAPREOLATA, Linn. Spec. Plant. 701 (1753) ; Hamm. Mon. 24 (1857) ; Pugsley, Fum. in Brit. 6 (1912). *F. pallidiflora*, Jordan in Schultz Archives, 305 (1854). (Pl. 9, fig. 2.)

In Hammar's Monograph Ray's *F. major scandens flore pallidior* (Hist. i. 405 (1686)), cited by Linnæus, is omitted from the synonymy of this species. The omission is not without justification, for Ray's remarks betray no acquaintance with *F. capreolata*, and none of the exsiccata in the Sloane Herbarium under his name belongs to this species, being all, except one doubtful fragment (probably *F. muralis* subsp. *Boræi*), rampant forms of *F. officinalis*, as is also a specimen similarly named in the contemporary Herb. Dubois at Oxford. It may thus be reasonably concluded that rampant forms of *F. officinalis* were the recognized *F. major scandens flore pallidior* of the British botanists of that period. The Sloane Herbarium contains a good example of *F. capreolata* (H.S. 58/146) under Bauhin's name (Pinax, 143), and there is a British specimen of var. *Babingtonii* in Herb. Dubois, labelled "*F. scandens altera* Cæsalp."

Icones. Savi, Mat. Med. tab. i, ic. 1 ; Sturm, Deutschlands Flora, i. 62. 13 ; Flora Danica, tab. 2359 (forma umbrosa) ; Hamm. l. c. tab. iii. (forma sepalis insolite dentatis) ; Journ. Bot. xl. tab. 436, fig. 2, ut *F. speciosa*. *Exsicc.* Bourgeau, Fl. Pyr.-Espag. No. 391 ! Neugebauer, Fl. Exsicc. Austro-Hungarica, No. 2899 !

! Sepala typi vel paulo breviora, subintegra ; corolla rubescens.

β. *speciosa*, Hamm. Mon. Slägt. Fum. 25 (1854), et Mon. 25 (1857).

F. speciosa, Jord. in Cat. Grenoble, 15 (1849), et Linnæa, xxiii. 507 (1850).

Exsicc. Mabile, Herb. Corsicum, 1868, No. 337, ut *F. speciosa* !

Hæc varietas racemis laxiusculis, pedicellorum tenuiorum bracteis paulo brevioribus, sepalis vulgo 4-5 mm. longis 2-3 mm. latis ovatis potiusquam ovalibus frequentius subintegris, corollis primo albidis sæpius tandem omnino rubris petalo superiore parum angustato præditi a typo differt.

In addition to the relatively shorter and broader sepals of this variety and its more highly coloured corolla, which often changes wholly from white to deep crimson, the upper petal, when fresh, is distinctly less laterally compressed than in typical *F. capreolata*, and the pedicels seem slenderer and more flexuous, with somewhat shorter bracts.

According to Hammar the racemes are denser than in the type, but the examples examined show laxer racemes as noticed by Jordan ("racemis . . . laxiusculis").

In the living state this variety, which is found chiefly in Spain and Southern France, is especially beautiful owing to the bright red and white colouring of its flowers.

!! Sepala quam typi sæpe longiora ; corolla albida vel roseo-tincta.

γ. *albiflora*, Hamm. Mon. Slägt. Fum. 25 (1854), et Mon. 25 (1857).

F. capreolata β. *flavescens*, Nicotra, Le Fum. Ital. 44 (1897), excl. syn. partim.

Exsicc. Heldreich, Herb. Græc. Norm. No. 1003, ut *F. capreolata*!

Many North European specimens that have been referred to this variety are probably shade-forms only (forma *parviflora*, Haussk.) of the type, but a few of them and some white-flowered examples from the Mediterranean region appear to constitute a distinct variety.

δ. *Babingtonii*, Pugsley, l. c. 9. *F. pallidiflora*, Babington in Journ. Linn.

Soc. iv. 157 (1860), non Jordan.

Icon. Journ. Bot. xl. tab. 436, fig. 1, ut *F. capreolata*.

ε. *devoniensis*, Pugsley, l. c. 10.

!!! Sepala minora, magis dentata ; corolla sæpius rubescens.

ζ. *condensata*, Ball, Spic. Fl. Marocc. in Journ. Linn. Soc. xvi. 315 (1878).

Exsicc. Hooker, Inzuda, Greater Atlas, S. Marocco, 1871, in Hb. Kew!

Racemi densi. Bractæ pedicellis parum recurvatis paulo breviores. *Sepala* 4 mm. longa, 2·5–3 mm. lata, *ovata*, *acuta*, basin versus conspicue *inciso-dentata*. *Corolla* 10–11 mm. longa, ut in var. *speciosâ* rubescens. *Fructûs* quam in typo *maiores*, 2·5 mm. longi et plus 2 mm. lati.

This variety shows the dense racemes characteristic of the specific type combined with relatively small and much cut sepals and large fruits similar to those of var. *Babingtonii*.

η. *Hochreutineri*, var. nov.

Exsicc. B. P. G. Hochreutiner, Voyage botanique en Algérie, 1901, No. 18, Environs d'Alger, ut *F. capreolata* var. *intermedia*, Haussk.!

Sepala relative *parva*, 3–3·5 mm. longa, vix 2 mm. lata, *oblongo-ovata*, breviter *acuminata*, circumeirca parce serrato-dentata, albida ; *corolla* 10–11 mm. longa, ut in var. *speciosâ* rubescens.

This rare plant, remarkable for its relatively small, toothed sepals, bears a general resemblance in other respects to var. *speciosa*, and in comparison may be regarded as somewhat analogous with the var. *brevisepala* of *F. purpurea*. It agrees in floral characters with Haussknecht's description of his var. *intermedia*, but the plant in the Boissier Herbarium on which this name was founded cannot be retained as a variety of *F. capreolata*, which Dr. Hochreutiner's plant evidently is, and a fresh name for the latter has therefore been substituted.

F. platycalyx, Pomel, Nouv. Mat. Fl. Atlant. 239 (1874), is a plant of which no material has been seen, but it is apparently a shade-form of *F. capreolata*, as treated by Battandier & Trabut (Fl. de l'Algérie, i. 26 (1888)).

Of *F. nemorosa*, Lojacono Pojero in Fl. Sicula, 61 (1888), which is reduced by Nicotra to a synonym of *F. capreolata* var. *albiflora*, several authentic specimens have been seen which either belong to this variety or are shade-forms of the specific type. The diagnosis of *F. nemorosa*, however, states that the fruits are "grosse rugulosis,"—a feature recalling *F. flabellata* rather than any form of *F. capreolata*—and so the name may be held doubtful.

The var. *atrosanguinea*, Brochon & Neyraut, adopted by Rouy & Foucaud (Fl. Fr. i. 171), seems to be a form only of var. *speciosa*, Hammar, in which the sepals as well as the corolla become red. It was originally issued as *F. speciosa*, Jord., forma *atrosanguinea*, in the exsiccata "C. Magnier, Fl. Sel. Exsicc. No. 2388. Pyrénées-Orientales, 1890."

It may be observed that while this variety *atrosanguinea* seems almost inseparable from var. *speciosa*, Hamm., the variety described by Rouy & Foucaud under this latter name appears to be Hammar's type, which is not otherwise accounted for by the collaborateurs.

The variety *provincialis*, Rouy & Foucaud (*l.c.*), seems from the description to be a luxuriant state of *F. capreolata* rather than a true variety—a view borne out by the example in Herb. C. Bailey of "Magnier, Fl. Sel. Exsicc. No. 456," which is cited by the authors in illustration.

Another specimen in the same collection under this name, gathered by Albert in 1893, at Solliès-Toucas, Var, whence Rouy & Foucaud record var. *provincialis*, is, however, much more distinct and perhaps a good variety. This has bracts barely exceeding half the length of the pedicels, and relatively lax and slender racemes of large, pale flowers attaining 14 mm. in length, with the upper petal very narrow and comparatively but very little laterally compressed, much as in var. *speciosa*.

A further conspicuously fine plant allied to this form, but with large fruit, is one from Corfu (Baenitz, Fl. Coreyrensis; Kastrades, 1896, as *F. capreolata*!), which may likewise be varietally separable.

It is not always easy, in the absence of adequate material and a knowledge of the habitats, to justly estimate the value of the differences presented by this widely distributed and variable species.

With regard to the geographical distribution shown at pp. 10 and 11 of "*Fumaria* in Britain," the correctness of the habitats, Canaries and St. Helena, given both by Hammar and Haussknecht, may be doubted, the plants intended being probably *F. coccinea* and *F. muralis* respectively.

13. *FUMARIA DUBIA*, sp. nov.

F. capreolata β . *intermedia*, Haussk. in Flora, lvi. 541 (1873).

Exsicc. Montagnes voisines du Fort L'Empereur, Alger, 1831, Herb. Fauché, No. 1 (in Hb. Boissier) !

Fumaria F. capreolata habitu foliisque et *pedunculis* longis *racemos densos superantibus*. *Bractee* *pedicellos fructiferos arcuato-recurvos subaequantes*. *Sepala* circa 3.5 mm. longa et 2 mm. lata, ovata, peltata, acuminata, denticulata, albida. *Corolla* 10–12 mm. longa, omnino rosea, ut videtur, aut roseo-albida ; *petalo superiore* angusto *acuto alis roseis* carinam haud superantibus praedito ; *petalo inferiore* *marginibus angustissimis erectis acuto*. *Fructus parvi*, 2.25 mm. longi et 2 mm. lati, subrotundi, ad medium latissimi, superne in apicem subacutum et inferne in stipitem quam pedicelli apex angustiore æqualiter angustati, juniores plane apiculati, siccitate apicis foveolis parvis distinctis rugulosi.

Descriptio secundum exemplar solum imperfectum in Herb. Boissier.

In montibus Algeriæ habitat.

Hæc *Fumaria* quæ ut species nova dubitanter descripta est, per sepala minora denticulata, per petali superioris alas roseas nec purpureas, et præsertim per fructus subacutos rugulosos a *F. capreolata*, ut videtur, specificè differt.

Secundum cl. Haussknecht hujus plantæ fructus rugulosus transitum ad *F. flabellatam* denotat, sed, me judice, et fructus rugulosus subacutus et corolla angusta sine apice purpureo rosea affinitatem cum *F. coccinea* monstrant.

The specific name *intermedia* having been already appropriated under the genus *Fumaria* (Withering, Arr. ed. 3, iii. 620, t. 29 (1796)) to represent a plant now referred to *Corydalis bulbosa*, DC., the present form has been described as *F. dubia*.

14. *FUMARIA PURPUREA*, Pugsley in Journ. Bot. xl. 135 & 179 (1902) ;
Fum. in Brit. 12 (1912). *F. Boræi*, Babington in Journ. Linn. Soc. iv.
157 (1860), non Jordan.

Icon. Journ. Bot. xl. tab. 436, fig. 3.

β . *brevisepala*, Pugsley, Fum. in Brit. 13.

Icon. Pugsley, l. c. fig. 1 (Journ. Bot. l. tab. 519).

There is a British specimen of *F. purpurea* in the Herbarium of Dillenius at Oxford, and another still earlier (circa 1700) in the Herb. Dubois. The latter is labelled "*F. major scandens floribus albis riche saturate purpureo* (sic). Omnibus partibus major est *F. scandente* nostrate. An *F. altera* Cæsalp.?"

** Series **Macrosepala**.

Pedicelli fructiferi suberecti ; fructûs rugosi.

15. FUMARIA MACROSEPALA, Boissier, Elenchus No. 7, 8 (1838) ; Voyage Bot. Espagne, ii. 19 (1839–1845) ; Hamm. Mon. 36 (1857) ; Willkomm & Lange, Fl. Hisp. iii. 880 (1880).

Icones. Boissier, Voy. Bot. Espagne, tab. iv. ; Hamm. *l. c.* tab. iii.

Exsicc. Willkomm, Iter Hispanicum, 1845, No. 863, Malaga ! Lange, Pl. Hisp. 1851–2, Jaen, in Hb. Kew ! Huter, Porta & Rigo, Iter Hisp. 1879, No. 518, ut *F. latisejala* !

In this species, which is said to inhabit rocky slopes rather than cultivated ground, the corolla resembles that of *F. capreolata* in its narrowly winged upper petal and its peculiar reddish dorsal suffusion.

F. malacitana, Haussk. & Fritze in Flora, lvi. 548 (1873), although described as closely allied to *F. gaditana*, Haussk., seems rather, judging by the type specimen in Herb. Boissier (Ad sepes prope Malacitanam, R. Fritze, Mai, 1873 !), as well as by the diagnostic characters, a form of *F. macrosepala*, as suggested by Willkomm & Lange (*l. c.* 881). Fritze's specimen is a piece of a large, vigorous plant, gathered late and perhaps on cultivated ground, in which the mucronulus of the fruit is obscured.

A plant sent out by Porta & Rigo as *F. macrosepala*, Boiss. var. *malacitana*, Haussk. & Fritze, (Iter IV Hispanicum, 1895, No. 24 !) is luxuriant *F. macrosepala*, with the sepals and corolla ranging to 7 mm. and 13 mm. in length respectively.

This fine species is reported also for the mountains of Tetuan, in Morocco, by J. Ball in Journ. Linn. Soc. xvi. 315 (1878). Ball's specimen is at Kew.

16. FUMARIA BERBERICA, sp. nov. (Pl. 11, fig. 1.)

F. agraria var. *atlantica*, Ball, Spic. Fl. Marocc. in Journ. Linn. Soc. xvi. 316 (1878), non Cosson.

Exsicc. J. Ball, Iter Maroccanum, Ait Mesan, 1871, in Hb. Kew, ut *F. agraria* var. *atlantica* !

Fumaria habitu robusto sine dubio annua. Folia 2–3-pinnatisecta, foliolis in lobos oblongos acutos mucronatosve eis *F. agrarie* similes fissis. *Racemi* 10–15-flori, *pedunculos* subequantes. *Bractee* magnæ, lineari-lanceolatæ, acuminatæ, subfoliatæ, *pedicellos* fructiferos *suberectos* breviusculos apice multo incrassatos conspicue *superantes*. *Sepala* 4·5–5·5 mm. longa, 2·5–3 mm. lata, ovata, peltata, acuminata, circa basin marginemque inferiorem *parce*

serrato-dentata, præter nervum dorsalem latum viridem albida, corollæ tubo latiora. Corolla 11–12 mm. longa, roseo-albida; petalo superiore alis atropurpureis reflexis carinam æquantibus apicemque fere attingentibus subacuto; petalo inferiore acuto marginibus erectis angustissimis; petalis interioribus apice atropurpureis. Fructûs majusculi, circa 2.5 mm. longi ac lati, subrotundi, cum mucronulo persistente obtusissimi et inferne parum angustati, paululum compressi sed distincte carinati, siccitate apicis foveolis parvis obscuris dense sed haud grosse rugosi.

Hæc rara species, ad gregem *Capreolarum* plane referenda, *F. macrosepalæ* proxima est, sed sepalis dentatis, corollis minus angustatis apicem versus haud rubescentibus nec in siccitate viridescentibus, fructibus minoribus sed distinctius rugosis differt.

Quamquam cl. Ball hanc plantam ad *F. agrariæ* varietatem retulit, id ab illo dubitanter factum esse manifestum est, nam “Planta haud omnino certa—facies *F. capreolatæ*, sed characteres potius *F. agrariæ*” scripsit. Ut etiam *F. macrosepalam* certe cognovit ejus similitudinem cum *F. berbericâ* non vidisse paulo notabile est, et per hujus corollam in vivo latiore forsitan explicandum sit.

F. capreolata per flores angustiores, pedicellos arcuato-recurvos fructûsque læves minores, *F. agraria* per sepala parva, corollam omnino diversam fructûsque rostratos grosse rugosos, et *F. flabellatæ* per corollæ formam pedicellosque arcuato-recurvos plane distant.

F. berberica in rupibus arenaceis Atlantis majoris Mauritanizæ australis, in convalle Aït Mesan (alt. 1600 m.) habitat.

A second specimen in Herb. Kew (*F. agraria*, var. —, Hooker, Revaia, 6–7000 ft., S. Marocco, Greater Atlas, May, 1871!) may also belong to this species, but it shows no fruit and is too fragmentary for certain determination.

17. FUMARIA COCCINEA, Lowe MSS. in Herb. Kew and Herb. Mus. Brit., sp. nov. (Pl. 12.)

F. montana, Haussk. in Flora, lvi. 546 (1873), et auct., non Schmidt.

Exsicc. Bourgeau, Pl. Canar. No. 178, ut *F. capreolata*! De la Perraudière, Canaries, 1855, in Hb. Boissier, ut *F. capreolata* var. *canariensis*! Lowe, Santa Cruz, Teneriffe, 1859, in Hb. Mus. Brit.! Bornmüller, Pl. Exsicc. Canar. 1901, No. 2029! et No. 2028 (forma umbrosa), ut *F. montana*! Sprague & Hutchinson, Canary Is., No. 1265!

Fumaria annua, internodis longis *gracilis*, plus minusve ramosa, petiolis cirrhosis scandens. Folia sæpe parvula, foliolis in lobos oblongos, subellipticos vel late cuneatos, sæpissime obtusos et nonnunquam mucronatos fissis, infimis breviter petiolatis, irregulariter 2-(rarius 3-) pinnatisecta. Racemi pauciflori (6–12-flori), pedunculis gracilibus paulo breviores. Bractæ lineari-subulatæ, acuminatæ, pedicellis fructiferis erecto-patentibus, rectis flexuosisve, apice incrassatis, sæpe breviusculis, paulo breviores. Sepala 3–4 mm. longa, circa

2 mm. lata, oblongo-ovata vel oblongo-lanceolata, peltata, acuta, parce dentata vel etiam præcipue basin versus paululum laciniata, nervo dorsali obscuro viridiusculo albida vel roseo-albida, corollæ tubum subæquantia, longe persistentia. Corolla 8-10 mm. longa, rubra vel coccinea (in formis umbrosis albida), in fructu juniore persistens; petalo superiore alis rubris angustissimis (carinam haud æquantibus) vel omnino obsoletis acuto angustissimo; petalo inferiore marginibus angustis erectis apicem haud attingentibus acuto; petalis interioribus prope rectis apice parum saturatioribus. Fructus parvi vel mediocres, 2-2.5 mm. longi ac lati, subrotundo-quadrati, obtusissimi obtusi vel rarius acutiusculi, inferne abrupte angustati, satis carinato-compressi, siccitate apicis foveolis parvis plus minusve distinctis rugosi.

F. coccinea habitu gracili, floribus minoribus rubris angustissimis petalo superiore fere exalato præditis ab hujus seriei aliis speciebus differt.

F. montana, Schmidt in Beit. Fl. Cap. Verd. Inseln, p. 263, quâcum *F. coccinea* forma umbrosa a cl. Haussknecht auctoribusque recentioribus confusa est, habitu robustiore, foliolis longius petiolatis cum lobis angustioribus, bracteis longissimis, floribus minoribus semper albidis, petali inferioris subspathulati marginibus patentibus fructuque majore subgloboso plane carinato distinguitur et ad subsectionem *Latiseptalarum* referenda est.

F. coccinea habitat in insulis Canariensibus ubi in montibus sylvaticis invenitur.

This very distinct fumitory, which has been distributed at intervals from the Canaries under different names, can only be placed among the *Capreolatae*, and is remarkable for its very narrow and nearly unicolorous corollas. In the living state, when not shade-grown, the flowers appear to be bright red in colour, and have been referred to by collectors as crimson, "*coccinea*," and "*sanguinea*."

The fruits of this species show considerable variation in form, for while those of Lowe's original specimens are quite rounded-obtuse, other herbarium material furnishes a transition to the subacute-fruited form lately obtained by Messrs. Sprague & Hutchinson.

Haussknecht's identification of this plant with Schmidt's *F. montana* seems attributable to the similarity in size and colour of the flowers when *F. coccinea* is shade-grown, both species lacking the dark corolla-tip that is generally prevalent in the genus. There is also some resemblance in the sepals, but in other respects the two plants appear widely different.

SUBSECTIO III. MURALES.

Murales, Haussk. in Flora, lvi. 513 (1873). *Capreolata*, Hamm. Mon. 24 (1857), ut sectio, ex parte; *Medicæ*, Pugsley, Fum. in Brit. 15 (1912).

Pedunculi plus minusve breviusculi, eis *F. bicoloris* et *F. sepium* exceptis. Pedicelli quam in subsectionibus prioribus sæpius minus incrassati, nisi in *F. Thuretii*. Bracteæ longitudine variabiles sed pedicellos fructiferos raro

aequantur. Flores racemorum recentiorum quam in prioribus sæpe pauciores minusque explicati. Sepala dentata, serrata vel integriuscula, raro corollæ tertiâ parte longiora vel ejus tubo plane latiora. Petala exteriora obtusa vel acuta, inferius marginibus angustis qui apicem vix attingentes plerumque erecti rarius patentes sunt. Fructûs parvi aut modici, formæ diversissimæ, siccitate tuberculato-rugosi, rugulosi vel etiam læves.

In this subsection the wings of the upper petal, as well as the tip of the inner ones, are dark purple except in *F. bicolor* and some forms of *F. Bastardii*.

The term *Mediæ*, which was applied to this difficult group in "*Fumaria* in Britain," has been abandoned in favour of *Murales*, Haussk. as further investigation sufficiently shows that *F. media*, Loiseleur, 'Notice,' p. 101 (1810), a plant whose identity has given rise to much discussion, represents only a rampant form of *F. officinalis*, Linn. and has no connection with the species of this subsection. Loiseleur refers to its retuse fruits in his diagnosis and again in his subsequent remarks, and the figure which he quotes (Vaillant, Bot. Par. tab. x. fig. 4)—an exceptionally good drawing but without fruits—bears a raceme of dorsally compressed flowers, with small sepals, which, if not a form of *F. officinalis*, can only be referred to *F. major*, Bad. De Candolle, Reichenbach, and Boreau clearly regard *F. media*, Lois. as closely allied to *F. officinalis*, and Parlatores (Mon. Fum. p. 59) shows at some length that they are not separable as species, a view more recently maintained in Rouy & Foucaud's 'Flore de France' and Nicotra's 'Le Fumariaceæ Italiane.' The confusion that has arisen through the connection of this name with *F. muralis* and its allies seems largely due to Hammar's interpretation of *F. media* (Mon. Fum. p. 28), which, combined with his association of *F. Bastardii* with *F. muralis*, forms the most serious error in his generally excellent work, and is carefully corrected by Haussknecht. The further extension of Loiseleur's name by Willkomm & Lange (Fl. Hisp. iii. p. 882) to cover the majority of the varied Spanish forms of this group argues a treatment of this subsection quite unequal to that of the remainder of the genus.

* Series **Sub-Agrariæ**.

Sepala parva ; petali inferioris margines angusti, patentes ; fructûs rugosi.

18. *FUMARIA BICOLOR*, Sommier ex Nicotra in Le Fum. Ital. 55 (1897) ; Fl. Giglio, 7 (1900). *F. capreolata* var. —, Duthie in Journ. Bot. x. 208 (1872) ; *F. rupestris* var. *maritima*, Battandier in Bull. Soc. Bot. Fr. xxxii. 336 (1885) ; *F. Loiseleurii* Clavaud *β. leronensis*, Burnat, Fl. Alp. Marit. 69 (1892).

Exsicc. Burnat, St. Marguerite, Cannes, in Hb. Boissier & Hb. Zurich, ut *F. Loiseleurii β. leronensis* ! Townsend, St. Marguerite, 1872, in Hb. Kew, ut *F. maculata* ! Duthie, Fl. Melit. Exsicc. 1874, in Hb. Kew & Hb. Mus. Brit., ut *F. capreolata*, var. — !

Fumaria annua, habitu *gracili*, diffusa vel petiolis cirrhosis scandens. Folia glaucescentia aut viridia, foliolis in lobos lanceolatos acutos vel oblongos mucronatos fissis irregulariter 2-3-pinnatisecta. *Racemi pauciflori* (8-12-flori), *pedunculis* tenuibus sæpe incurvatis breviores. *Bractea* oblongæ, cuspidatæ, *pedicellis* fructiferis gracilibus flexuosis interdum suberectis interdum patentibus triplo quadruplo breviores. *Sepala minima*, 2-2.25 mm. longa, circa 1 mm. lata, ovalia, vix peltata, breviter acuminata, plus minusve dentata, nervo dorsali rubro rosea, corollæ tubo multo angustiora. *Corolla* 10-13 mm. longa, fere recta, albida vel roseo-albida, tandem præter petalorum interiorum apicem omnino rosea, ut in racemo singulo flores juniores albidii maturiores rosei videantur; *petalo superiore subacuto alis roseis reflexis* apicem vix attingentibus carinam æquantibus vel paulo excedentibus calcar breviusculum versus longe productis ut in *F. Bastardii*; *petalo inferiore marginibus angustis patentibus* roseis apicem haud attingentibus acuto; petalis interioribus apice atropurpureis. *Fructus parvi*, 2-2.25 mm. longi et 1.5-1.75 mm. lati, subrotundo-ovati, subacuti sed inferne parum angustati, obscure carinati et paululum compressi, siccitate dense sed haud grosse rugosi, apice foreolis angustis superius nigris et nonnunquam maculâ laterali nigrâ notati.

Hæc species, a cl. Sommer in 'Florula del Giglio' et a cl. Burnat in 'Flore des Alpes Maritimes' bene descripta, in subsectione *Agrariarum*, ad quam per corollæ formam accedit, a cl. Nicotra locata est. In aliis characteribus, sicut in habitu gracili et in fructus formâ, subsectionem *Muralium* plane refert, et, me iudice, *F. Bastardii*, Bor. (et præcipue varietati *vaganti*) proxima est.

F. bicolor racemis paucifloris, pedunculis tenuibus longioribus, bracteis sepalsisque minimis, corollâ angustiore fere rectâ, petali superioris calcare brevior, petali inferioris marginibus paulo latioribus, fructibus minoribus et densius rugosis a *F. Bastardii* distinguitur.

F. rupestris, Boiss. habitu robustiore, bracteis longis setaceo-acuminatis, sepals majoribus lanceolatis, fructibus rugosioribus multo majoribus plane differt.

F. amarysia, Boiss. bracteis multo longioribus, petalis interioribus apice brevius atropurpureis, fructibus multo majoribus obovatis subtruncatis longe recedit.

F. bicolor in insulis italicis Giglio, Elbâ, Montecristo, Capraiâ et Giannutri, atque in insulâ Sta. Margaritâ prope Cannes Galloprovinciæ dumeta nec culta habitat; in insulâ Melitâ etiam in locis saxosis umbrosis atque in scopulis maritimis Algeriæ invenitur. In herbario Kewensi exemplar imperfectum "*F. Petteri* Rehb. Sicilia, Parlatore, No. 137" forsitan ad hanc speciem relatum sit.

This rare fumitory, one of the few species not affecting disturbed ground, is especially interesting to British botanists in that it was discovered in 1872 almost simultaneously at Cannes by the late Mr. F. Townsend, who pointed

it out to M. Burnat, and at Malta by Mr. J. F. Duthie. The identity of *F. bicolor* and *F. Loiseleurii* β . *leronensis* seems to have been hitherto overlooked.

19. *FUMARIA BASTARDII*, Boreau in Duchartre Rev. Bot. ii. 359, excl. var. β (1846-7); Fl. du Centre, ed. 2, 28 (1849), et ed. 3, 34 (1857); Pugsley, Fum. in Brit. 35 (1912). *F. confusa*, Jordan in Cat. Dijon (1848), et Linnæa, xxiii. 469 (1850); Pugsley in Journ. Bot. xl. 173 (1902); *F. media* β . *confusa*, Hamm. Mon. 28 (1857), non *F. media*, Loiseleur; *F. Gussonei*, Boiss. ex Haussk. in Flora, lvi. 513 (excl. *F. Petteri*, Rehb. in syn.), in sensu lato (1873).

Icones. Hamm. l.c. tab. 3, ut *F. media* β . *confusa*; Journ. Bot. xl. tab. 436, fig. 6, ut *F. confusa*.

Æsicc. Billot, Fl. G. & G., No. 1206! et No. 3307 bis! Schultz, Herb. Norm. No. 605, ut *F. confusa*!

Fumaria annua, habitu satis robusto, sæpe ramosissima, *suberecta vel diffusa* vel rarius petiolis cirrhosis scandens. Folia irregulariter 2-3-pinnatisecta, viridia vel glaucescentia, foliolis in lobos oblongos acutos mucronatosve quam *F. muralis* angustiores fissis prædita. *Racemi laxiusculi, multiflori* (vulgo 15-25-flori), *pedunculos superantes*. *Bractee* lineari-oblongæ, cuspidatæ, *pedicellis fructiferis* longiusculis *suberectis* vel erecto-patentibus duplo vel etiam triplo breviores. *Sepala* circa 3 mm. longa, 1.5 mm. lata, ovalia, vix peltata, acuta, plus minusve circumeirca *serrata*, præter nervum dorsalem viridiusculum rosea, corollæ tubo angustiora, inferne remota, sæpe in fructu juniore persistentia. *Corolla* 10-11 (raro 12) mm. longa, præter *petalorum interiorum apicem atropurpureum rosea*; *petalo superiore* obtuso vel acuto, *a latere compresso* (dorso satis angusto), etiam in gemmis haud spathulato, *alis roseis reflexis* calcar versus longe productis sæpe carinam excedentibus apicemque attingentibus prædita; calcar sepalis longius: *petalo inferiore marginibus angustis patulis* apicem vix attingentibus subacuto. *Fructus* modici, circa 2.5 mm. longi ac lati, *rotundati, obtusiusculi* vel rarius obtusissimi, paulo compressi sed obscure carinati, in vivo *inferne* in stipitem obscurum qui pedicelli apicem parum incrassatum æquat vel excedit sæpissime *vix angustati*, siccitate apicis foveolis latis paululum obscuris satis *rugosi*.

! Petalum superius omnino roseum.

β . *patens*, comb. nov.; *F. Gussonei*, var. *patens*, Haussk. l.c. 518.

Æsicc. Mabillet, Herb. Corsicum, 1868, No. 338, ut *F. Gussonei*!

Planta laxa sed robusta, foliorum lobis quam in typo paulum latioribus. *Bractee acuminatæ*, intimæ *pedicellos* fructiferos breviusculos *flexuosos sæpe patulos* subæquantes, reliquæ dimidio breviores. *Corolla* 9-10 mm. longa. *Fructus* circa 2 mm. longi ac lati, ut in var. *Gussonei subglobosi* et *leviter rugosi*. Aliter ut in typo.

γ. vagans, var. nov.

F. vagans, Jord. in Cat. Grenoble (1849), et Linnæa, xxiii. 508 (1850); Hamm. l. c. 46.

Icon. Hamm. l. c. tab. 6, ut *F. vagans*.

Bracteæ oblongæ, cuspidatæ, apice denticulatæ, pedicellis fructiferis triplo breviores. Sepala 2–2.5 mm. longa, 1.5–2 mm. lata, rotundato-ovalia, breviter acuta, nervo dorsali incrassato carinata. Petalum superius vix a latere compressum, alis roseis patenti-reflexis carinam paulo superantibus apicemque vix attingentibus subacutum. *Fructus* circa 2.25 mm. longi, 2 mm. lati, *subrotundo-orati*, *acutiusculi*, inferne in stipitem obscurum quam pedicelli apex paulo angustiorum angustati, *tenuiter rugosi*. Aliter ut in typo.

This plant, though near the specific type, is separable by its more carinate sepals, by the form of its corolla, which when fresh is broader and less laterally compressed, and especially by its smaller, more acute and more finely rugose fruits. Rouy & Foucaud's variety *occidentalis* of *F. vagans* (Fl. France, i. p. 174) seems from the description to be a shade-form only.

!! Petalum superius apice atropurpureum.

δ. *Gussonei*, Pugsley, Fum. in Brit. 40 (1912). *F. Gussonei*, Boiss.

Diag. Pl. Or. ii. No. 8, p. 13 (1849); Hamm. l. c. 34. (Pl. 9, fig. 3.)

Exsicc. Billot, Fl. G. & G., No. 1109, ut *F. Gussonei*! Fiori & c., Fl. Exsicc. Ital. No. 827, ut *F. serotina* var. *Gussonei*! Lojacono, Pl. Ital. Select. No. 74, ut *F. Gussonei*!

Varietas sæpius satis nana foliis plus minusve glaucis. *Sepala* 2–3 mm. longa, 1–2 mm. lata, *quam typi paulo latiora*. *Corolla* 9–10 (raro 11) mm. longa; *petalo superiore. alis atropurpureis sæpe obtuso*; *petalo inferiore marginibus quam in typo angustioribus*. *Fructus satis parvi*, circa 2 mm. longi et lati, *subglobosi*, rotundato-obtusi et inferne plane angustati, siccitate quam in typo apicis foveolis obscurioribus *tenuius rugosi*.

ε. *hibernica*, Pugsley, Fum. in Brit. 41 (1912).

Icones. Eng. Bot. Suppl. 2976, ut *F. confusa*. Pugsley, l. c. fig. 5 (Journ. Bot. l. tab. 519).

The E.B.S. figure was drawn from a Scilly specimen collected by Townsend. Although not very characteristic, the acuminate purple tip of the upper petal is sufficiently indicated.

The Spanish plant represented in the exsiccata "Sennen, Pl. d'Espagne, No. 228," as *F. vagans*, closely resembles this variety except for its smaller, acuter fruits.

ζ. *affinis*, var. nov.

F. affinis, Hamm. Mon. Slägt. Fum. 47 (1854), et Mon. 39 (1857).

Icon. Hamm. Mon. tab. 5, ut *F. affinis*.

Exsicc. Lange, Almeria, 1852, in Hb. Boiss.!

Hammar's description and figure of this little-known plant recall the small-flowered form of *F. major*, Bad., but Lange's specimen from Almeria in

Herb. Boissier clearly belongs to *F. Bastardii*, as determined by Haussknecht. In the colour of the corolla it resembles var. *Gussonei*, but the flowers are larger with more broadly winged outer petals; and the fruits are relatively large and very obtuse, approaching those of *F. major* in shape but showing no mucronulus in the dry state.

The specimen of *F. affinis* in Herb. Kew, received from Lange, does not agree with that in Herb. Boissier and with Hammar's diagnosis, but seems to be a large-flowered example of typical *F. Bastardii*.

η. benedicta, comb. nov.

F. Gussonei var. *benedicta*, Nicotra in Nuov. Giorn. Bot. Ital. nov. ser. iv. 312 (1897); Le Fum. Ital. 53 (1897).

Icon. Nuov. Giorn. Bot. Ital. l. c. tab. 10.

This variety is remarkable for the black apical pits and lateral markings of its fruit, resembling those of *F. bicolor*. It is also characterized by its rampant habit, relatively broad leaf-segments, apically thickened pedicels, and rather narrow sepals and wings to the upper petal.

Plants agreeing in all respects with Nicotra's description and plate were collected at Tangier by Rev. J. Roffey in the spring of 1916.

F. Jordanii, Gussone, Enum. Pl. Ins. Inar. (1854), seems from authentic specimens to be a variation of var. *Gussonei* with flowers coloured as in the specific type, and *F. serotina*, Guss. (l. c.) is perhaps a shade-form of the same plant. The former is stated to have fruits sometimes spotted at the apex. There is Ischian material of both of these plants in Herb. Kew received from Gussone himself.

F. recognita, Lacroix in Bull. Soc. Bot. France, vi. 551 (1859), described as intermediate between *F. Bastardii* and *F. Borsei*, is represented in Herb. Kew by a specimen received from Lacroix in 1861 which is typical *F. Bastardii*, with finely developed flowers and unusually long sepals. Other material observed under this name shows large, dark-tipped flowers resembling those of var. *affinis*, of which *F. recognita* is made a synonym by Rouy & Foucaud.

F. pia, Nicotra in Att. Acc. Dafnica, Acireale, Ser. 2a, i. 5 (1905), may also belong to this species, but its inadequate diagnosis renders its determination impossible in the absence of authentic specimens.

A form resembling the specific type, but with remarkably small flowers (only about 8 mm. long), was collected at Gibraltar by Major Wolley-Dod in 1913.

F. Bastardii is one of the most difficult species of the genus and is unique among the *Grandifloræ* owing to some of its forms having the inner petals only tipped with purple, while in others this colour pervades also the wings of the upper petal. In fruit, likewise, it is remarkably variable, the rugosity being appreciably finer in the varieties *patens*, *vagans*, and *Gussonei* than in

the type. On the other hand, the general habit, the oval, serrate sepals, and the long-winged corolla are so constant and so marked in the plants brought together by Haussknecht under this species, and it is so evident from Herbarium material that they are largely connected by intermediates, that they cannot with confidence be kept specifically apart.

The distribution of this chiefly Mediterranean species is given at p. 41 of "*Fumaria* in Britain." Of its varieties, *β. patens* was described from Corsica, and *γ. vagans* occurs in Southern France; var. *Gussonei* is common in Italy and the neighbouring islands, and grows also in Algeria, Spain, and Greece, as well as in Britain; var. *hibernica* is exclusively British; var. *affinis* is only certainly known from Spain; and var. *benedicta* has been seen from Sicily, Sardinia, and Morocco.

A hybrid (apparently barren) between this species and *F. muralis* subsp. *Borœi* has been observed in Guernsey.

**** Series Eu-Murales.**

Sepala magnitudinis variabilis; petali inferioris margines angustissimi, erecti vel rarius patentēs; fructūs læves vel rugulosi.

20. FUMARIA MUNBYI, Boissier & Reuter, Pugillus, 5 (1852); Haussk. in Flora, lvi. 536 (1873).

Exsicc. Reuter, Oran in suburbio La Mosquée, 1849, in Hb. Boiss.! Boissier & Reuter, Prov. Oran, 1849, in Hb. Boiss., ut *F. flabellata*! G. Munby, Oran, in Hb. Kew, ut *F. capreolata*!

Fumaria robusta sed laxa, plus minusve elongata, interdum petiolis cirrhosis scandens. Folia foliolis in lobos anguste oblongos acutos vel ovato-oblongos mucronatos (forma *major*, Haussk.) irregulariter 2-3-pinnatisecta. *Racemi laxiusculi, multi-(20-25-) flori, pedunculos breviusculos superantes.* *Bractee* anguste lineari-oblongæ, acuminatæ, *pedicellis* fructiferis 5 mm. longis, tenuibus, flexuosis, *patenti-erectis* vel patentibus tertiâ parte breviores. *Sepala* 2-4 mm. longa, 1.5-2.5 mm. lata, subrotundo-ovata vel ovata, peltata, breviter acuminata, circumcirca (præsertim ad basin) irregulariter *dentata*, nervo dorsali viridi valde carinata, albida. *Corolla speciosa*, 12-13 mm. longa (14 mm. in f. *major*), pallide rosea; petalo superiore alis atropurpureis reflexis carinam paulo excedentibus apicemque vix attingentibus obtusiusculo, calcare quam sepala longiore prædito; petalo inferiore marginibus angustis patulis pallidis apicem vix attingentibus acuto, sæpe libero deflexo; petalis interioribus sursum curvatis apice atropurpureis. *Fructūs minimi*, vix 2 mm. longi ac lati, subrotundi, subacuti vel obtusi, circa medium latissimi, paululum compressi et obscure carinati, siccitate apicis foveolis parvis paulo obscuris sublæves.

Quod ad formam pertinet, fructus *F. Munbyi* satis variabilis videtur, nam quanquam in exemplaribus Boissieranis subacutus in specimine Herbarii Kewensis rotundato-obtusum est.

Hæc rara species, quæ propter flores magnos cum fructibus minimis conjunctos notabilis videtur, per florum spectabilium racemos longos *F. Martinii* proxima est, sed pedunculis longioribus, bracteis longioribus angustioribusque, sepalis dentatis carinatis, petali inferioris marginibus latioribus, et fructibus minimis plane differt.

F. muralis (sensu lato) racemis brevioribus, sepalis ecarinatis, petalo superiore subspathulato, inferiore sine marginibus patulis, fructibus sæpissime majoribus distinguitur. Præterea, hæc species (sensu stricto) per habitum gracilem et flores minores recedit, dum subspecies *neglecta* bracteas breviores, sepala integriuscula, corollas minores, fructusque obtusiores magis obovatos habet, atque subspecies *Borœi*, ad quam *F. Munbyi* a cl. Hammar, descriptionem in Boissier, Diag. Pl. Or. Ser. II. i. p. 17 (1853), sequente, relata est, sepalis majoribus, petali superioris calcare brevior, fructibus multo majoribus obovatis obtusissimis facile dignosci potest.

F. apiculata, Lge. habitu minus robusto, pedunculis brevissimis, pedicellis suberectis, floribus minoribus acutioribus, sepalis angustioribus paucidentatis, fructibus apiculo persistente præditis separanda est.

F. Bastardii, Bor. per bracteas breviores, per sepala ovalia serrata, et per fructus majores rugosos nec sublæves a *F. Munbyi* longe distat.

F. Munbyi provinciam Oran in Algeriâ habitat.

21. *FUMARIA MARTINII*, Clavaud in Act. Soc. Linn. Bordeaux, tom. XLII. 5^e série, tom. 2, p. lxix (1888). *F. paradoxa*, Pugsley, Fum. in Brit. 31 & 74 (1912).

Icon. Pugsley, *l.c.* fig. 4 (Journ. Bot. I. tab. 519), ut *F. paradoxa*.

Exsicc. Bourgeau, Pl. d'Espagne, 1863, ut *F. Bastardii*! Magnier, Fl. Select. No. 1075!

Since the publication of this plant as a new species under the name of *F. paradoxa*, it has been found that in 1888 a communication respecting Martin's plant mentioned at page 74 of "*Fumaria in Britain*" was made by Clavaud to the Linnean Society of Bordeaux, as cited above, which defines its salient features and its position in the genus, and may fairly be regarded as a valid publication of the name *F. Martinii*. It is therefore proposed to accept this name, reducing *F. paradoxa* to a synonym.

It curiously happens that Clavaud's communication was due to the plant collected by Martin (C. Magnier, Fl. Selecta, No. 1075) being referred by certain botanists to *F. major*, Badarro, just as occurred at first with the British form (Fum. in Brit., p. 35), and it may thus be of interest to reproduce some of Clavaud's observations.

"J'avais indiqué pour cette dernière plante . . . le nom de *F. Martini*, en prévenant M. Magnier qu'il ne fallait y voir qu'une forme du stirpe *Capreolata* voisine du *F. Borvi*, Jord. et du *F. muralis*, Sond. et qu'elle n'avait rien de commun avec le *F. major*, Bad. . . M. Magnier n'en conserva pas moins sur ses étiquettes le nom de *F. major*, Bad., en m'informant qu'il s'appuyait sur l'opinion de deux éminents botanistes . . . après . . . il m'a adressé une étiquette imprimée conforme à ma détermination . . . chacun peut voir et lire dans la Monographie d'Olof Hammar quels sont les caractères distinctifs très nets des *F. capreolata* et des *F. agraria* . . . Je me plais à croire que les botanistes un peu au courant du genre *Fumaria* n'auront pas de peine à reconnaître que la plante de M. Martin appartient au groupe du *F. capreolata* et n'a rien de commun avec le *F. major*, Bad. . . Notre plante n'a d'analogie réelle qu'avec le *F. Borvi*, Jord., *muralis*, Sond. et *speciosa*, Jord., et j'ajoute qu'elle se distingue de ces trois dernières formes elles-mêmes par plusieurs caractères. . . En somme, si, comme croyaient Koch et Sonder, la terminaison ogivale du fruit a une sérieuse importance, c'est du *F. muralis* que notre plante se rapproche le plus, malgré la dimension très différente de ses fleurs. Si, au contraire, ce caractère de l'achaine n'était guère ici qu'un accident, comme il se pourrait, notre plante se séparerait bien peu du *F. Borvi*, Jord."

It will thus be seen that Clavaud was the first to notice and to describe the true affinities of this fumitory, and that the restoration of his name, *F. Martinii*, is clearly due to him. In emphasizing its likeness to *F. muralis* and *F. Borvi*, however, he scarcely allows sufficient importance to the long, lax, short-peduncled racemes that lend it the general facies of *F. major*.

Rouy (Fl. France, i. 172) refers Martin's plant to *F. flabellata*, Gasp.—a species lacking even the superficial resemblance that connects it with *F. major*.

When growing, *F. Martinii* is a remarkably beautiful plant owing to its long and graceful racemes and its brilliantly coloured flowers.

It is evidently distributed through the Iberian Peninsula, whence its range extends through Western France to Southern Britain. Its Spanish localities at present known are Navalmoral, Estremadura (Bourgeau, 1863, as *F. Bastardii*!), Calatayud, Aragon (Vicioso, 1906, as *F. affinis*!), Ameyugo, Ayelas, Pancorbo, Castile (Sennen, 1906, as *F. muralis* var. *Pauli*!), and Almeria, Andalusia (Huter, Porta & Rigo, 1879, as *F. muralis*!). In Portugal it occurs at Vimioso, Pinello (Mariz, 1888, as *F. agraria*!), and probably in other localities, where it has been confused with *F. muralis* subsp. *Borvi*. The only French stations known are Romorantin, Loir-et-Cher (Martin, 1884!), Gatteville, Manche (Tardieu, 1880, as *F. Borvi*!) and Rennes, Bretagne (Hb. Kew, as *F. capreolata*!). In Britain, in addition to Penryn, Cornwall (Davey, 1904!), it grows in the island of Guernsey (Pugsley, 1914!).

22. *FUMARIA SEPIUM*, Boissier, Diag. Pl. Or. Ser. II. No. 1, p. 16 (1853); Hamm. Mon. 27 (1857); Haussk. in Flora, lvi. 525 (1873).
F. muralis var. *platycarpa*, Rouy & Foucaud, Fl. Fr. i. 173 (1893).
 (Pl. 9, figs. 8, 9.)

Exsicc. Boiss. & Reuter, Algeciras, 1849, in Hb. Boiss.! Wolley-Dod, Fl. Calpensis (Algeciras), Nos. 1711! et 201!

Fumaria annua, *robusta*, ramosa, elongata, sæpe petiolis cirrhosis longe lateque *scandens*. Folia irregulariter 2-3-pinnatisecta, foliolis in lobos oblongos, cuneatos vel ovato-rotundos plus minusve obtusos et sæpius longiuscule mucronatos fissis prædita. *Racemi laxiusculi, pauciflori* (6-12-flori), *pedunculis gracilibus* vulgo strictis rarius paulo incurvatis *breviores*. *Bractee* angustelineari-lanceolatæ, setaceo-acuminatæ, *pedicellos* fructiferos 5 mm. longos, tenuissimos, *erecto-patentes*, strictos vel flexuosos *infimæ subæquantes*, ceteræ breviores. *Sepala* 4-5 mm. longa, 2-2.5 mm. lata, *ovata* (in formis umbrosis angustiora, lanceolata), peltata, plus minusve acuminata, basi parce dentata aliter *subintegra*, præter nervum dorsalem viridem albida, corollæ tubo æquilata. *Corolla magna*, 12-14 mm. longa, *speciosa, roseo-albida*, præsertim apicem versus læte rubescens (in floribus serioribus pallida et interdum conspicue minor); *petalo superiore subacuto*, vix dorsum compresso, calcare longo deflexo *alisque* intense *atropurpureis* reflexis carinam paulo excedentibus sed apicem vix attingentibus prædito; *petalo inferiore marginibus angustissimis erectis vel subpatentibus* apicem haud attingentibus acuto, sæpe libero deflexo; petalis interioribus albidis vel rubescentibus apice atropurpureis. *Fructûs parvi*, circa 2 mm. longi ac lati, *subrotundi, obtusissimi*, subcompressi, carinati, in vivo inferne in stipitem paulo obscurum quam pedicelli apex paulisper angustiore contracti, siccitate *laeves* apicis foveolis parvis notati.

Descriptio secundum exemplaria viva ad Algeciras (in loco classico) a Major Wolley-Dod collecta, Martio, 1913.

β. gaditana, var. nov.

F. gaditana, Haussk. l. c. 547; Willkomm & Lange, Fl. Hisp. iii. 879 (1880).

Exsicc. Boissier & Reuter, Tangier, 1849, in Hb. Boiss.! Boissier & Reuter, Grazalema, Prov. Granada, 1849, in Hb. Boiss.! Wolley-Dod, Fl. Calpensis, Nos. 1629! 1647! 1701!

Racemi densiores, vulgo 10-16-flori; pedunculi pedicellique robustiores. *Bractee* quam in typo breviores latioresque, lineari-oblongæ, acuminatæ, pedicellorum longitudinem dimidiam paulo superantes. *Sepala* 3-4 mm. longa, 1.5-2 mm. lata, *oblongo-ovata*, acuta, saltem basin versus parce irregulariter *dentata*. *Corolla* typi sed tandem sæpe omnino rubescens. *Fructûs* quam in typo majores, 2.5 mm. longi ac lati, subrotundo-quadrati.

Hæc pulchra species, cujus primum forma umbrosa floribus depauperatis a cl. Boissier et a cl. Hammar descripta est, nunc e plantâ normali depingitur. Inter *F. capreolatam* et *F. muralem* medium fere tenet, sed ab alterâ racemis.

paucifloris, pedicellis tenuibus nec recurvatis, sepalis minoribus, sine stipite distincto fructibus, ab alterâ foliorum segmentis latioribus, pedunculis longioribus, sepalis subintegris, corollis angustioribus albidis nec roseis plane differt.

F. macrosepala et *F. berberica* subsectionis *Capreolarum* pedicellis crassioribus, bracteis sepalisque majoribus, fructibus majoribus rugosis nec lævibus facile separandæ sunt.

Speciei typus hætenus in Algeciras Bæticæ solum inventus est, sed varietas *gaditana* freti Gaditani contrarias partes in Bæticâ et in Mauritaniâ habitat. Exemplar nunc in herbario Mus. Brit. a cl. R. P. Murray ad sepes prope Cintram Lusitanicæ collectum ad hanc speciem, ut videtur, etiam referendum est.

This fine but local fumitory was originally described by Boissier from a depauperate form, collected at Algeciras late in the season, in which, as sometimes happens with other species, the sepals were particularly narrow. The flowers of this material were so poor that its identity with other specimens obtained the same year by Boissier & Reuter at Tangier, Grazalema, and Gibraltar does not appear to have been recognized by Boissier or later by Haussknecht, although the Tangier example in Herb. Boissier is labelled *F. sepium* in the handwriting of Reuter.

These last-named plants, as represented in Herb. Boissier, are more or less normal, though collected late, and form the basis of Haussknecht's *F. gaditana*, which he seems to have regarded as in no way related to the *F. sepium* from Algeciras. But it is clear that the original *F. sepium* is a depauperate shade-form, and its specific identity with *F. gaditana*, first suggested by Willkomm & Lange (*l. c.*), may be confirmed by a comparison with "Porta & Rigo, Iter IV Hisp. 1895, No. 610" from Algeciras and the specimens collected in 1913 by Major Wolley-Dod in Boissier's original locality, some of which are shade-forms plainly showing a transition to the state of the plant as found by Boissier. As Boissier's name antedates *F. gaditana*, it must necessarily stand for the species, and as the plant of Algeciras, which is thus the specific type, seems to differ in minor details from that found at Gibraltar and elsewhere, this latter form has been distinguished as a separate variety *gaditana*.

23. FUMARIA MURALIS, Sonder in litt. ap. Koch, Synopsis Fl. Germ. ed. 2, Appx. 1017 (1845); Haussk. in Flora, lvi. 523 (1873); Pugsley in Journ. Bot. xl. 175 (1902), et Fum. in Brit. 16, 22 & 74, excl. *F. apiculata* in syn. (1912). *F. capreolata* β . *Burchellii*, DC. Syst. ii. 133 (1821); *F. media* γ . *muralis*, Hamm. Mon. 29 (1857), non *F. media*, Lois.

Icones. Fl. Danica, tab. 2473; Hamm. *l. c.* tab. 4, ut *F. media* γ . *muralis* (fructu obtuso); Journ. Bot. xl. tab. 436, fig. 4.

Exsicc. Billot, Fl. G. & G. No. 2807! Mandon, Pl. Mader. No. 5! Bourgeau, Pl. Canar. No. 1173, ut *F. officinalis*!

Fumaria annua, *habitu* semper *gracili* et sæpius exiguo, interdum in arvis nana, suberecta, ramosior, interdum diffusa vel petiolis cirrhosis scandens. Folia irregulariter 2-3-pinnatisecta, nonnunquam plus minusve glauca, foliolis (sæpius parvis) in lobos oblongos mucronatos vel lanceolatos acutos fissis. *Racemi* *laxiusculi*, *pauciflori* (sæpissime sub-12-flori), *pedunculos* graciles rectos incurvatosve fere æquantes. *Bracteæ* lineari-lanceolatæ, acuminatæ, *pedicellis* fructiferis tenuibus qui plerumque recti et *erecto-patentes* sed rarius flexuosi et paulo recurvati sunt *tertiâ parte breviores*. *Sepala* 3-4 mm. *longa*, 1.5-2 mm. *lata*, *ovata*, peltata, sæpissime acuminata, præsertim basin versus et in margine inferiore plus minusve *dentata*, præter nervum dorsalem viridiusculum albida vel roseo-albida, latitudine corollæ tubum æquantia. *Corolla* 9-10 mm. *longa*, *rosea*; *petalo superiore* dorsum compressiusculo, haud lato, *alis atropurpureis* reflexis carinam superantibus apicemque fere attingentibus, *apiculato* et, ut in floribus junioribus saltem videtur, spathulato; calcare sepala fere æquante; *petalo inferiore marginibus erectis* angustissimis acuto vel apiculato; petalis interioribus sursum curvatis apice atropurpureis. *Fructûs parvi* vel etiam minimi, circa 2 mm. *longi* (apiculo incluso) et latitudine paulo minores, *subrotundo-ovati* vel subrotundi, usque ad maturitatem *acutiusculi vel obtusi* brevissime *apiculati*, in stipitem prope obsoletum inferne angustati, parum compressi et obscure carinati, in sicco apicis foveolis parvis sæpius paululum obscuris *laves*.

! Fructûs subglobosi sine apiculo obtusi.

β. lata, Lowe, Fl. Mader. i. 15 (1868).

Herba virescens, foliorum segmentis latiusculis, racemis 8-15-floris, *sepalis subintegris*, *corollis usque ad 12 mm. longis*, *late roseis* apice atropurpureis, *fructibus obtusis subglobosis* obsolete *rugulosis*.

Lowe's types of this Madeira variety, notable for its large, bright flowers with almost entire sepals, are in Herb. Mus. Brit.

[*γ. Lebelii*, Rouy & Foucaud, Fl. Fr. i. 173 (1893); non vidi.

This plant appears to be chiefly notable for its dense racemes and broad bracts and sepals.]

δ. Lowai, Pugsley, Fum. in Brit. 17 & 23 (1912).

In addition to the points of distinction already assigned to this variety, its sepals are commonly broader and less acuminate than in the specific type.

Lowe's specimens referable to this variety are in Herb. Mus. Brit.

!! Fructûs subrotundo-ovati, acutiusculi vel brevissime apiculati.

ε. decipiens, Pugsley, Fum. in Brit. 23 (1912).

F. Borwi δ . *muraliformis*, Clavaud, Fl. Gironde, p. 49 and Pl. iii. B 2 (1882), appears from authentic material to be a form of *F. muralis* closely allied to var. *Loweii*, and his β . *verna* and γ . *serotina* early and late states of the same form.

The present remarkable distribution of *F. muralis* is shown at pages 23 & 74 of "*Fumaria* in Britain." Another link in the chain of habitats extending from north-western Europe and the Atlantic Islands round South Africa to the East Indies and New Zealand is supplied by a specimen in Herb. Mus. Brit. (erroneously referred to *F. parviflora*, Lam.) from Utakamand, in the Nilghiris of Southern India.

The variety *decipiens* occurs in Western France (Reverchon, Roche-sur-Yon, Vendée, 1882, as *F. Borwi*!) as well as in Britain.

23a. Subspecies *NEGLECTA*, Pugsley, Fum. in Brit. 20 & 24 (1912).

Icon. Pugsley, *l.c.* fig. 2 (Journ. Bot. l. tab. 519).

23b. Subspecies *BORÆI*, Pugsley in Journ. Bot. xl. 132, 175 & 180 (1902); Fum. in Brit. 18 & 25 (1912). *F. Borwi*, Jordan in Cat. Grenoble (1849), et Pugillus, 4 (1852); Haussk. in Flora, lvi. 520 (1873); *F. Bastardii* β . *major*, Boreau in Duchartre, Rev. Bot. ii. 359 (1846-7); *F. media* α . *typica*, Hamm. Mon. 28, excl. syn. partim (1857), non *F. media*, Lois. (Pl. 9, fig. 10.)

Icones. Curtis, Fl. Londinensis, ii. tab. 145 (fasc. vi. 47), ut *F. capreolata*; Smith, Eng. Bot. 943, ut *F. capreolata*; Hamm. *l.c.* tab. 3, ut *F. media* α . *typica*; Journ. Bot. xi. tab. 436, fig. 5.

Exsicc. Billot, Fl. G. & G. Nos. 2209 et 2209 bis, ut *F. Borwi*! Schultz, Herb. Norm. No. 1007, ut *F. Borwi*!

Fumaria sæpius *robusta* et satis *ramosa*, in arvis suberecta vel plus minusve diffusa, in sepibus murisque elongata et sæpe petiolis cirrhosis valde scandens. Folia irregulariter 2-3-pinnatisecta, viridia (raro plus minusve glauca), foliolis in lobis oblongos vel late cuneiformes, acutos vel mucronatos fissis. Racemi laxiusculi, haud multiflori (sub-15-flori), pedunculos subæquantes. Bractee lineari-lanceolatae, acuminatae, pedicellis paululum crassis rectis erecto-patentibus (aliquanto flexuosis vel recurvatis in formis umbrosis) paulo (interdum tertiâ parte) breviores. Sepala 4-5 mm. longa, 2.5-3 mm. lata, ovata vel subrotundo-ovata, peltata, acuta vel breviter acuminata, sæpissime basin versus irregulariter dentata sed raro subintegra, præter nervum viridiusculum albida vel roseo-albida, corollæ tubo latiora et inferne contigua. Corolla 10-12 mm. longa, rosea vel raro rubra (forma *rubens*); petalo superiore lato, dorsum compresso, alis atropurpureis reflexis carinam superantibus apicemque sæpe attingentibus acuto, apiculato vel etiam obtuso, in gemmis ante alarum reflexionem spathulato, calcare sepalis brevior; petalo inferiore marginibus angustissimis erectis rarissime patulis acuto, sæpe

libero deflexo ; petalis interioribus sursum curvatis apice atropurpureis. *Fructûs modici*, circa 2·5 mm. longi, 2–2·25 mm. lati, *obovati* vel subrotundo-obovati, *obtusissimi*, paulo compressi sed obscure carinati, et in stipitem obscurum quam pedicelli apex laud latiore inferne angustati, siccitate apicis foveolis parvis distinctis *laeves aut leviter rugulosi*.

! Flores fere typi ; fructûs subquadrati, rugulosi.

β. ambigua, Pugsley in Journ. Bot. xl. 178 & 180 (1902) ; Fum. in Brit. 26 (1912).

Varietas typi habitu sed foliorum lobis angustioribus lanceolatis, sepalis angustioribus acuminatis, corollis paulo minoribus. *Fructûs* fere 2·5 mm. longi, latitudine paulisper minores, *subquadrati* et *inferne* in stipitem pedicelli apicem saltem æquantem *vix angustati*, quam in *F. Borœi* aliis formis *magis compressi*, in sicco apicis foveolis obscuris leviter rugulosi.

γ. hispanica, var. nov.

Æsicc. Porta & Rigo, Iter II Hisp. 1890, No. 105, Almeria, Barranco del Caballar, ut *F. media*, var. *muralis* !

Varietas *bracteis lanceolatis* acuminatis *pedicellos* patulos patentirecurvosve *æquantibus* vel infinis paulo superantibus ; *fructibus* 2·25 mm. longis, 2 mm. latis, subrotundo-quadratis, obtusissimis, inferne paululum angustatis, plane *rugulosi*. Aliter ut in typo.

This plant is remarkable among the forms of the subspecies *Borœi* for its large, broad bracts and distinctly rugulose fruits.

!! Flores minores ; fructûs subrotundo-obovati, fere *laeves* ;
plantæ graciliores.

δ. gracilis, Pugsley, Fum. in Brit. 19 & 26 (1912).

ε. britannica, Pugsley, Fum. in Brit. 19 & 27 (1912).

Æsicc. Marshall, No. 2915, ut *F. Borœi* var. *serotina* !

ζ. longibracteata, Pugsley, Fum. in Brit. 19 & 27 (1912), ut subvarietas.

Hybrids between this subspecies and *F. officinalis*, quite barren and intermediate in characters, have been observed in Guernsey and in the south of England.

The subspecies *Borœi* is a rare plant except in the British Islands and the north and west of France, but there are specimens from Hesse, Germany, and from Sweden in Herb. C. Bailey, and one from Norway in Herb. Kew. Coutinho records it for Portugal, and it occurs in Spain, where it is reported by Haussknecht to grow commonly about Gibraltar and elsewhere in Southern Andalusia. As Major Wolley-Dod, however, recently failed to find it in that district, and met with *F. sepium* in abundance, it is probable that these two plants have been confused.

The records for Morocco and Algeria, though supported by the authority both of Hammar and Haussknecht, may also be doubted, the plants observed in these two countries being probably *F. sepium* and *F. Munbyi* respectively. Hammar's records for the Canaries and South Africa doubtless refer to true *F. muralis*, to which likewise (perhaps var. *luta*) Haussknecht's Madeira locality in all probability belongs. The recognition of the subspecies *Boræi* and of *F. muralis* as Italian plants by Nicotra (Le Fumar. Ital.) seems due to confusion with forms of *F. Bastardii*.

× FUMARIA PAINTERI, Pugsley, Fum. in Brit. 29 (1912).

Icon. Pugsley *l.c.* fig. 3 (Journ. Bot. 1. tab. 519).

Although of presumably hybrid origin (*F. muralis* subsp. *Boræi* × *F. officinalis*?) this plant appears to merit recognition as a more or less established form, differing from other known *Fumaria*-hybrids in its general development of perfect fruits.

24. FUMARIA APICULATA, Lange, Ind. Sem. Haun. 23, et Ann. Sci. Nat. Ser. IV. ii. 371 (1854); Hamm. Mon. Slägt. Fum. 36 (1854), et Mon. 31 (1857). *F. Reuteri*, Boiss. Diag. Pl. Or. ii. No. 8, p. 13 (1849), et Pugillus, 4 (1852), ex parte; Haussk. in Flora, lvi. 538 (1873); *F. media* δ. *apiculata*, Willkomm & Lange, Fl. Hisp. iii. 882 (1880), non *F. media*, Lois.

Icon. Hamm. *l.c.* tab. 4.

Exsicc. Lange, Escorial, 1851, in Hb. Boiss.! Reuter, Castella prope Miraflores ad radices Sierræ de Guadarrama, in Hb. Boiss., ut *F. Reuteri*! Durieu, Pl. Sol. Hispano-Lusit. Sec. 1, Asturiæ, 1835, No. 413, Cangas de Tineo, ut *F. capreolata*! Lange, Cordoba ad sepes, 1852, in Hb. Kew, ut *F. Boræi*!

Hæc species hispanica, quæ a cl. Hammar cum icone bene descripta est, quanquam cum *F. Reuteri* confusa, sine dubio *F. muralem* (sensu stricto) maxime refert. A *F. murali* foliorum lobis angustioribus, racemis brevissime pedunculatis, pedicellis fere erectis nec erecto-patentibus, sepalis angustioribus ovato-lanceolatis paucidentatis, petalo superiore angustato acuto, fructibus longioribus cum apiculo minimo persistente obtusiusculis separari potest.

F. Reuteri, planta Granatensis quæ ad *F. Thuretii*, Boiss. a cl. Haussknecht translata est, foliorum laciniis etiam angustioribus, pedicellis patentibus, sepalis late oblongis, corollis minoribus (raro 10 mm. longis), fructibus minimis subacutis stipitatis plane differt.

The closely cohering petals mentioned in Hammar's diagnosis are characteristic of weak or shade-grown plants in this as in other species. In good flowers the lower petal of *F. apiculata* is deflexed and free, as is well shown in the Durieu example in Herb. Kew.

This fumitory has been the subject of considerable confusion. It was first included in 1849 in the original account of *F. Reuteri*, a species founded by Boissier on two Spanish plants, one from Castile and the other from the Sierra Nevada in Andalusia. Five years later a second species, also founded on a Castilian plant, was established by Lange as *F. apiculata*. In Hammar's Monograph these two species are retained, the description of *F. Reuteri* being taken from Boissier's original diagnosis and a specimen, probably Andalusian, sent by him to Fries, while *F. apiculata* is described and figured from living, cultivated plants presumably grown from seed obtained from Lange. Haussknecht, who examined the original material of these plants in Herb. Boissier, detected that the two Spanish examples cited for *F. Reuteri* were essentially different, and retained Boissier's name for the Castilian plant, referring the Andalusian one to the Greek *F. Thuretii*, which it closely resembles. At the same time he made *F. apiculata*, Lge., of which Herb. Boissier also contains an original specimen, a synonym of *F. muralis*, Sond. This arrangement is reflected in Willkomm & Lange's 'Flora Hispanica' (except that *F. apiculata* there becomes *F. media* δ . *apiculata*), but the authors do not appear familiar with the Castilian form placed under *F. Reuteri* or with Boissier's Andalusian plant.

It is evident from the types in Herb. Boissier that Haussknecht correctly separated the two plants on which *F. Reuteri* was founded by Boissier. But the original specimens also show with nearly equal certainty that the Castilian *F. Reuteri* is conspecific with *F. apiculata*, Lge., described from the same district, and that these two plants, while allied to *F. muralis*, are distinct from it and from all other described forms. They agree well with Hammar's diagnosis of *F. apiculata*, except that the fruiting pedicels are markedly suberect, as noted by Lange, instead of "erecto-patentes," and the fruit perhaps less oval than ovate.

The nomenclature of these plants is involved, for of the two forms originally included by Boissier under *F. Reuteri*, that inhabiting Andalusia is apparently described under this name by Hammar, while Haussknecht restricts the name to the Castilian form. It is clear that this latter plant was the first to be segregated (as *F. apiculata*, Lange), and hence it seems preferable to apply Boissier's name to the Andalusian form and to maintain *F. apiculata*, Lange, for that discovered in Castile. Moreover, although both plants were originally cited for *F. Reuteri* by Boissier, it is probable from the terms of his diagnosis that it was actually taken from the Andalusian one which he himself collected, rather than from the Castilian plant gathered by Reuter which he united with it.

25. *FUMARIA PETTERI*, Reichenbach, Icones Fl. Germ. iii. 1 (1838); Parlatore, Mon. Fum. 85 (1844), ex parte; Visiani, Fl. Dalmatica, iii. 98 (1852), et Suppl. i. 118 (1872); Hamm. Mon. 32 (1857), ex parte; Schlosser & Vukot. Fl. Croatica, 205 (1869).

Icon. Reichb. *l. c.* tab. 2, fig. 4453 b.

Exsicc. Pichler, Mte. Marian bei Spalato, 1885, in Hb. Zurich and Hb. C. Bailey! Huter, Fl. Exsicc. Austro-Hungarica, No. 2900, cult., orig. Clissa in insulâ Lesinâ!

Fumaria annua, gracilescens, multo ramosa, diffusa, vix scandens. Folia irregulariter 2-3-pinnatisecta, foliolis flabellatis longiuscule petiolatis in lobos sæpissime oblongos mucronatos fissis. Racemi laxiusculi, haud multiflori (vulgo sub-12-, raro ad 18-flori), brevissime pedunculati aut subsessiles. Bractee lineari-lanceolatæ, acuminatæ, albidæ, pedicellos fructiferos apice in-crassatos patulos vel erecto-patentes (rarius paulo recurvos) suberquant. Sepala 3·5-4·5 mm. longa, 2-2·5 mm. lata, ovalia vel subrhombea, conspicue peltata, subacuta, præsertim medium versus irregulariter uni- vel paucidentata, rarius integruscula, nervo dorsali viridi sæpe lato albida, corollæ tubo paululum latiora. Corolla 9-10·5 mm. longa, rosea; petalo superiore angustato subacuto alis atropurpureis reflexis apicem raro attingentibus carinamque viridem abrupte terminatam vix æquantibus et calcare longo adscendente prædito; petalo inferiore marginibus angustissimis erectis subacuto; petalis interioribus fere rectis apice atropurpureis. Fructûs mediocres, 2·5-2·75 mm. longi et 2 mm. lati, ovati vel fere turbinei, plus minusve apice attenuati, acutiusculi, prope basin latissimi et in stipitem obscurum quam pedicelli apex angustiore abrupte angustati, carinati et paulo compressi, siccitate apicis foveolis angustis satis distinctis rugulosi.

Hæc species racemis fere subsessilibus, sepalis subrhombeis, corollâ anguste alatâ, fructibus ovatis fere turbineis plus minusve attenuatis acutiusculis inter affines notabilis est.

Apud cl. Boissier in 'Flora Orientalis,' i. 137 (1867), specimina *F. Petteri* dalmatica a cl. Petter accepta *F. Gussonei*, Boiss. affines vel formæ sunt, sed hæc planta, quæ vero *Fumaria Bastardii*, Bor. solum varietas est, racemis plane pedunculatis, sepalis serratis multo minoribus, petalo superiore latius alato, petali inferioris marginibus patulis, fructibus subrotundis obtusis longe distat.

A *F. murali*, Sond., quæ in Koch, Synopsis Fl. Germanicæ, ed. 2, p. 435, ad hanc speciem relata est, *F. Petteri* racemis subsessilibus, sepalis subrhombeis paucidentatis, petalo superiore angustius alato, fructibus ovatis attenuatis plane separatur.

Racemi laxi floribus magnis multiflori et fructûs qui quidem acutiusculi sed subrotundi nec ovati sunt etiam *Fumariam Martinii*, Clav. sejungunt.

F. Munbyi, Boiss. racemis multifloris longius pedunculatis, sepalis magis dentatis, corollis majoribus cum inferioris petali marginibus patulis, fructibus subrotundis duplo minoribus facile distinguitur.

F. apiculata, Lge. pedicellis suberectis, sepalis ovato-lanceolatis, petalo superiore acutiorè sed alis latioribus prædito, fructibus apiculatis lavibus cum hac specie confundi non potest.

In exemplaribus Fl. Exsicc. Austro-Hungarica, No. 29001, flores fructusque, ut in fumariis cultis expectandum est, minores sunt quam in speciminibus agrestibus quæ cl. Th. Pichler in vineis ad montem Marian prope Spalato collegit.

F. Petteri montem Marian prope Spalato, insulæ Lesinæ Clissam et forsan locos alios in Dalmatiâ habitat.

The application of the name *F. Petteri*, Rchb. to this apparently rare Dalmatian plant has been decided on only after careful consideration. Although it appears from Hammar's note (Mon. p. 33) that Petter sent out various fumitories under this name, it seems fairly certain that the Dalmatian plant on which Reichenbach founded his species was that cited in Visiani's Fl. Dalmatica, viz. :—" *F. media*, Petter, Bot. Wegw. No. 421, non Lois." (1832), which was collected by Petter at Spalato. Hammar regards this plant as conspecific with *F. Thuretii*, Boiss., but Boissier (*l. c. supra*) entirely dissents from this view, regarding *F. Petteri*, Rchb. as allied rather with *F. Gussonei*. Haussknecht reduces *F. Petteri*, Rchb. to a synonym of *F. Gussonei*, and Halácsy (Fl. Græc. i. 48 (1901)) uses the name in preference to *F. Gussonei* for Boissier's plant. Koch again likened *F. Petteri*, Rchb. to *F. muralis*, which he first referred to it (*l. c., supra*).

An explanation of these differing views is afforded by the later Spalato specimens collected by T. Pichler and referred to *F. Petteri*, Rchb., which agree with Reichenbach's account, taken in conjunction with the diagnoses in the Floras of Dalmatia and Croatia, and are no doubt identical with Petter's original plant described by Reichenbach. It may be seen from these specimens that while the species produces flowers resembling those of *F. Thuretii* and similarly borne in subsessile racemes, thus accounting for Hammar's union of the two forms, its habit and foliage are very different and rather recall *F. muralis* and *F. Gussonei*, as was noticed by Koch and Boissier respectively. The ovate, attenuate form of the fruit in *F. Petteri*, moreover, is distinctly different from that obtaining in either of these allied plants, and hence there seems sufficient reason for maintaining it as a separate species.

Hammar's figure of *F. Petteri* (Mon., tab. iv.) seems compounded of this and the following species, the foliage and corolla recalling *F. Petteri*, and the pedicel, sepal and fruit *F. Thuretii*.

* * * Series **Sub-Latisepalæ.**

Sepala majuscula ; petali inferioris margines angustissimi, erecti aut rarius subpatentes obscure apice dilatati ; fructus minimi, plus minusve rugulosi ; foliorum laciniae relative angustæ ; flores minores in racemis subsessilibus.

26. FUMARIA THURETII, Boissier, Diag. Pl. Or. Ser. II. No. 1, p. 15 (1853) ; Fl. Orient. i. 137 (1867) ; Haussk. in Flora, lvi. 494 (1873), excl. loc.

hisp.; Halácsy, Fl. Græc. i. 46 (1901). *F. Petteri*, Hamm. Mon. 32 (1857), ex parte, non Reichb.

Exsicc. Heldreich, Herb. Græc. Norm. No. 1005 !

Fumaria annua, habitu *satis robusto*, basi præcipue ramosa, nunc suberecta et sæpe nana nunc in formis umbrosis diffusa subscandens. Folia irregulariter 2-3-pinnatisecta, glaucescentia, foliolis (sæpius parvis) in lobos oblongos mucronatos vel lineari-oblongos acutos fissis. *Racemi sæpius multi*-(15-35-). *flori*, sub anthesin densi, *tandem elongati*, *brevissime pedunculati* vel subsessiles. *Bractee* sublanceolatæ, acuminatæ, *pedicellos* fructiferos breviusculos apice incrassatos, ut in *F. capreolatâ arcuato-recurvos* (in formis umbrosis vulgo rectos divaricatos), *subæquantes*. *Sepala* 2.5-3 mm. longa, 1.5-2 mm. lata, *ovata* vel rarius subrhombea, peltata, acuta, parce irregulariter *repando-dentata*, præter nervum dorsalem viridiusculum albida vel subrosea, corollæ tubum subæquantia. *Corolla* circa 9 mm. longa, *intense rosea*, ei *F. Petteri* subsimilis; *petalo superiore angustato subacuto alis atropurpureis reflexis* apicem raro attingentibus carinamque viridem subtruncatam vix æquantibus et calcare adscendente prædito; *petalo inferiore marginibus angustissimis erectis* acuto; *petalis* interioribus apice atropurpureis. *Fructûs minimi*, circa 2 mm. longi ac 1.5-1.75 mm. lati, *ovati* vel subrotundo-ovati, *acutiusculi* et inferne in stipitem quam pedicelli apex angustiore contracti, paulum compressi et obscure carinati, siccitate apicis foveolis minutis distinctis plus minusve *rugulosi*.

! Corolla quam in typo major; foliorum lacinia angustiores.

β. Heldreichii, Boiss. Fl. Orient. i. 137 (1867); Halácsy, l. c. 46 (1901).

F. Heldreichii, Boiss. Diag. Pl. Or. Ser. II. No. 1, p. 16 (1853); Hamm. l. c. 33 (1857).

Exsicc. Haussknecht, Iter Græcum, 1885, Athenæ, in valle Cephissi, in Hb. Mus. Brit., ut *F. Heldreichii* !

Varietas habitu subscandente et *foliis* pallide virentibus in *lacinias lineari-oblongas* fissis. *Bractee* lineari-lanceolatæ, pedunculos fructiferos recurvos æquantes. *Corolla* plus 9 mm. longa, *pallide rosea*. *Fructûs* minimi, vix 2 mm. longi et paululum angustiores, *subrotundi* et breviter acutiusculi, levissime rugulosi. Aliter ut in typo.

The exsiccata of this variety, "*Heldreich*, Herb. Græc. Norm. No. 903," as represented in Herb. Mus. Brit., is a lax and vigorous plant with suberect fruiting pedicels and fruits less globose than ovoid. The station whence it was obtained, Mt. Pentelicos, produces a number of forms of this variable species.

γ. deflexa, var. nov.

F. deflexa, Heuffel in Flora, xxxvi. 619 (1853).

Exsicc. Heldr. Herb. Græc. Norm. No. 1005b, ut *F. Thuretii* f. *floribunda* !

Planta typo *robustior*, internodis longis sæpe scandens. *Folia* glauca, *lacinii* *lineari-oblongis* planis. *Racemi* sub-30-flori, floribus cernuis *laxiusculi*; bracteæ lineari-lanceolatæ pedicellos fructiferos arcuato-recurves plus minusve incrassatos æquantes vel etiam superantes. *Corolla* 9–10 mm. longa, *rosea*, quam in typo *major*. Fructus typi, nisi apicis foveolis paululum majoritus.

The fruits of this form are described by Heuffel as “subrotundis obtusis,” but those observed in recent specimens from the Banatus (Degen, prope Orsovam, 1904!), as well as in Heldreich’s Greek exsiccata, are of the subrotund-ovate, subacute form seen in the specific type.

!! Corolla quam in typo haud major; pedicelli fructiferi raro recurvi.

δ. pikermiana, var. nov.

F. pikermiana, Boiss. Diag. Pl. Or. Ser. II. No. 6, p. 9 (1859); Fl. Orient. i. 137 (1867); Haussk. l. c. 493 (1873); Halácsy, l. c. 48 (1901).

Icon. Stefani, Major & Barbey, Samos, tab. 5 (1891), ut *F. pikermiana*.

Exsicc. Guicciardi, No. 3189, Pikermi Atticæ, in Hb. Boiss. ! Heldreich, No. 771, Chelidoni Atticæ, in Hb. Boiss., ut *F. bracteata* ! Pichler, Pl. Græc. Exsicc., Eubœa, 1876, in Hb. Mus. Brit., ut *F. Thuretii* var. *glauca* ! Haussk. Iter Græcum, Laurion, 1885, in Hb. Mus. Brit., ut *F. pikermiana* !

Caulis multo ramosa; *foliorum lacinia* *lineari-oblongæ* sæpius obtusæ mucronatæ. *Racemi laxiusculi bracteis* sublanceolatis *pedicellos* incrassatos *patulos* vulgo *superantibus*. *Flores intense rosei*, eis typi similes sed *minores*; corolla 7–8.5 mm. longa. Fructus minimi, vix 2 mm. longi, ovati, acutiusculi. Aliter ut in typo.

The material examined of this variety consists of branches of large plants gathered late and showing poor flowers. Although described as a distinct species by Boissier, and maintained as such both by Haussknecht and Halácsy, it is difficult to see how it essentially differs from *F. Thuretii*, of which it possesses the characteristic narrowly-winged corolla without (so far as can be seen) any spathulate dilation of the lower petal. The length of its bracts are sometimes equalled in other forms of this species, and it may be doubted whether its small flowers and spreading pedicels are not merely the result of a depauperate condition such as sometimes produces similar features in *F. capreolata*. The figure in ‘Samos’ also portrays the general features of *F. Thuretii*, excepting its recurved pedicels; and the absence of wings to the upper petal of the enlarged flower in this plate seems due to an artist’s error, the wings being sufficiently indicated in the flowers of the racemes. In the absence of good material and in deference to the views of botanists acquainted with the living plant, *F. pikermiana* is retained as a variety.

The Zurich collection contains a number of varying depauperate or shade-forms of *F. Thuretii*, mostly much branched, and showing ample foliage and

relatively few-flowered racemes with small flowers and spreading fruiting pedicels. Some of these very closely approach this variety *pikermiana*.

ε. thasia, var. nov.

Exsicc. Sintenis & Bornmüller, Iter Turcicum, 1891, No. 447 (Limenas, Insula Thasos), ut *F. Thuretii*! Bornmüller, Iter Anatolicum tertium, 1899, No. 4046 (Mudania, Bithynia), ut *F. anatolica*!

Planta gracilis, scandens, racemis sub-20-floris, *pedicellis* fructiferis *gracilibus*, sæpius irregulariter *sub-patentibus* nec recurvis, *bractea* lanceolatâ acuminatâ plane *longioribus*; typi sepalis et corollâ, nisi *petali superioris alis* atropurpureis *apicem attingentibus carinamque superantibus*; fructibus minimis, vix 2 mm. longis et 1.5 mm. latis, subrotundo-ovatis, subacutis, in sicco minute rugulosis.

Hæc species variabilis ad *Fumariam Petteri* accedit, sed foliorum laciniis minoribus angustioribusque, *pedicellis* sæpissime arcuato-recurvis, floribus minoribus, sepalis magis ovatis, fructibus minimis nec inferne abrupte angustatis neque apice attenuatis specificè differre videtur.

F. Thuretii in Græciâ, ubi copiose crescere videtur, in Cyprio, et in insulis Principum prope Byzantium invenitur; varietates *Heldreichii* et *pikermiana* in Græciâ; var. *deflexa* in Græciâ, in Banatu, et forsân in Hercegovinâ et in Montenegro; var. *thasia* in insulâ olim turcicâ Thasos, et in Bithyniâ.

This species, both as *F. Thuretii* and *F. pikermiana*, is placed by Haussknecht in the subsection *Latisepalæ* of the *Parvifloræ*, although included by Hammar among the *Capreolatæ*. Owing to its relatively fine leaf-cutting and large sepals it certainly approaches the *Latisepalæ*, but the examination of good and abundant material shows its floral features to be essentially those of the section *Grandiflora*.

27. FUMARIA REUTERI, Boissier, Diag. Pl. Or. ii. No. 8, p. 13 (1849), et Pugillus, 4 (1852), ex parte; Hamm. Mon. 35 (1857), excl. loc. not. Castell., pro parte. *F. Thuretii*, Boiss. (ex parte) ap. Haussk. in Flora, lvi. 494 (1873); *F. parviflora* β . *segetalis*, Hamm. l. c. 17, et Willkomm & Lange, Fl. Hisp. iii. 885 (1880), pro parte; *F. segetalis*, Coutinho, Fl. Portugal, 246 (1913).

Exsicc. Boissier, Sierra Nevada prope San Geronimo, in Hb. Boiss.! Ball, Iter Hisp. 35, ex regione subalpinâ montium S. Nevada, in jugis Cerro Tesoro et La Cartajuela, 5-6000 ft., in Hb. Kew, ut *F. bætica*! Reverchon, Pl. d'Andalousie, 1889, Sierra de Ronda, ut *F. media* var. *apiculata*! Reverchon, Pl. d'Espagne, 1891, No. 572, Sierra de Segorbe, Valence, ut *F. Bastardii*!

Fumaria annua, *gracilescens*, multo ramosa, suberecta vel diffusa, haud scandens. Folia irregulariter 3-pinnatisecta, foliolis in lacinias parvas confertas oblongas vel lineari-oblongas acutas vel mucronatas interdum subcanaliculatas fissis. *Racemi laxiusculi*, 10-18-flori, tandem elongati, *brevissime pedunculati* vel subsessiles. *Bractea* lineari-oblongæ, cuspidatæ, viridescens, *pedicellis*

fructiferis apice parum incrassatis flexuosis irregulariter *patentibus* nec recurvis paulo breviores. *Sepala* 2.5–3 mm. *longa*, 1.5–2 mm. *lata*, late oblonga, peltata, breviter acuta vel obtusa mucronata, basi sæpius subtruncata, *integriuscula* vel parce irregulariter denticulata, præter nervum dorsalem viridiusculum albida, corollæ tubo æquilata. *Corolla* 9–10 mm. *longa*, pallide rosea; *petalo superiore* subacuto, *calcare magno* longicollo deflexo sepala superante et *alis atropurpureis* reflexis apicem attingentibus carinamque paululum superantibus prædito; *petalo inferiore marginibus* angustissimis *suberectis* nonnunquam ut in sectione *Parriflorarum* apice paululum dilatatis subacuto; petalis interioribus fere rectis apice atropurpureis. *Fructus minimi*, angusti, circa 2 mm. longi, 1.5 mm. lati, *ovato-elliptici*, juxta medium latissimi, in *apicem acutiusculum* vel fere acutum et in stipitem angustissimum subæqualiter angustati, paulo compressi et plane carinati, siccitate apicis foveolis minutis distinctis *leviter rugulosi*.

Hæc rara planta, ab auctoribus multo confusa et a cl. Haussknecht ad *F. Thuretii* relata, ei sine dubio valde affinis est sed habitu minus robusto, foliorum laciniis confertis minoribus, racemis cum pedicellis *patentibus* haud multifloris, sepalis latioribus *integriusculis*, corollis pallidioribus *petalo superiore* latius alato *calcareque* longiore prædito, fructibus semper angustis stipitatis satis differt.

F. Reuteri in regione subalpinâ montium in Sierrâ de Ronda, in Sierrâ Nevadâ, et in Sierrâ Segorbe Hispaniæ australis, atque in Sierrâ de Serpa Lusitaniæ habitat, ubi indigena certe videtur.

The confusion that has occurred between *F. Reuteri* and *F. apiculata*, Lge., giving rise to a complicated synonymy, has been dealt with under the latter species.

A specimen collected at Granada by Lange was associated with *F. parviflora* by Hammar as a variety *segetalis* (Mon. l. c.), although at first referred to *F. Reuteri*. Lange himself also named this plant *F. Reuteri* (in Kjoeb. Vidensk. Meddel. 65 (1865)), but afterwards in the 'Flora Hispanica' he followed Hammar, remarking, however, "forsan specificè distinguenda." Hammar's diagnosis of his var. *segetalis* is too brief for certain determination, but Lange's clearly points to a plant specifically distinct from *F. parviflora*; and on its discovery and recognition in Portugal it was raised to specific rank as *F. segetalis* in Coutinho's recent 'Flora de Portugal.' Professor Coutinho has been kind enough to send an authentic Portuguese specimen which confirms its identity with the original Andalusian *F. Reuteri* of Boissier, and *F. parviflora* β . *segetalis*, Hamm. and *F. segetalis*, Coutinho, must accordingly be added to the synonymy of that species, with the modification "pro parte" in the case of the former, Hammar having also described the plant in question under the valid name *F. Reuteri*.

F. Reuteri approximates, both in flowers and in foliage, to the species of the section *Parviflora*, and more than any other member of this subsection shows

a slight apical dilation of the lower petal. It is retained among the *Grandifloræ*, however, as it is obviously much more closely allied to the preceding species *F. Thuretii* than to any member of the small-flowered group.

SECTIO II. PARVIFLORA.

Parvifloræ, Pugsley, Fum. in Brit. 45 (1912). *Officinales*, Hamm. Mon. 9 (1857); *Angustisectæ*, Haussk. in Flora, lvi. 404 (1873).

Foliorum laciniae planæ aut canaliculatæ, lanceolatæ vel anguste oblongæ usque ad lineares vel setaceæ (*F. montanæ*, Schmidt, exceptâ), nonnunquam mucronatæ. Flores rarissime quam in *F. officinali*, L. majores, plerumque minores, nec plus 9 mm. longi; petalum superius apice gibbum format cujus margines (alæ) vulgo sursum reflexi sed plus minusve erecto-patentes, rarius patuli sunt; petalum inferius apice gibbum monstrans qui margines patentes apicem versus plane dilatatos habet plus minusve spathulatum est. Petala interiora sæpius parum curvata, quam in sectione I relative latiora.

SUBSECTIO IV. LATISEPALÆ.

Latisepalæ, Haussk. in Flora, lvi. 493 (1873); Pugsley, Fum. in Brit. 54 (1912). *Officinales*, Hamm. Mon. 9 (1857), ut sectio, ex parte.

Pedunculi breves (*F. montanæ* exceptâ) pedicellis plerumque apice valde incrassatis præditi. Bracteæ, nisi in *F. rostellatâ*, pedicellos fructiferos vulgo superantes. Sepala magna, sæpe parum dentata, longitudine corollæ tertiam partem saltem æquantia, ejusque tubo latiora. Petalum inferius quam in subsectionibus sequentibus obscurius spathulatum. Fructûs minimi usque ad majusculi, plus minusve subrotundi, siccitate rugosi, rugulosi vel sublævæ.

In this subsection the wings of the upper petal are dark purple like the tip of the inner ones in *F. Kralikii*, *F. micrantha*, *F. bracteosa*, and *F. rostellata*, but sometimes obscurely so in *F. micrantha*. In *F. montana* the dark colouring appears to be absent not only from the wings of the upper petal but from the tip of the inner ones.

28. FUMARIA MONTANA, J. A. Schmidt, Beitr. Flora Cap Verd. Inseln, 263 (1852). (Pl. 11, fig. 2.)

Exsicc. Schmidt—In rupestribus montium Ins. S. Antonii, März 1851, in Hb. Vindob.!

Fumaria annua, ut videtur, habitu modice robusto, satis ramosa, diffusa, petiolis cirrhosis scandens. Folia foliolis in lobos oblongos vel cuneatos, mucronatos, planos, obtusos vel rarius emarginatos fissis, infimis longiuscule petiolatis, irregulariter 2–3-pinnatisecta. Racemi pauciflori (10–12-flori), laviusculi, pedunculos rectos crassiusculos subæquantes. Bracteæ lineari-lanceolatæ, acuminatæ, longissimæ, pedicellis fructiferis apice incrassatis

flexuosis et sæpius ut in *F. capreolatâ* arcuato-recurvis semper *longiores*. *Sepala* 3-3.5 mm. *longa*, 1.5-2 mm. *lata*, *lanceolato-ovata*, *acuminata*, *peltata*, *grosse serrato-dentata*, præter nervum *viridiusculum albida*, *corollæ* tubo paululum *latiora*. *Corolla* 6-7 mm. *longa*, *roseo-albida*; *petalo superiore subacuto alis albidis* *patenti-reflexis* apicem vix attingentibus et *carinam* *viridem* haud æquantibus prædito; *petalo inferiore marginibus patentibus* *albidis* *subspathulato*; *petalis* *interioribus*, ut videtur, omnino *albidis*. *Fructûs majusculi*, 2.5 mm. *longi* et 2.75 mm. *lati*, *subglobosi*, circa medium *latissimi*, in *apicem rotundato-obtusum* et in *stipitem* *obscurum æqualiter* *angustati*, paululum *compressi* sed insigniter *carinati*, in *sicco* *dense* sed tenuiter *rugosi*, *nitidi*, et apicis *foveolis* *parvis angustis* *distinctis* *notati*.

The diagnosis of this very rare fumitory, known only from the Cape Verde Island of S. Antonio and unique in its combination of small flowers and broad leaf-segments, is taken from Schmidt's specimen at Vienna, which has been lent for examination through the kindness of Dr. Zahlbruckner. This specimen now shows very few developed flowers, but such as remain are quite small, with the subspathulate lower petal clearly visible. The essential smallness of the flower is emphasized in Schmidt's very fair description, although, influenced probably by the broad leaf-segments, he contrasts it with *F. agraria* rather than any member of the *Parvifloræ*. Without more ample material it is perhaps impossible to determine with certainty the plant's exact affinities, but as not only the floral characters, both of sepals and corolla, but also the form of its fruit recalls the *Latisepalæ*, it seems preferable to place it in this group, in spite of its foliage, rather than to regard it as an *Agrarian* species with a degenerate corolla. In the dried specimen the peculiar unevenness of the leaf-margins alluded to by Schmidt does not now seem traceable.

F. montana is said to inhabit the rocks of the higher mountains of S. Antonio, probably at about 5000 ft. alt. (the highest point in the island is 7400 ft.), and even at this height, in the latitude of Cape Verde, the humid atmosphere may account in some measure for the development of its foliage.

The occurrence of an endemic species of the *Parvifloræ* on the west side of Africa is somewhat unexpected, but it may be noted that another species of this subsection, *F. bracteosa*, Pomel, is chiefly North African.

The relationship of *F. montana* with the endemic species of the Canaries that has been referred to it, is dealt with under *F. coccinea*.

29. FUMARIA KRALIKII, Jordan in Cat. Dijon, 19 (1848), et Linnæa, xxiii. 471 (1850); Hamm. Mon. 23 (1857). *F. anatolica*, Boiss. in Pinard, Pl. de Carie Exsicc. (1842), nomen solum, et Diag. Pl. Or. ii. No. 8, p. 14 (1849); Haussk. in Flora, lvi. 505 (1873).

Icon. Hamm. l. c. tab. ii.

Exsicc. Sintenis & Bornmüller, Iter Turcicum, 1891, No. 97, Dedeagatsch, ut *F. anatolica*! Schultz, Herb. Norm. Nov. Ser. Cent. 20, No. 1912, Nisch,

ut *F. anatolica* ! Heldreich, Pl. Exsicc. Græciæ, No. 3479, ut *F. anatolica* (var. *minor* ?) ! Sintenis, Iter Thessalonicum, 1896, No. 433, ut *F. anatolica* !

This very pretty fumitory has the aspect, when dried, of a miniature *F. purpurea* owing to its recurved, purplish flowers with large, whitish sepals. It also recalls *F. Thuretii* in the abruptly terminated keels of the outer petals and the slight development of the wings of the upper one, but it may be readily distinguished by the subspathulate lower petal of its much smaller flowers, which do not exceed 7 mm. in length, as well as by its much more obtuse fruits.

F. Kralikii is well described by Jordan (*loc. cit.*), who is largely followed by Hammar, but its bracts are oblong or linear-oblong rather than oblong-obovate, the wings of the upper petal are narrow and do not cover the keel, and the very small, subglobose fruits (1.5–1.75 mm. long and broad), which show distinct if very small apical pits, are less “læves” than “sublæves vel leviter rugulosi.” In some forms the racemes are at first very short and dense, though afterwards elongating.

In addition to the habitats cited by Haussknecht, this species grows in Bulgaria (Herb. Mus. Brit.) and in Armenia (Herb. Kew), and would thus seem to occur throughout the Balkan Peninsula and Asiatic Turkey, with the exception of Mesopotamia and Arabia. It is also represented in Herb. Mus. Brit. from the Crimea (Herb. Pallas, ut *F. officinalis*, partim), the label noting that it grows copiously on rocks.

30. FUMARIA MICRANTHA, Lagasca, Elench. Hort. Matrit. et Gen. Spec. Pl. Nov. 21 (1816); Hamm. Mon. 21 (1857); Pugsley, Fum. in Brit. 54 (1912). *F. densiflora*, DC. Cat. Hort. Monsp. 113 (1813), et Prodr. Syst. Nat. i. 130 (1824), ex parte; Haussk. in Flora, lvi. 507 (1873); *F. calycina*, Bab. in Trans. Bot. Soc. Edinb. i. 34 (1844); *F. mucronulata*, Schur, Enum. Pl. Transsilv. 38 (1866)?

F. tenuifolia; Gerard, Herb. 928 (1597), described from plants found in cornfields between Charlton and Greenwich. In Johnson’s ‘Gerard’ the description was changed to fit *Platycapnos spicatus*, Bernh., with which it was generally confused by succeeding authors although apparently distinguished by Morison (Hist. ii. p. 262 (1680)) as *F. vulgaris minor tenuifolia*.

Icones. Eng. Bot. Suppl. 2876; Hooker, Icones, iv. tab. 363; Hamm. *l. c.* tab. ii.

β. *dubia*, var. nov. *F. micrantha* forma *dubia*, Pugsley, *l. c.* 57 & 58 (1912); *F. micrantha* γ. *Parlatoriana*, Rouy & Foucaud, Fl. Fr. i. 179 (1893)? non Boissier.

Icon. Fl. Danica, tab. 2472, ut *F. micrantha*.

Exsicc. Ridley & Fawcett, Wareham, in Hb. Mus. Brit. ! Billot, Fl. G. & G. No. 709, ut *F. densiflora* !

In addition to the distinguishing features pointed out in "*Fumaria* in Britain," this variety is usually somewhat less robust and more freely branched than the specific type. Rouy & Foucaud's description of var. *Parlatoriana* seems to refer to this plant rather than that so named by Boissier.

[*γ. littoralis*, Rouy & Foucaud, Fl. Fr. i. 179 (1893); n. v. *F. littoralis*, Du Mortier, Bull. Soc. Roy. Bot. Belg. vii. 359 (1868). This plant is allied to the preceding variety, being much branched and having similar relatively narrow sepals; but it appears to be separable owing to its broader leaf-segments and short racemes of pale flowers.]

It is noteworthy that prior to the appearance of Grenier & Godron's 'Flore de France' in 1847, *F. densiflora* DC. was not associated by botanists with this species. This may be seen not only from De Candolle's works, but in Sibthorp & Smith's 'Flora Græca,' vii. p. 63, in Moris's 'Flora Sardoæ,' i. p. 90, and in Arnott's paper on the genus in Rep. Bot. Soc. Edinburgh, p. 104 (1840).

F. micrantha is shown in "*Fumaria* in Britain" to be eminently a Mediterranean species. The varieties *dubia* and *littoralis* are at present known only from Western Europe.

31. FUMARIA BRACTEOSA, Pomel, Nouv. Mat. Fl. Atlant. 239 (1874).

F. densiflora β. *bracteosa*, Batt. et Trabut, Fl. de l'Algérie, i. 29 (1888);

F. Parlatoriana, Kralik, Pl. Ægypt. Exs. (nomen); *F. micrantha*

β. *Parlatoriana*, Boiss. Fl. Orient. i. 137 (1867); *F. densiflora*

β. *Parlatoriana*, Haussk. in Flora, lvi. 510 (1873).

Easicc. Letourneux, Pl. Ægypt. No. 229a, Mariout, 1879, ut *F. densiflora* (partim)! Bornmüller, Iter Syriacum, 1897, No. 43, Jaffa, ut *F. Parlatoriana*! Sintenis & Rigo, Iter Cyprium, 1880, No. 175, ut *F. parviflora*!

Fumaria annua, caulibus crassis elongatis *robusta*, parce ramosa, diffusa, suberecta, vix scandens. *Folia* glauca foliolis in *lacinias* angustissimas *lineari-setaceas* canaliculatas acutas fissis 2-4-pinnatisectis. *Racemi* floriferi *densissimi*, fructiferi laxiores, *multiflori* (20-30-flori), *pedunculos* crassos brevissimos multo *superantes*. *Bractee* magnæ, *lineari-oblongæ*, *acuminatæ*, *viridescentes*, *pedicellis* fructiferis *erecto-patentibus* brevissimis (circa 2 mm. longis) apicem versus conspicue incrassatis plane (sæpe subduplo) *longiores*. *Sepala* 1.5-2 mm. longa, .75-1.25 mm. lata, *rotundato-ovata* vel *ovato-lanceolata*, peltata, *acuminata*, *denticulata*, nervo dorsali roseo albida. *Corolla* minima, 3.5-4.5 mm. longa, *pallide rosea*; *petalo superiore* subacuto *alis atropurpureis* carinam conspicuam viridem haud æquantibus apicemque vix attingentibus atque *calcarea brevissimo* fere gibbiformi; *petalo inferiore* marginibus angustis roseis *subspathulato*; *petalis interioribus* apice atropurpureis. *Fructûs* *modici*, circa 2 mm. longi et lati, *subrotundi*, *obtusissimi* vel *subtruncati*, parum compressi sed conspicue carinati, siccitate apicis foveolis obscuris plane *rugosi*.

Hæc *Fumaria* quæ *F. micranthæ* faciem eximie exhibet et pro varietate ejus speciei a pluribus auctoribus habetur, per flores generis minimos breviter calcaratos notabilis est, et hoc caractere cum foliorum laciniis setaceis, pedicellis brevissimis, fructibusque conspicue carinatis specificè differre videtur.

F. bracteosa Palæstinam (Jaffa (Bornmüller) ! et prope Beersheba (Hb. Mus. Brit.) !), Mesopotamiam (Schlæfli, prope Bagdad, in Hb. Kew !), insulam Cyprum, Ægyptum (prope Alexandriam !) et Algeriam (Faure, prope Oran !) habitat.

This, the smallest flowered of all fumitories, is shown as a distinct species rather than a variety of *F. micrantha*, chiefly on account of its corolla, which is not only remarkably small but of characteristic form with a much diminished spur. This feature is quite constant in the different herbarium material examined, some of which shows good and abundant flowers, and there seems no sufficient reason for regarding the plant as a depauperate form or condition of *F. micrantha*.

32. FUMARIA ROSTELLATA, Knaf in Flora, xxix. 290 (1846) ; Hamm. Mon. 20 (1857) ; Haussk. in Flora, lvi. 510 (1873). *F. transsilvanica*, Schur (= *F. macrosepala*, Schur, non Boiss.), Enum. Pl. Transsilv. 38 (1866), ap. Haussk. *l. c.*

Icon. Hamm. *l. c.* tab. ii.

Exsicc. Celakovsky, &c. Fl. Exsicc. Austro-Hungarica, No. 2902 !

An authentic example of *F. prehensilis*, Kit. in Hb. Mus. Brit. is identical with this species, but according to Parlatore specimens of *F. micrantha* were sent out by Kitaibel under this name, and the posthumous diagnosis of *F. prehensilis* in Linnæa, xxxii. p. 493 (1863), shows evident confusion between *F. rostellata* and *F. officinalis*. It thus seems clear that Hammar and Haussknecht were wise in passing over Kitaibel's name (Ind. Pl. Hort. Pesth, p. 10 (1812)), though anterior to both *F. micrantha* and *F. rostellata*.

Another name that appears to have been generally overlooked is *F. Sturmii*, Opiz in Naturalientausch, x. p. 267 (1825). This is referred to *F. micrantha* in the 'Index Kewensis,' but both the diagnosis and the habitats cited recall *F. rostellata*, and if this identification can be confirmed from authentic exsiccata, the name *F. Sturmii* must be used in preference to *F. rostellata*.

Knaf's description of this species is accurate and fairly complete, and is largely followed by Hammar. The fruiting pedicels are slenderer and the bracts smaller than in the other plants of this subsection, and the pedicels are by no means always short as stated in Hammar's diagnosis. In some agrestal forms with highly coloured flowers in very floriferous racemes the wings of the upper petal are much developed and extend almost to the apex, which is then no longer rostellate though still acute. Such plants are possibly varietyally distinct.

There is also some degree of variation in the fruit, which is sometimes plainly longer than broad and occasionally very shortly acute. Its surface, when dry, is usually finely rugulose.

The range of *F. rostellata*, a plant of Central Europe, extends as far north as Lithuania (Grodno, in Hb. Kew!), and in addition to the habitats cited by Haussknecht, it occurs in Serbia (Hb. Kew) and in Bulgaria (Hb. Mus. Brit.).

SUBSECTIO V. OFFICINALES.

Officinales, Haussk. in Flora, lvi. 404 (1873); Pugsley, Fum. in Brit. 45 (1912); Hamm. Mon. 9 (1857), ut sectio, ex parte.

Pedunculi breves vel breviusculi, nisi in *F. Boissieri*, pedicellis sæpius apice parum incrassatis præditi. Bracteæ pedicellis fructiferis breviores (*F. microstachys* exceptâ). Sepala haud magna, plus minusve dentata, raro corollæ tertiâ parte longiora, ejusque tubo (nisi in *F. microstachys*) angustiora. Fructus modici aut maximi, conspicue lati, truncati vel retusi, siccitate rugosi rarius rugulosi.

In *F. officinalis* and *F. microstachys* the wings of the upper petal are normally dark purple like the tip of the inner ones, but this colouring is obscure in *F. cilicica* and *F. Boissieri*.

33. *FUMARIA OFFICINALIS*, Linn. Spec. Plant. 700 (1753); Hamm. Mon. 9 (1857); Haussk. in Flora, lvi. 404 (1873); Pugsley, Fum. in Brit. 45 (1912). *F. vulgaris*, Bubani, Fl. Pyr. iii. 278 (1901).

F. purpurea et *F. flore albo*, Gerard, Herb. 927 (1597); *F. vulgaris*, Parkinson, Theatr. Bot. 287 (1640).

Icones. Woodville, Med. Bot. ii. tab. 88 (floribus pallidis ad var. *elegantem* accedens); Smith, Eng. Bot. 589; Curtis, Fl. Lond. i. tab. 147 (fasc. ii. 52) (forma *agrestis*, Haussk.); Wagner, Pharm.-Med.-Bot. tab. 59; Fl. Danica, tab. 940 (f. *floribunda*, Pet. ex Haussk.); Hayne, Gewächse, v. tab. 4; Sturm, Deutschl. Fl. i. 62, tab. 14, ut *F. officinalis* var. *major*; Svensk Bot. i. tab. 42; Reichb. Icones Fl. Germ. iii. tab. 3, fig. 4454, cum var. *scandente*; Hamm. l. c. tab. i; Clavaud, Fl. Gironde, pl. 4, fig. 1.

As pointed out in the general remarks on the subsection *Murales*, *F. media*, Loiseleur, 'Notice' p. 101 (1810), is closely related to this species. Loiseleur separates it from *F. officinalis* by its more rampant habit, ample foliage, and larger, paler flowers; and it seems best regarded as a large-flowered state of the plant figured by Reichenbach, without diagnosis, as *F. officinalis* var. *scandens*, which was reduced to a *forma scandens* in "*Fumaria* in Britain," p. 51. It is perhaps also the *α. vulgaris* of Koch, Syn. Fl. Germ. ed. 2, App. p. 1017 (1845), and of Hammar (Mon. p. 10), but it is not clear whether these authors intend to distinguish under this name a variety separable from the specific type.

! Racemi quam in typo breviores, relative pauciflori; sepala minora.

β. minor, Koch in Sturm Deutschl. Fl. i. 62, No. 14 (1833); Syn. Fl.

Germ. ed. 2, App. 1018 (1845); Hamm. *l. c.* 10 (1857); Haussk.

l. c. 419 (1873); Pugsley, *l. c.* 52 (1912).

Icon. Sturm, Deutschl. Fl. i. 62, tab. 14.

Exsicc. Orphanides, Fl. Græca, No. 519, ut *F. officinalis* var. *laxiflora*!

Glaucæ, tenella, diffusa et sæpe ramosissima. *Racemi laxiusculi*, 10–20-flori. *Sepala parva*, circa 2 mm. longa; *corolla quam typi paulo minor pallidiorque*. Fructus ut in typo latiores quam longi, 2 mm. longi et 2.5 mm. lati, retusi.

The comparatively short and few-flowered racemes and the small sepals characteristic of this variety were first accurately diagnosed by Haussknecht, but the former feature and the relatively small, pale flowers seem sufficiently shown in Koch's original figure.

In Herb. Mus. Brit. there are Crimean specimens from Herb. Pallas seemingly referable to this variety labelled "In rupibus Tauriæ ubique." It may be inferred from this that the plant grows in natural stations in that country, and this appears to be confirmed in M. Bieberstein's 'Fl. Taurico-Caucasica,' ii. 147 (1808), where it is observed, under *F. officinalis*, "Habitat in ruderalis et arvis, varietas minor in saxosis."

It is probable that *F. Meyeri*, Steven, Enum. Pl. Phaner. in Tauriâ sponte crescentium in Bull. Soc. Bot. Mosc. xxix. i. 288 (1856), is identical with this variety.

γ. Wirtgenii, Haussk. *l. c.* 411 & 420 (1873); Pugsley, *l. c.* 52 (1912).

F. Wirtgenii, Koch, Syn. Fl. Germ. ed. 2, App. 1018 (1845).

Icon. Pugsley, *l. c.* fig. 6 (Journ. Bot. i. tab. 519).

Exsicc. Dörfler, Herb. Norm. No. 4601, ut *F. Wirtgenii*!

Habitu foliisque variabilis, sed sæpe typo gracilior foliorum laciniis paulo angustioribus. *Racemi laxiusculi, vulgo 10–20-flori*; pedicelli quam in typo breviores et crassiores, rarius plus minusve elongati. *Sepala parva, circa 2 mm. longa et 1 mm. lata, sæpius albida et vix acuminata. Corolla quam typi paulo minor pallidiorque, petalorum exteriorum alis apice valde dilatatis* ut petala superius emarginatum et inferius truncato-spathulatum fiant. *Fructus 2–2.5 mm. longi et vix latiores, rotundato-truncati sed haud retusi, sæpissime apiculo parvo persistente præditi, circa medium latissimi et inferne in stipitem quam in typo minus obscure angustati, siccitate apicis foveolis obscuris plane rugosi.*

The exsiccata, Billot No. 1603 (*F. Wirtgenii*, Koch), as represented in Herb. Boissier, clearly belongs to this variety and is not identical with the example similarly labelled in Herb. Mus. Brit. which is referred to var. *elegans* in "Fumaria in Britain."

!! Racemi longi, multiflori; foliorum laciniae quam in typo angustiores.

δ. *densiflora*, Parlatore, Mon. Fum. 53 (1844); Haussk. l. c. 421 (1873). *F. densiflora*, DC. Cat. Hort. Monsp. 113 (1813), et Prodr. Syst. Nat. i. 130 (1824), ex parte; *F. officinalis* var. *floribunda*, Koch, Syn. Fl. Germ. ed. 2, App. 1018 (1845), ex parte; Hamm. l. c. 10 (1857); *F. officinalis* var. *pycnantha*, Loret & Barr. Fl. Montp. ed. 1, 32 (1876); *F. parviflora*, Sibth. & Smith, Fl. Græc. Prodr. ii. 50 (1813), et Fl. Græc. vii. 63 (1830)? non Lamarck.

Icon. Sibth. & Smith, Fl. Græc. vii. tab. 668, ut *F. parviflora*.

Exsicc. Bourgeau, Pyr.-Espag. No. 394, ut *F. officinalis*! Welwitsch, Fl. Lusit. Nos. 136 & 764, ut *F. officinalis* var. *parviflora*!

The *F. parviflora* of Sibthorp & Smith was referred by Hammar to *F. micrantha*, to which the description, at least as to its subglobose fruits, may be held to apply. The figure, however, has evidently been drawn from an example of this variety of *F. officinalis*, which it very well portrays, except for the obscurely shown fruits. Both the corolla and the sepals are widely different from those of any form of *F. micrantha*.

It is also probable, though not equally certain, that this variety is the *F. officinalis* var. *densiflora* of Moris's 'Flora Sardoia,' i. p. 90 (1837).

ε. *elegans*, Pugsley, l. c. 52 (1912). *F. media*, Reichb. Icon. Fl. Germ. iii. 1 (1838), nec Lois. nec aliorum.

Icon. Reichb. l. c. tab. 2, fig. 4453, ut *F. media*.

Exsicc. Billot, Fl. G. & G. No. 214, ut *F. officinalis*! Fiori & Béguinot, Fl. Exsicc. Ital. ii. No. 1050, ut *F. officinalis*!

This plant is well marked by its ample glaucous foliage with narrowly lanceolate segments, by its long racemes of usually pale flowers, and by its small fruits borne on long and slender pedicels subtended by relatively short bracts. These features do not agree with those of Loiseleur's *F. media*, but are emphasized by Reichenbach, either in his plate or his diagnosis, where the plant is referred to as a "species constantissima."

Continental examples occasionally show finer flowers than those from which the description in "*Fumaria* in Britain" was taken, and present somewhat the appearance of a rampant state of var. *densiflora*.

Hammar cites Reichenbach's figure of *F. media* for his var. *scandens*, but his description depicts a different plant with broad leaf-segments and large fruits, whose affinity may be held uncertain.

The variety *albiflora*, Parlatore, Mon. p. 53, with which the author identifies *F. Gasparinii*, Bab. in Trans. Bot. Soc. Edin. i. 36 (1844), is referred by Hammar to var. *minor*. No material of this species has been seen, however, with the white flowers by which var. *albiflora* is distinguished, and it seems probable that this character was taken from a shade-form only.

Of the var. *banatia*, Haussk. l. c. 421 (1873), no authentic material has been examined, and its identity with Reichenbach's var. *scandens* seems to require further investigation.

The varying states of this fumitory, as it is seen in cornfields in spring, in gardens in summer, and when shade-grown, are carefully distinguished by Haussknecht under the three form-names, *floribunda*, Peterman, *agrestis*, and *umbrosa*; and the parallel variations of the variety *Wirtgenii* are similarly dealt with, as also those of the species *F. Schleicheri*, Soy-Will., *F. Vaillantii*, Lois., and *F. parviflora*, Lam. These variations, which Haussknecht remarked in the species familiar to him, probably occur generally throughout the genus where the climatic conditions are favourable for the continued propagation and growth of the plants throughout the summer.

The distribution of *F. officinalis*, as given by Hammar, is amended by Haussknecht and in "*Fumaria* in Britain." It is pre-eminently the common European Fumitory, but both in Asia and North Africa it is scarcer and less widely spread than *F. parviflora*.

Haussknecht further enumerates a number of widely scattered localities for the varieties *minor*, *Wirtgenii*, and *densiflora*; and it may be added that var. *elegans* occurs not only in Britain, France, and Germany, but also in Italy and Spain.

A hybrid of the variety *Wirtgenii* with *F. Vaillantii* var. *Chavinii* has been described from the Var in Southern France as $\times$ *F. Albertii* in Rouy & Foucaud's *Fl. de France*, i. p. 178 (1893); and in the same year another description of *F. officinalis* $\times$ *Vaillantii* (*F. abortiva*) from Thessaly was published by Haussknecht in *Mittheil. Thür. Bot. Ver. N. Folge*, iii. & iv. p. 102 (*Symbolæ ad floram græcam*). There is an authentic example of this latter plant in *Herb. Kew*. *F. officinalis* $\times$ *parviflora* and *F. officinalis* $\times$ *micrantha* are referred to at page 50 of "*Fumaria* in Britain."

34. FUMARIA CILICICA, Haussk. in *Flora*, lvi. 423 (1873). *F. officinalis* γ . *tropidocarpa*, Buser in *Fl. Orient. Suppl.* 26 (1888).

Exsicc. Kotschy, *Iter Cilicico-Kurdicum*, 1859, No. 42, ut *F. officinalis* var. *floribunda*! Bourgeau, No. 32, Trebizond, 1862, in *Hb. Boissier*, ut *F. officinalis*! Balansa, Vallée de Djimil, Lazistan, 1866, in *Hb. Boissier*, ut *F. officinalis*! Zorab, No. 417, Erzerum, ut *F. officinalis*! Darbes, Syria Libanotica, 1881, in *Hb. Zürich*, ut *F. officinalis*! *Pl. Auraniticæ*, Postian ap. *Coll. Syriens. Prot.*, El Kafr, 1886, ut *F. officinalis* var. *tropidocarpa*! Sintenis, *Iter Orient.*, 1894, No. 5495, Armenia Turcica!

In addition to authentic material of Kotschy's plant on which this species was founded, the herbaria at Kew and the British Museum contain excellent Armenian examples collected by Sintenis, which are labelled as referred by Haussknecht to *F. cilicica*.

In these examples the characters of this remarkably floriferous and somewhat showy fumitory are well seen, and they generally confirm the accuracy of Haussknecht's unusually full diagnosis.

After an examination of the exsiccata cited it may be remarked that, compared with *F. officinalis*, *F. cilicica* seems chiefly notable for its very long and dense racemes, bearing from 30 up to 80 flowers and much exceeding the short and thick peduncles. Its bracts, also, are more subulate and more finely pointed, while the sepals are relatively small and narrow and, at least in some cases, acuminate rather than mucronate. The corolla is rather larger than in *F. officinalis* (8-9 mm. long), with broad, short, obscurely purple wings to the upper petal much exceeding the keel and extending to its apex; the spur ascending, longer and more curved than in *F. officinalis*; and the lower petal less spathulate, and subacute with spreading margins scarcely reaching the apex. The apical pits of the fruit are roundish and shallow, and the persistent apiculus, while apparently invariably present, is sometimes very short, giving the fruit a strong resemblance to that of *F. officinalis*. On this ground Buser seems to have reduced this plant to a variety of that species.

It will be seen from the exsiccata cited that *F. cilicica* has a wide distribution in Asiatic Turkey.

35. *FUMARIA BOISSIERI*, Haussk. in Flora, lvi. 424 (1873); Buser in Fl. Orient. Suppl. 27 (1888).

Exsicc. Haussk. Terek Mesopotamiæ borealis, 1867, in Hb. Boissier!

This species, described by Haussknecht from plants which he himself collected in Northern Mesopotamia, seems from the exsiccata in Herb. Boissier—the only material examined—to be separable with difficulty from *F. cilicica*.

In the Boissier specimen, which shows good foliage and flowers though only immature fruit, the leaves, racemes, pedicels, bracts, and sepals appear to be essentially those of *F. cilicica*; and although the outer petals are more broadly winged and the apiculus of the young fruit is longer than in the Kotschy gathering which forms the type of *F. cilicica*, yet it is clear from the more recent material referred to this species that these features are liable to an appreciable range of variation.

Although Buser retains *F. Boissieri* as a species while he reduces *F. cilicica* to a variety of *F. officinalis*, it is apparent that he recognizes the very close affinity of the three plants.

36. *FUMARIA MICROSTACHYS*, Kralik ex Haussk. in Flora, lvi. 552 (1873).

F. judaica β ? *microstachys*, Buser in Fl. Orient. Suppl. 29 (1888).

Exsicc. Kralik, Alexandrie, Egypt, 1847, in Hb. Boissier! et Hb. Kew! Gaillardot, Pl. d'Egypte, No. 437, Alexandrie, 1870, ut *F. Vaillantii*?! Schweinfurth, Basse-Egypte, No. 267, Alexandria, 1890, ut *F. judaica*!

Fumaria, ut videtur, annua, *satis robusta*, diffusa, tandem ramosissima. *Folia* plus minusve glauca, foliolis in *laciniis lineari-oblongas*, planas, acutas vel obtusas raro mucronatas fissis 3-4-pinnatisecta. *Racemi laxiusculi, pauciflori*

(6-12-flori), *primarii pedunculos subæquantes, seriores pedunculos brevissimos multo superantes*. *Bracteæ* subulato-lanceolatae, breviter acuminatae, *pedicellos* fructiferos *erecto-patentes* brevissimos (2 mm. longos) apice valde incrassatos *subæquantes vel superantes*. *Sepala* circa 1.5-2 mm. longa, .75 mm. lata, sæpius *ovata*, acuminata, *dentata*, albida. *Corolla* 5-7 mm. longa, *pallide rosea*; petalorum exteriorum carinis abrupte terminatis, alis atropurpureis marginibusque roseis in exemplaribus visis haud bene explicatis; petalis interioribus apice atropurpureis. *Fructûs maximi*, 3 mm. longi et paululum latiores, *brevissime obcordati, retusi*, supra medium latissimi et inferne in stipitem obscurum multo angustati, parum compressi sed conspicue carinati, in sicco apicis foveolis latis obscuris *rugosi*.

Hæc *Fumaria* distinctissima propter fructûs maximos cum *F. judaica* vulgo confusa est. In exemplaribus visis flores haud satis explicantur, sed corollas formam sectionis *Parviflorarum* exhibere manifestum est.

F. judaica foliorum laciniis majoribus latioribus, pedunculis pedicellisque longioribus, sepalis angustioribus, corollis albidis multo majoribus cum petalo inferiore haud spatulato, fructibus paulo minoribus, obscurius carinatis, magis tuberculato-rugosis longe distat.

F. microstachys in Ægypto solo (prope Alexandriam) hactenus inventa est.

This remarkable fumitory, of whose position in the genus Haussknecht expressed some doubt owing to lack of adequate material, and of which good flowering specimens are still wanting in British herbaria, is unique among the *Parvifloræ* on account of its very large fruits. In habit it evidently approaches *F. officinalis* and *F. Vaillantii*, which in some degree it probably resembles also in flower, but its fruits recall *F. macrocarpa* and *F. judaica* of the *Grandifloræ*, and it thus seems a somewhat anomalous intermediate between these widely different species. As a member of the *Parvifloræ* it seems best placed in the subsection *Officinales* on account of the moderate size of its sepals and the broad form of its fruits.

SUBSECTIO VI. MICROSEPALÆ.

Microsepalæ, Pugsley, Fum. in Brit. 59 (1912). *Officinales*, Hamm. Mon. 9 (1857), ut sectio, ex parte; *Parvifloræ*, Haussk. in Flora, lvi. 441 (1873).

Pedunculi plus minusve breves, rarius obsolescentes (*F. australi* exceptâ), pedicellis incrassatis tenuibusve præditi. *Bracteæ* variabiles. *Sepala* minima (nisi in *F. Jankæ* et *F. australi*) vel etiam absentia, sæpiissime insigniter dentata, vulgo corollæ quartâ parte breviora ejusque tubo sæpiissime multo angustiora. *Fructûs* parvi vel modici, rarissime conspicue lati, siccitate rugosi vel rugulosi.

The blackish-red wings of the upper petal so generally characteristic of the genus are well marked in the deep rose corollas of *F. Schleicheri* and *F. Jankæ*, and in the lighter flowers of *F. microcarpa*. They become less marked in

F. abyssinica, and are generally obscure in *F. indica* and *F. Schrammii*, while in *F. Vaillantii* the dark colouring is fairly distinct in some forms and quite absent in others.

In *F. parviflora* the normally white corolla usually shows a small external blotch only of purple on the wings of the upper petal, recalling the coloration of *F. occidentalis*; and in *F. asepala* the purple tinting, if present at all, is confined to the tips of the inner petals.

* Series **Ambiguæ**.

Flores rosei, 5–7 mm. longi; sepala 1·5–2 mm. longa; petali superioris alæ sursum reflexæ vel obsolescentes deflexæ.

37. *FUMARIA ABYSSINICA*, Hamm. Mon. 19 (1857); Haussk. in Flora, lvi. 492 (1873).

Icon. Hamm. l.c. tab. vi.

Exsicc. Schimper, Iter Abyss., sec. secunda, 1842, No. 1347, Demerki, ut *F. officinalis*! Schimper, Abyss. 1863, No. 1429 (shade-form)! Ankober, 1841, in Hb. Kew! Fl. Colon. Eritræa, 1902, No. 207, in Hb. Mus. Brit.! Schweinfurth, 1889, No. 1675, El Ejani am Schibam (2700 m.), Arabia Felix, in Hb. Kew!

There is good material in Herb. Mus. Brit. of the plant on which this species was founded. As pointed out by Haussknecht (l.c.), the fruit is scarcely obtuse, as stated in Hammar's diagnosis, but rather mucronulate when young, and at maturity subacute and very shortly apiculate, much as in some forms of *F. parviflora*, though the keel is less marked than in that species. In the Eritræan exsiccata a somewhat more rounded-obtuse, though still apiculate form prevails. The fruit is 2–2·25 mm. long and about equally broad, with very shallow apical pits.

It may further be remarked that the leaf-segments in *F. abyssinica* are more generally linear-oblong than oblong-lanceolate; and the racemes, which are usually sub-12-flowered in Schimper's examples but show as many as 20 flowers in the Eritræan exsiccata, are much longer in fruit than the very short peduncles, except occasionally when shade-grown. The bracts seem to be relatively broad—linear-oblong rather than linear—and fully as long as the short (2 mm. long), suberect pedicels. The ovate, acuminate sepals are about 1·5 mm. long and 1 mm. broad; the purple wings of the obtuse upper petal are reflexed upwards as in *F. officinalis* or in *F. Schleicheri*, but are normally rather narrow and scarcely cover the keel; and the lower petal appears less distinctly spatulate than in most of the other species of the subsection.

In the Arabian specimen at Kew the wings of the outer petals are but little developed, and the obscurely apiculate fruit is more rounded-obtuse than in the Abyssinian type.

The range of *F. abyssinica* is now known to extend from Abyssinia to the Italian coast colony of Eritræa and across the Red Sea to Arabia Felix. There is also an immature specimen from Uganda in Herb. Mus. Brit. (Bagshawe, Ruchiga, No. 396 l) which seems referable here. It appears to occur only at a considerable altitude. *F. abyssinica* is further recorded on Haussknecht's authority for Gabes in Murbeck's 'Contributions Fl. du Nord-Ouest de l'Afrique,' p. 5 (1897).

The material collected in the Kilimandjaro district of East Africa as *F. abyssinica* is referred to a distinct species *F. australis*.

38. FUMARIA AUSTRALIS, sp. nov. (Pl. 13.)

Exsicc. Volkens, Fl. des Kilimandscharo, 1893, Nos. 953 & 1333, Marangu (2800 m.) et Fuss des Kifinnka (2700 m.), ut *F. abyssinica*! Whyte, Nandi District, Tropical E. Africa (2000 m.), 1898, in Hb. Kew!

Fumaria verisimiliter annua, habitu satis robusto, internodis longis elongata, petiolis cirrhosis scandens. *Folia glauca*, foliolis in laciniis planas lineari-lanceolatas vel lanceolatas, acutas, longe mucronatas vel aristatas fissis 2-3-pinnatisecta. *Racemi* 12-20-flori, floriferi conspicue densi, etiam fructiferi pedunculis mediocribus paulo breviores, rarius eos subæquantes. *Bractee* magne et conspicue latæ, oblongæ, cuspidatæ, sparsim serrulatæ, pedicellis fructiferis brevissimis (circa 1.5 mm. longis), crassis, erecto-patentibus subduplo longiores. *Sepala* circa 2 mm. longa, 1 mm. lata, oblongo-ovata, acuta, irregulariter dentata, rosea. *Corolla* 5-7 mm. longa, rosea; petalo superiore alis roseis angustissimis fere obsoletis sæpissime deflexis apicem haud attingentibus acuto, calcare brevi parum curvato; petalo inferiore marginibus patentibus apicem vix attingentibus subacuto subspathulato; petalis interioribus apice atropurpureis. *Fructus* modici, circa 2.25 mm. longi ac lati, subrotundi, superne cum apiculo brevissimo persistente obtusiusculi, inferne in stipitem latum parum angustati, paululum compressi sed plane carinati, in sicco apicis foveolis obscurissimis dense rugosi.

Hæc *Fumaria*, quæ ad *F. abyssinica* relata est, habitu laxiore scandente, foliorum laciniis fere aristatis nonnunquam latioribus, racemis densis longius pedunculatis, bracteis majoribus, et præsertim corollis acutis petalique superioris alis angustissimis deflexis nec sursum reflexis satis differt.

Ab hujus subsectionis speciebus aliis per corollæ formam subexalatam *F. australis* æqualiter distat. Petali superioris alæ fere obsoletæ eis *F. coccineæ* similes sed specierum duarum characteres reliqui omnino diversi sunt.

F. australis in regionibus Kilimandjaro et Nandi Africæ orientalis crescit.

The exsiccata collected by Volkens, though elongate, show highly coloured and what seem to be normally developed flowers, and appear to be the usual form of a southern endemic species.

39. *FUMARIA JANKÆ*, Haussk. in Flora, lvi. 491 (1873).

Exsicc. Janka, Szekelyhid com. Bihar Hungariæ, 1861, in Hb. Boiss.!

The only material examined of this rare Hungarian plant is the specimen from Janka in Boissier's Herbarium. This shows poor flowers, but has the appearance of a distinct species agreeing with Haussknecht's diagnosis except in the length of the pedicels, which seem distinctly shorter than those of *F. Schleicheri*.

F. Jankæ is evidently somewhat intermediate between *F. rostellata* and *F. Schleicheri*, and is retained in this subsection in accordance with the views of Haussknecht.

** Series **Eu-Microsepalæ**.

Flores rosei vel albidi, raro plus 6 mm. longi; sepala minuta (·5–1·5 mm. longa) vel absentia; petali superioris alæ sursum reflexæ, erecto-patentes vel patulæ.

40. *FUMARIA SCHLEICHERI*, Soyer-Willemet, Observ. Pl. France, 17 (1828); Haussk. in Flora, lvi. 411 & 485 (1873). *F. Vaillantii*, subsp. *Schleicheri*, Rouy & Foucaud, Fl. Fr. i. 181 (1893); *F. Laggeri*, Jordan, Pugillus, 7 (1852); *F. tenuiflora*, Fries Herb. ex Hamm. Mon. 13 (forma umbrosa), et *F. Vaillantii* β. *Laggeri*, Hamm. Mon. 15 (1857); *F. acrocarpa*, Peterman (nomen?).

Icon. Hamm. l.c. tab. i, ut *F. Wirtgenii* (sic).

Exsicc. Schultz, Herb. Norm. No. 2109! Borbas, Fl. Exsicc. Austro-Hungarica, No. 2903 II!

Fumaria annua, gracilescens, satis ramosa, suberecta vel diffusa, rarius petiolis cirrhosis scandens. *Folia* plus minusve glauca, foliolis in *lacinias* planas *lineari-oblongas* vel *lineari-lanceolatas*, acutas rarius mucronatas fissis 2-(rarius 3-) pinnatisecta. *Racemi* floriferi *densiusculi*, sæpissime 12–20-, rarius plus 20-flori, fructiferi laxiores, *primarii pedunculos* *graciles subæquantes* *seriores* plane *superantes*. *Bracteæ* lanceolato-subulatæ, acuminatæ, *pedicellis* fructiferis *suberectis* gracilibus (4 mm. longis) apice ipso incrassatis fere *triplo breviores*. *Sepala* circa 1 mm. longa, ·5–·75 mm. lata, ovata, acuminata, irregulariter *inciso-dentata*, rosea, corollæ tubo plane angustiora. *Corolla* 5–6 mm. longa, *saturate rosea* (in sicco sub-violacea); *petalum superius obtusum* alis *atropurpureis* sursum *reflexis* carinam viridem excedentibus apicemque attingentibus et calcare longo curvato præditum; *petalum inferius* marginibus patulis roseis apicem vix attingentibus *obtusiusculum spatulatum*; petala interiora apice atropurpurea fere recta. *Fructûs* *modici*, circa 2 mm. longi ac lati, *subrotundi*, superne cum *apiculo* brevi persistente *rotundato-obtusi* (rarissime sine apiculo), inferne parum angustati, paulo compressi et plane carinati, siccitate apicis foveolis parvis paulo obscuris *rugosi*.

β. *supina*, var. nov.

F. supina, Janka in Termesz Füzetek, i. 30 (1877).

Exsicc. Janka, Noszoly et Feketelak, Transsilvaniæ centralis, 1876, in

Hb. Kew! Szépligeti, Fl. Hungarica, Budapest, Schwabenberg, 1888, in Hb. Mus. Brit., ut *F. Schleicheri*!

Type simillima, sed *petalo superiore alis latioribus* carinam conspicue superantibus obtusissimo, petalo inferiore marginibus latioribus apice obovato, fructibus paululum minoribus vix 2 mm. longis ac latis leviter rugosis.

F. Schleicheri foliorum laciniis latioribus, racemis longius pedunculatis pedicellis longioribus gracilibus breviter bracteatis, floribus saturate roseis, sepalis majoribus, petali superioris haud emarginati alis atropurpureis reflexis nec patulis a *F. Vaillantii* et a *F. Schrammii* differt.

F. officinalis habitu robustiore, bracteis longioribus, floribus sepalisque majoribus, fructibus latioribus retusis truncatisve facile distinguitur.

This pretty species, which is normally a very distinct plant, characterized especially by its deeply coloured flowers and its apiculate fruits borne on long, slender, and shortly bracteated pedicels, has been the subject of much confusion since it was first distinguished by Soyer-Willemet. Hammar, who overlooked Soyer-Willemet's description, seems to have been but slightly acquainted with it; and he failed to recognize the identity of Peterman's shade-grown *F. acrocarpa* from Leipzig, which he described as *F. tenuiflora*, Fries, with the Swiss plants usually distributed by Lager as *F. Lageri*, Jordan, and reduced in the Monograph to a variety of *F. Vaillantii*.

It was not till Haussknecht dealt with these plants that Soyer-Willemet's name was re-established and the essential features of *F. Schleicheri* satisfactorily diagnosed in a tabular form in which they are contrasted in detail with *F. officinalis*, *F. Wirtgenii*, and *F. Vaillantii*—the species with which *F. Schleicheri* had been previously hopelessly confused. This elucidation is a careful and accurate piece of work, clearly showing Haussknecht's intimate knowledge of these plants, but his identification of *F. Lageri*, Jord. with *F. Chavinii*, Reuter, rather than with *F. Schleicheri*, cannot be accepted, as explained at page 68 of "*Fumaria* in Britain." Haussknecht's determination was perhaps influenced by the fact that in Herb. Boissier Lager's specimen of *F. Lageri* is *F. Chavinii*.

Even in quite recent years other species have occasionally been mistaken for *F. Schleicheri*, as in the exsiccata Fl. Austro-Hungarica, No. 2903 I, where *F. Schrammii* has been sent out under this name.

According to Haussknecht, authentic material of *F. carinata*, Schur, Enum. Pl. Transsilv. p. 38 (1866), the identity of which is indeterminable from the author's description, belongs to this species, but it is referred to *F. Vaillantii* in Simonkai's Transylvanian Flora.

The distribution of *F. Schleicheri* is shown by Haussknecht to extend from Montpellier and Nice, and from the mountains of Savoy across Central Europe and Russia to the Caucasus and the Altai District of Central Asia. It is also recorded for the Spanish province of Valencia (*cf.* Willkomm,

Fl. Hisp. Suppl. 311 (1893)). It is one of the hardiest species of the genus, growing at an altitude of nearly 6000 feet in the Pennine Alps; and there are specimens in Herb. Kew from Siberia Altaica (Ledebour & Ludwig, as *F. Vaillantii*!).

Janka's *F. supina* has been reduced to a variety of this species as the authentic specimen from Janka at Kew appears to show all the essential features of *F. Schleicheri* and scarcely to differ except in its broadly winged corolla. It is reduced to a synonym of *F. Schleicheri* by Simonkai.

F. Schleicheri × *F. Vaillantii* var. *Chavinii*.

Exsicc. Brunies, Zerne, Ofenpass Gruppe, Graubünden, Switzerland, 1903, in Hb. Zurich, ut *F. Vaillantii* var. *Laggeri*!

Planta robusta, elongata; folia laciniis paululum latioribus quam in *F. Vaillantii* var. *Chavinii* prædita. Racemi 20–30-flori, longi, laxiusculi, pedunculos plane superantes. Bracteæ lineari-oblongæ, acuminatæ, pedicellorum gracilium suberectorum dimidium paulo excedentes. Sepala 1 mm. longa, ovata, longe acuminata; corolla circa 6 mm. longa, læte rosea, petali superioris alis purpureis et ut in *F. Schleicheri* sursum reflexis. Ovaria apiculata; fructus omnino abortivi.

Exemplaria *Fumariæ Schleicheri* et *F. Vaillantii* var. *Chavinii* in hac regione collecta in herbario Zurich sunt.

41. *FUMARIA MICROCARPA*, Boissier ex Haussk. in Flora, lvi. 490 (1873).

F. Schleicheri β. *microcarpa*, Buser in Fl. Orient. Suppl. 27 (1888).

Exsicc. Huet du Pavillon, Erzerum, 1853, in Hb. Boiss., ut *F. parviflora* var. fl. roseis! Maunsell, Van, Asiatic Turkey, 1899–1900, in Hb. Mus. Brit.! Becker, Pl. Astrachanicæ, Sarepta, 1879, in Hb. Mus. Brit., ut *F. Vaillantii*!

This plant, diagnosed as a species with some doubt by Haussknecht from Huet du Pavillon's specimen in Herb. Boissier, is clearly very closely allied to *F. Schleicheri*, as Haussknecht remarks. The resemblance is seen in the foliage, in the dark-tipped flowers with the wings of the upper petal reflexed upwards, and in the sub-rotund, apiculate fruits. But *F. microcarpa* differs in its dwarfer and more erect habit, its much shorter pedicels with relatively long bracts, its smaller and less deeply coloured flowers with more curved inner petals, and its smaller fruits (about 1.75 mm. long and broad).

In some degree *F. microcarpa* may be regarded as intermediate between *F. Schleicheri* and *F. Schrammii*, the latter of which it resembles in its small, apiculate fruit. Its corolla, however, quite lacks the marked dorsal compression, with spreading wings, which characterizes the flowers of *F. Schrammii* and *F. Vaillantii*.

The more recent material collected by Maunsell and Becker, and now at the British Museum, appears to be conspecific with the type of *F. microcarpa* in Herb. Boissier, although these later plants show shorter peduncles and

the *Sarepta* examples somewhat longer pedicels and larger corollas (up to 5.5 mm. long).

It may thus be concluded apparently that *F. microcarpa* is a local species, more or less generally distributed from Armenia northwards to the basin of the lower Volga.

The exsiccata labelled "*F. microcarpa*, Boiss., Huet du Pavillon, Erzerum, 1853," in Herb. Mus. Brit. (a fragment) and in Herb. Kew are not identical with the type in Herb. Boissier and are referable to *F. Schrammii* and *F. Vaillantii* respectively.

Other Asiatic specimens annotated as similarly named by Haussknecht (Bornmüller, Pl. Anatol. Orientalis, 1890, No. 1877, Amasia!) appear to belong to *F. Vaillantii* var. *conferta*, or (Bornmüller, Pl. Lydiæ et Cariæ, No. 9015, Smyrna!) to *F. Schrammii*.

42. *FUMARIA INDICA*, sp. nov.

F. Vaillantii var. *indica*, Haussk. in Flora, lvi. 443 (1873); *F. parviflora*, Wight & Arnott, Prod. Fl. Penins. Ind.-Orient. i. 18 (1834), non Lamk.; *F. parviflora* var. *Vaillantii*, Hooker fil. & Thomson, Fl. Indica, i. 258 (1855); *F. parviflora* subsp. *Vaillantii*, Hooker fil. Fl. British India, i. 128 (1872).

Icon. Wight, Illustr. Ind. Bot. i. tab. $\frac{114}{80}$, ut *F. parviflora*.

Exsicc. Hohenacker, Pl. Ind. Or. No. 1488, ut *F. parviflora*! Hooker, No. 206, Behar, ut *F. Vaillantii* (f. *umbrosa*)! Clarke, Nos. 26864 & 26903, Pubna & Beanleah, Bengal, ut *F. parviflora*! Watt, Fl. N.W. Himalayas, No. 852, Pangi, ut *F. parviflora*! Watt, Fl. Gangetic Plain, No. 2156, Bankipore, ut *F. parviflora*!

Fumaria annua, sæpius caulibus crassis habitu robusto vel elongato, suberecia vel diffusa, verisimiliter haud scandens. Folia vulgo ampla, fœniculoidea, plus minusve glauca, foliolis in lacinias longas lineares vel lineari-oblongas (raro paulo latiores in formis umbrosis) confertas planas acutas fissis 2-4-pinnatisectis. Racemi 15-25-flori, floriferi densiusculi, fructiferi elongati, laxi, pedunculos crassos sæpissime subduplo superantes, rarius subsessiles. Bractæ lanceolato-subulatæ, tenuiter acuminatæ, pedicellos (vulgo 2-2.5 mm. longos, rarius ad 4.5 mm. elongatos) erecto-patentes apice multo incrassatos subæquantes vel inferiores nonnunquam longiores. Sepala circa 1.5 mm. longa, .50-1 mm. lata; lanceolata vel ovato-lanceolata, acuminata, plus minusve inciso-dentata, rosea, in fructu juniore sæpe persistentia. Corolla 5-6 mm. longa, rosea; petalo superiore haud lato alis roseis (rarius purpurascens) plus minusve sursum reflexis carinam superantibus apicemque attingentibus obtuso, et calcare longo curvato non adscendente prædito; petalo inferiore marginibus patulis apicemque attingentibus obtuso spatulato, sæpe libero deflexo; petalis interioribus apice atropurpureis sursum curvatis. Fructus mediocres, 2-2.5 mm. longi, 2.25-2.5 mm. lati, subrotundo-quadrati, subtruncati et interdum obscure retusi (in statu juniore cum apiculo brevi qui rarissime persistens est),

inferne abrupte angustati, paululum compressi sed valde (præsertim apicem versus) carinati, in sicco apicis foveolis obscuris rugosi.

Forma montana.

Exsicc. Wallich, No. 1436 B, Kamaon! Collett, No. 457, Simla, ut *F. parviflora*! Aitchison, No. 216, Afghanistan!

Planta humilior, compacta; foliorum minorum laciniis brevioribus crassioribus subcanaliculatis; bracteis pedicellos breviores sæpius multo superantibus.

Fumaria indica per folia vulgo magis decomposita laciniis longioribus prædita, per racemos longiores prope constanter pedunculatos, per sepala plerumque majora, per corollam angustiore plane curvatam, minus dorso compressam, petali superioris alis sursum reflexis potius quam patentibus, et per fructûs subtruncatos valde carinatos sæpissime majores a *F. Vaillantii*, a *F. Schrammii*, et a *F. parviflorâ* differt.

Præterea *F. Vaillantii* habitu graciliore, foliorum laciniis latoribus, petalo superiore emarginato cum calcare adscendente distinguitur; *F. Schrammii* habitu gracili, racemis paucifloris, floribus petalo superiore emarginato pallidis, fructibus rugulosis apiculatis insuper separanda est; et *F. parviflora* foliorum laciniis vulgo angustioribus canaliculatis, floribus albidis vel roseo-tinctis nec vero roseis, petali superioris alis sæpius externe purpureo-maculatis calcareque semper adscendente etiam notata est.

F. Schleicheri et *F. microcarpa* habitu graciliore, foliorum laciniis multo latoribus relative sparsis, floribus constanter apice omnino atropurpureis, fructibus minoribus rotundatis semper apiculatis longe distant.

F. indica in Indiâ extratropicâ in planitie, in montibus subtropicis et in peninsulæ montibus Nilghiri occurrit, atque in cultis planta communis est; etiam in Scindiâ, in Afghanistan, in Kashmir, et sub montibus Himalaya in Kumaon, in Napaliâ et in Bhotan invenitur.

Ultra regiones Indiæ hæc species in Beloochistan (Duthie, No. 8568, Quetta, in Hb. Mus. Brit., ut *F. parviflora* (abnormalis)!) et in Persiâ (Kotschy, No. 133, Abu Schier, in Hb. Mus. Brit.! Polak, Iter Persicum, 1882, Kaswin, in Hb. Kew, ut *F. Vaillantii*! Kotschy, No. 45, prope Teheran, 1843, in Hb. Kew solo, ut *F. parviflora*!) crescit; etiam ad septentrionem in Turkestan (Regel, Iter Turkestanicum, Baldschuan, 1883, in Hb. Mus. Brit., ut *F. Vaillantii*!), in Songariâ (Krassnow, Fl. Iliensis, 1886, ut *F. Vaillantii*, partim!), in Orenburg (Haussk.) et in Mongoliâ (Meyer, Pl. Mongoliæ, No. 720, Chugutchak!).

The distinctive appearance of this plant, which is now well represented at Kew from numerous Indian localities, was remarked so long ago as 1834 by Wight & Arnott (*l. c.* i. p. 18), who refer it to *F. parviflora* with the remark: "In the Indian plant the flowers are rose-coloured and approach closely to *F. Vaillantii*." Hammar places it under *F. Vaillantii* on account of its flat leaf-segments and obtuse fruits, but notes that its leaf-cutting is much finer

than in the type; and the same peculiar features are recognized by Haussknecht in his diagnosis of *F. Vaillantii* var. *indica*. Like his predecessor, however, Haussknecht does not seem to have remarked the characteristic corolla or to have closely examined the fruits.

It is evident from their labels that some more recent Indian collectors have hesitated what name to apply to this plant, and Aitchison, who found it a common weed on the Afghan frontier, refers it to *F. officinalis*, seemingly distinguishing it from *F. Vaillantii*, which he collected as a rare species in the Kurrum Valley.

F. indica is remarkable for its great altitudinal range, extending from the lowland Ganges basin to at least 9000 ft. in the N.W. Himalayas. As might be expected, examples obtained in the warm regions differ considerably from montane specimens. The form of the plains is usually a large, robust plant, with long leaf-segments, giving it a fennel-like aspect, and frequently elongate pedicels. The hill-plant is naturally dwarfer, and shows relatively small leaves, with thicker and somewhat channelled segments. It also has commonly very short and thick pedicels, much exceeded by the bracts, rather finer flowers, and probably relatively larger sepals. As these differences are such as would be expected to arise solely from the varied environment, the mountain plant has been distinguished merely as a form.

43. FUMARIA VAILLANTII, Loiseleur in Desvaux, Journ. Bot. ii. 358 (1809), et Notice, 102 (1810); Hamm. Mon. 14 (1857); Haussk. in Flora, lvi. 411 & 441 (1873); Pugsley, Fum. in Brit. 66 (1912). *F. Camerarii*, Bubani, Fl. Pyr. iii. 281 (1901).

Icones. Vaillant, Bot. Paris, tab. 10. fig. 6; Sturm, Deutschl. Fl. i. 62, tab. 15; Reichb. Icon. Fl. Germ. iii. tab. 1. fig. 4452; Hamm. *l.c.* tab. i (f. *sepalis latoribus*); Clavaud, Fl. Gironde, Pl. 4. fig. 3.

Exsicc. Billot, Fl. G. & G. No. 215 bis! Schultz, Herb. Norm. No. 414! Fl. Exsicc. Carniol. No. 2871!

Hammar's diagnosis of this species is fairly satisfactory, but he does not seem to have appreciated the sparse and long-petioled foliage characteristic of the typical form, which was noticed by the older botanists Vaillant and Loiseleur. It is possible that his description was partly based on examples of the variety *Chavinii*, which, judging from British herbaria, appears to be the prevalent if not the only form growing in Scandinavia.

In addition to its omission to emphasize the slender habit and bipinnatisect leaves peculiar to typical *F. Vaillantii*, the Monograph is inaccurate respecting the sepals, which are usually lanceolate instead of subrotund-ovate, and frequently persistent on the young fruit rather than caducous. The flowers of the typical form are normally of a purplish-pink colour; and the ascending spur of the upper petal is a characteristic feature in this species, as

in *F. parviflora*, which is not mentioned in the diagnoses in "*Fumaria* in Britain."

The mucronulus of the young fruit, which sometimes lasts almost to maturity on the living plant, although invisible in the dry state, is also inadvertently unnoticed in "*Fumaria* in Britain." Four forms, based chiefly on the variations of the fruit, are distinguished by Clavaud (Fl. Gironde, 51 (1882)).

F. Vaillantii var. *gracilis*, Knaf in Flora, xxix. 292 (1846), is referred by Haussknecht to a shade-form of the specific type.

β. conferta, Haussk. l. c. 445.

Exsicc. Heldreich, Isbarte, 1854, ut *F. Vaillantii* !

Herba robusta, compacta et satis ramosa ; folia laciniis obtusiusculis haud sparsis 2-3-pinnatisecta. Racemi breves plerumque subsessiles ; pedicelli haud graciles, brevissimi (circa 1 mm. longi). Corolla minima, 4-5 mm. longa, pallide rosea, petalo superiore alis roseis plus minusve emarginato, calcare ut typi curvato adscendente. Fructus minimi, vix 2 mm. longi et latitudine paulo minores, subrotundi vel subrotundo-obovati, sine apiculo obtusi. Aliter ut in typo.

The type of this variety is represented in Herb. Mus. Brit., and also at Kew, where two good examples exist.

Other exsiccata, as "Bornmüller, Pl. Anatol. Or. No. 1877," referred to *F. microcarpa*, Boiss., apparently agree most nearly with this variety.

γ. Chavinii, Rouy & Foucaud, Fl. Fr. i. 181 (1893) ; Pugsley, l. c. 70 (1912). *F. Chavinii*, Reuter, Cat. Pl. Genève, ed. 2, 10 (1861) ; *F. Vaillantii*, Bab. in Eng. Bot. Suppl. 2877 (1844), partim (fl. roseis) ; *F. Vaillantii β. Laggeri*, Haussk. l. c. 442, nec Hamm. nec *F. Laggeri*, Jord.

Icon. Eng. Bot. Suppl. 2877, partim (fl. roseis), ut *F. Vaillantii*.

Exsicc. Billot, Fl. Exsicc. Cont. No. 3508, ut *F. Chavinii* ! Bourgeau, Pl. d'Espagne, No. 2108, ut *F. Vaillantii* ! Schultz, Fl. G. & G. 2nd Cent. No. 6, ut *F. Vaillantii* !

Quam typus planta robustior et erectior, sæpius parce ramosa et nunquam intricato-ramosissima. Folia irregulariter 2-3-pinnatisecta, foliolis quam in typo brevius petiolatis, laciniis lineari-oblongis linearibusve, acutis, confertis potius quam sparsis. Racemi 10-20- (raro 25-) flori, pedunculos breves superantes. Pedicelli quam typi plerumque longiores (3 mm. longi), flexnosi, suberecti vel rarius erecto-patentes. Sepala quam in typo minus persistentia. Corolla circa 6 mm. longa, dilute sed sæpius læte rosea, petali superioris valde emarginati alis latissimis, sæpe subserratis, roseis vel raro obscure purpureis. Fructus quam typi sæpe paululum majores, circa 2.25 mm. longi et 2 mm. lati, subrotundo-ovati, obtusi vel etiam subretusi, siccitate dense rugosi.

In this variety, which was feebly defined by Reuter but more accurately diagnosed by Haussknecht and by Rouy & Foucaud, the flowers are usually

light rose-coloured with very little, if any darker tinting in the wings of the upper petal. These wings, as well as the margins of the lower petal, are frequently more strongly developed than in the specific type. The fruit of var. *Chavinii*, besides being often rather larger and more rugose than in typical *F. Vaillantii*, differs further in being normally plainly longer than broad.

There is good material of this variety at Kew from the *locus classicus* near Geneva.

F. Vaillantii γ. *ochroleuca*, Knaf in Flora, xxix. 292 (1846), is probably, for the most part, a pale-flowered form of this variety.

δ. *venetica*, var. nov.

Exsicc. Fiori, Béguinot, Pampanini, Fl. Exsicc. Ital. No. 565, Venetia, G. Rigo, ut *F. Vaillantii*!

Planta glauca, ut in var. *Chavinii robusta*, et satis ramosa. Folia ampla, irregulariter 2-3-pinnatisecta, foliolis in lacinias confertas, lineari-lanceolatas vel lineares, acutas fissis. Racemi densiusculi, multi-(sub-20-) flori, quam in typo paulo longius pedunculati. Bractee latae, lineari-oblongae, cuspidatae, pedicellis breviusculis (circa 2 mm. longis) erecto-patentibus paulo breviores. Sepala saltem 1 mm. longa, .50-.66 mm. lata, ovato-lanceolata, plus minusve serrata, nervo dorsali viridiusculo rosea aut roseo-albida, caduca. Corolla ut in var. *Chavinii*, sed petali superioris alis angustioribus obscure purpureis. Fructus plane latiores quam longi (2 mm. longi et 2.25 mm. lati), subtruncati, siccitate cum apicis foveolis latis rugosi.

Hæc varietas var. *Chavinii* proxima est, sed pedicellis brevioribus erecto-patentibus, bracteis sepalisque latioribus, corollâ alis angustioribus obscurius coloratâ, fructibus multo latioribus distinguitur.

F. officinalis var. *Wirtgenii* foliorum segmentis latioribus, sepalis corollis fructibusque majoribus conspicue differt.

F. Schleicheri pedicellis gracilioribus et multo longioribus, bracteis minimis, floribus saturate roseis petali superioris alis valde reflexis, fructibus apiculatis rugulosis plane recedit.

F. Vaillantii var. *venetica* in cultis prope Torri del Benaco, Rivoli et Veronam in Venetiâ Italiæ septentrionalis habitat, ubi frequentissime a cl. Rigo ut *F. Laggeri* collecta est. Hæc planta non solum ut *F. Laggeri* et *F. Vaillantii* sed etiam sub nomine *F. Schleicheri* (Fiori, etc., Fl. Exsicc. Ital. No. 566!) distributa est. Exemplar hujus varietatis, ut videtur, sub nomine *F. Laggeri* prope Weimar (Kastenberg) a Dr. Torge collectum in herbario Kewensi est.

An element of doubt exists as to whether the above three varieties are best placed as such under *F. Vaillantii*, and further study of the group seems desirable, especially as the features of the floral organs can be readily mistaken owing to their small size.

The short racemes of minute flowers seen in var. *conferta* are not unlike those of *F. Schrammii*, which is treated as a separate species, but its fruit characters seem to bring it to *F. Vaillantii*, with which it also agrees in the form of the corolla-spur.

The specific type, peculiar chiefly for the distant and sparing leaflets noted by its earliest describers, looks widely different from well-marked examples of var. *Chavinii*, not only in foliage but also in its slenderer and more branching habit, its differently coloured corolla with apparently a more ascending spur, and its distinctly broader fruits. But Haussknecht's remarks that various intermediates are to be found seems correct from the evidence of dried material, and this renders it difficult to define the two forms as distinct species.

The variety *venetica* is most closely related to var. *Chavinii*, which it resembles in habit and foliage. These features, combined with its broad fruits, somewhat recall those of *F. officinalis*, and it might be confused with the small-flowered varieties of this species on a cursory examination.

Fumaria Vaillantii is one of the most widely distributed species of the genus, extending from Spain across Europe to the Altai Mountains of Central Asia and to the Indian frontier. In Europe it appears to be less plentiful in the Mediterranean region than in the central portions of the Continent, while in Asia it occurs from the Ægean to Beloochistan, Afghanistan and Kashmir, as well as further north from the Caspian eastwards to Chinese Songaria. Ledebour's specimens at Kew from the Altai Mountains are a mixture of this species and *F. Schleicheri*.

The occurrence of *F. Vaillantii* in North Africa and the Canaries, though reported by both Hammar and Haussknecht, seems open to doubt. It is indeed recorded by Ball for one Moroccan station (Journ. Linn. Soc. xvi. p. 314 (1878)), but Battandier & Trabut (Fl. de l'Algérie, p. 29) remark that they have not seen this species from Algeria, and Munby's Algerian specimens at Kew under this name belong to *F. parviflora*. More recently, however, a Tunisian habitat has been reported by Murbeck (Contr. Fl. Nord-Ouest Afrique, p. 5 (1897)). The examples from the Canaries similarly named, both in Herb. Kew and Herb. Mus. Brit., are referable to *F. parviflora*.

The specific type, originally described by Loiseleur from a French plant, seems to be chiefly found in Western Europe on the calcareous soils of France and Britain. It also grows in the Tyrol (Hb. Kew !), in Albania (Hb. Kew !), in Asia Minor (Hieropolis, Haussk. in Hb. Mus. Brit. !), and in Persia (Teheran, Kotschy, in Hb. Kew !); while still further east a similar form, sometimes with broader sepals, prevails, which is represented by the exsiccata Jacquemont, No. 723, Kashmir, in Herb. Kew ! and Aitchison, No. 210, Kurruu Valley, Afghanistan, in Herb. Kew, as *F. parviflora* !

The variety *Chavinii*, which is not confined to calcareous ground, appears from herbarium material to be the prevalent form, though not always equally

well marked, of Central and Northern Europe, and is the only form seen from Scandinavia. It also grows in Spain and in France, as well as in Britain, but no undoubted examples of it have been identified from the more eastern parts of the specific range.

44. *FUMARIA SCHRAMMII*, sp. nov.

F. Vaillantii var. *Schrammii*, Haussk. in Flora, lvi. 444 (1873) ; Rony & Foucaud, Fl. Fr. i. 181 (1893) ; *F. parviflora* a. *tenuifolia* aa. *Schrammii*, Ascherson, Verhandl. Bot. Ver. Prov. Brandenburg, v. 221 (1863).

Exsicc. Bourgeau, Pl. d'Espagne, 1850, No. 538, ut *F. Vaillantii* ! Filarszky, Fl. Exsicc. Austro-Hungarica, No. 2903 I, ut *F. Schleicheri* ! Schneider, Iter Balcanicum, 1907, No. 144, Bulgaria prope Varna ! Bornmüller, Pl. Lydiæ et Cariæ, No. 9015, Smyrna, ut *F. Schleicheri* var. *microcarpa* ! Bornmüller, Pl. Anatol. Or. 1889, Nos. 127 & 135, et 1890, No. 1739 ! Kotschy, No. 55, Teheran, 1846, ut *F. Vaillantii* !

Fumaria annua, sæpissime *gracilis*, caulibus tenuibus nunc elongatis sparsis nunc ramosissimis compactis prædita, raro petiolis cirrhosis scandens. *Folia* plus minusve glauca, sæpius *ampla*, foliolis tenuibus longe petiolatis in *laciniis lineari-lanceolatas* vel fere lineares (sæpius satis longas) planas acutas fissis 2-3-pinnatisectæ. *Racemi breves*, pauci-(6-15-) flori, *breviter pedunculati*, subsessiles vel etiam *sessiles*. *Bractææ angustæ*, lineari-subulatæ, tenuiter acuminatæ, *pedicellis* fructiferis *erecto-patentibus brevissimis* (circa 2 mm. longis) sæpius gracillimis *subduplo breviores*. *Sepala* 5-7.5 mm. longa, 2.5-4 mm. lata, *sublanceolata*, *inciso-dentata*, albida, facile caduca. *Corolla* 5-5.5 mm. longa, *pallide lilacina* ; *petalum superius* alis *lilacinis* vel subpurpureis fere patentibus *emarginatum*, valde dorso compressum, calcare deflexo parum curvato præditum ; *petalum inferius* marginibus *lilacinis* patentibus *subtruncatum spatulatum* ; petala interiora apice atropurpurea fere recta. *Fructus parvi*, 1.75-2 mm. longi et lati, *subrotundi vel subrotundo-ovati*, cum *apiculo* brevissimo persistente *obtusiusculi* vel obtusi, inferne in stipitem angustum obscurum contracti, paulo compressi et plane carinati, in sicco apicis foveolis distinctis *rugulosi*.

β. orientalis, var. nov.

Exsicc. Brotherus, Pl. Caucasicae, 1881, No. 426, Carthalia, in Hb. Mus. Brit., ut *F. Vaillantii* ! Huet du Pavillon, Erzerum, 1853, in Hb. Mus. Brit., ut *F. microcarpa* ! Komarow, Samarkand, 1892, in Hb. Kew, ut *F. asepala* ! Gilgit Exped., No. 191, in Hb. Kew !

Herba *robustior*, sæpius basi ramosissima, foliolis quam in typo *sæpius* arboribus. Racemi plerumque subsessiles, raro pedunculati. Corolla 5-6 mm. longa, petali superioris valde emarginati alis pallide purpureis. *Fructus* 2 mm. longi et lati, cum *apiculo distincto* (quam typi longiore) persistente *obtusissimi*, inferne abrupte angustati, quam in typo minus compressi, in sicco *rugosi* potius quam *rugulosi*.

Hæc species *Fumarice Vaillantii* cujus formam umbrosam sæpe refert simillima est, sed per foliorum lacinias longiores, per racemos breviores sæpe subsessiles, per corollas lilacinas petali superioris calcare parum curvato, per fructûs minores persistenter apiculatos minus rugosos specificè differre videtur.

F. parviflora, Lamk. habitu robustiore, foliorum segmentis angustioribus plus minusve canaliculatis, bracteis sepalisque latioribus, corollis albidis petalo superiore haud emarginato calcare adscendente, fructibusque valde carinatis rugosis sæpius mucronulatis plane differt.

F. Schrammii Hispaniam (Reuter, Madrid, in Hb. Kew!), Galliam (Bentham, Avignon, in Hb. Kew! Reverchon, Briançon et Vaucluse, in Hb. Kew! Lille, Haussk. Gironde, Rouy & Foucaud), Helvetiam (Graubünden, in Hb. Zurich!), Germaniam (Ascherson & Bænitze, Brandenburg, in Hb. Kew! Thuringen!), Hungariam (Filarszky, No. 29031!), Bulgariam (Schneider, Varna!), Macedoniam (Salonika, Haussk.), et Tauriam (Hb. Pallas!) Europæ habitat; in Asiâ etiam Anatoliam (Bornmüller, Smyrna! et Amasia!), Armeniam (Huet du Pavillon, Erzerum—var. *orientalis*!), Transcaucasiam (Brotherus, Carthalia—var. *orientalis*!), Persiam (Kotschy, Teheran! Bunge, Astrabad—var. *orientalis*!), Turkestan (Komarow, Samarkand—cum var. *orientali*!), Chitral (Relief Expedn., No. 15875, in Hb. Mus. Brit., ut *F. parviflora*!), Gilgit (Expedn. No. 191, in Hb. Kew—var. *orientalis*!), et Kashmir (Winterbottom, in Hb. Kew!).

A compact and densely branched Spanish plant in Herb. Zurich, labelled without date "*F. cespitosa* Loscos Exsicc. Fl. Arag. n. Castelseras. Leg. Loscos" differs from the original plant sent out by Loscos as *F. cespitosa* and is a form of *F. Schrammii* var. *orientalis*. The specimen of *F. cespitosa* in Herb. Boissier also belongs to this form.

It is only after some hesitation that *F. Schrammii* has been described as a species distinct from *F. Vaillantii*, to which it is evidently very closely allied and of which it will be seen to possess almost the same general geographical distribution. While resembling its ally, however, it seems to keep constantly distinct in several particulars, and no intermediate material has come under observation concerning the identity of which any reasonable doubt can be entertained.

Haussknecht, in describing *F. Schrammii* as a variety of *F. Vaillantii*, mentions it as a remarkable plant that may prove to be a separate species, and it seems probable from the notations on Bornmüller's labels that at a later date both he and Ascherson were confirmed in this view.

The variety *orientalis* has been placed under *F. Schrammii* owing to its similarly coloured flowers and persistently apiculate fruit, but the latter organ differs considerably in form from that of the type, and it may prove, when better material of the variety is available, that the two plants are not conspecific.

45. *FUMARIA ASEPALA*, Boissier, Fl. Orient. i. 135 (1867); Haussk. in Flora, lvi. 461 (1873).

Exsicc. Bornmüller, Pl. Anatol. Orient., 1893, No. 1737, Amasia, ut *F. parviflora* f. *erecta* ! Wiedemann, Anatolia, in Hb. Kew, ut *F. parviflora* ! Bornmüller, Iter Persico-Turcicum, 1892-3, No. 3136, Angora, Anatolia, ut *F. parviflora* ! Kotschy, No. 17, Mons Taurus, 1836, ut *F. parviflora* (partim) ! Kotschy, Iter Cilicico-Kurdicum, 1859, No. 41, in Hb. Mus. Brit., ut *F. parviflora* ! Sintenis, Iter Orientale, 1888, No. 282, Mesopotamia ! Stapf, No. 2158, Schiras, 1885, in Hb. Kew !

Fumaria annua, *humilis*, *caulibus* gracilibus *suberectis* haud scandentibus sæpius valde ramosis prædita. Folia glauca, irregulariter 2- (raro 3-) pinnatisecta, foliolis paulo sparsis in lacinias lineari-oblongas planas acutas basi plus minusve attenuatas fissis. Racemi floriferi brevissimi, fructiferi tandem paulo elongati, pauciflori (6-12-flori), subsessiles aut raro brevissime pedunculati. Bractæ lineari-oblongæ, acuminatæ, albidæ, pedicellos fructiferos erecto-patentes brevissimos (1-2 mm. longos) haud crassos sæpe superantes sed nonnunquam breviores. Sepala absentia aut rarissime (Sintenis, Iter Or. No. 282, partim) minutissima vix videnda. Corolla 4-5 mm. longa, alba; petalo superiore valde dorsum compresso, alis latis albis patentibus vel etiam deflexis ultra carinæ crassæ viridis apicem productis conspicue emarginato, atque calcare vix curvato prædito; petalo inferiore lato, carinæ crassæ viridis marginibus albis patentibus apicem versus abrupte dilatatis et ultra apicem productis spatulato-emarginato, petalum superius extra calcar simulante; petalorum interiorum apice (interdum obscure) purpureo ab exteriorum alis subcelato. Fructus parvi, circa 2 mm. longi et subæque lati vel paulo angustiores, subrotundi vel subrotundo-ovati, paulo compressi et plane carinati, cum apiculo brevissimo persistente obtusi et inferne paululum angustati, siccitate apice minute sed plane bifoveolati rugulosi.

β. compacta, Haussk. l. c. 461 (1873).

Exsicc. Aucher-Eloy, Herb. d' Orient, No. 4051, Ispahan, ut *F. Vaillantii* ! Kotschy, No. 45, Teheran, 1843, in Hb. Mus. Brit. (non Hb. Kew), ut *F. parviflora* ! Bunge, Iter Persicum, 1859, inter Teheran et Tabriz, ut *F. parviflora* ! Polak, Iter Persicum, 1882, Dauletabad, in Hb. Kew !

Planta nana, caulibus curtis suberecta. Foliorum laciniæ anguste oblanceolatae, obtusæ vel rarius mucronatæ. Racemi constanter brevissimi, vulgo 4-6-flori. Flores typi, sed petalorum interiorum apex viridescens nec purpureus. Fructus subrotundi, nonnunquam quam in typo paulo majores.

γ. aprica, var. nov.

Exsicc. Bornmüller, Iter Persico-Turcicum, 1892-3, No. 3234, Anatolia (Siwas), ut *F. parviflora* f. *aprica* ! Kotschy, Iter Cilicico-Kurdicum, 1859, No. 41, in Hb. Kew, ut *F. parviflora* !

Foliorum laciniae angustiores, *lineares* nec lineari-oblongæ. Bracteæ quam in typo angustiores. *Corolla* dorso et petalorum exteriorum marginibus angustioribus præsertim apicem versus *rubescens*. Fructûs minimi, 1.75 mm. longi et 1.5 mm. lati, subrotundi. Aliter ut in typo.

Hæc species quæ *Fumarie Vaillantii* habitum foliaque sed *F. parvifloræ* flores albidos habet non solum calyce abortivo sed etiam petalis duobus exterioribus valde emarginatis altero alterum simulante notabilis est.

F. Vaillantii racemis longioribus pedunculatis, sepalis lanceolatis, corollis majoribus roseis calcare adscendente petaloque inferiore truncato nec emarginato, fructibus sine apiculo persistente rugosis; *F. parviflora* habitu robustiore, foliorum magis decompositorum laciniiis angustioribus vulgo canaliculatis, racemis longioribus, sepalis sæpissime ovatis rarissime obsoletis, corollis vulgo majoribus calcare adscendente petalisque exterioribus haud emarginatis, fructibus sæpissime rugosis valde carinatis insuper distinguitur.

F. Schrammii habitu laxiore, foliorum laciniiis et racemis longioribus, sepalis sublanceolatis, corollis majoribus lilacinis petalo superiore solo emarginato satis differt.

F. indica habitu robusto, foliorum laciniiis longis angustis, racemis longis pedunculatis, floribus majoribus roseis, petalis exterioribus haud emarginatis, fructibus truncatis rugosis facile separanda est.

This distinct though inconspicuous fumitory, remarkable for its strongly compressed flowers with the outer petals almost equally winged, is widely distributed in Asiatic Turkey and extends eastwards into Persia. The variety *compacta* seems to occur chiefly in the latter country, but it is also recorded by Haussknecht for two Syrian localities.

46. *FUMARIA PARVIFLORA*, Lamareck, Encycl. Méthod. ii. 567 (1788); Hamm. Mon. 16 (1857); Haussk. in Flora, lvi. 456 (1873); Pugsley, Fum. in Brit. 60 (1912). *F. tenuifolia*, Roth, Catalecta, fasc. ii. 82 (1800).

Clusius' *Capnos cretica floribus candidis fuscâ maculâ* (Hist. Rar. Pl. lib. vi. p. ccix (1601)) appears to be this species. It is cited by C. Bauhin (Pinax, p. 143 (1623)) as a synonym of *Fumaria minor folio oblongo capillaceo*, which, according to A. P. de Candolle (Bull. Hb. Boissier, Tom. iv. 2^{me} Série, No. 3, p. 304 (1904)), is represented in Bauhin's Herbarium by *F. parviflora*.

Icones. Sturm, Deutschl. Fl. i. 62, tab. 16; Reichb. Icon. Fl. Germ. iii. tab. 1. fig. 4451 (f. sepalis majoribus); Hamm. l.c. tab. ii; Clavaud, Fl. Gironde, Pl. 4. fig. 4.

Exsicc. Heldreich, Herb. Græc. Norm. No. 1206, ut *F. parviflora* f. *umbrosa*! Wirtgen, Pl. Sel. Rhenan. fasc. iv. No. 159! Bourgeau, Pl. Pyr.-Espagnol. No. 389! Bourgeau, Pl. d'Espagne, 1851, No. 1014! Fiori & Béguinot, Fl. Exsicc. Ital. No. 1051 (ad var. *Symeii* accedens)!

Forma Vivianii.

F. leucantha, Viviani, Fl. Corsicæ Sp. Nov. Diagn. 12 (1824); *F. parviflora* var. *leucantha*, Clavaud in Act. Soc. Linn. Bordeaux, xxxv. 4^e sér. v. 276 (1881), et Fl. Gironde, 52 (1882), ex parte.

Exsicc. Pichler, Fl. Exsicc. Austro-Hungarica, No. 87, Spalato, ut *F. parviflora* ! Reverchon, Pl. de Sardaigne, No. 91, ut *F. parviflora* (f. fol. laciniis latioribus) !

Fructibus obtusis nec acuminatis nec emarginatis a typo differt.

In the case of this species Hammar's diagnosis is generally accurate, but he appears to have overlooked the characteristic broad bracts, which he describes as linear, as well as the normally obtuse but not emarginate upper petal, with its purple blotch on the outer or lower side of the wings.

The form regarded as the specific type, in accordance with the general view of authors, is the more robust plant, with laxer and less glaucous foliage, whiter and somewhat narrowly winged corollas, and shortly mucronulate fruits, as described in "*Fumaria in Britain*" (*F. parviflora* var. *leucantha*, Clavaud, l. c., excl. forma *Vivianii*). The rotundate, ascending spur common to all the forms of the species is not mentioned, through inadvertence, in that description. It may be added that the leaves in this species are commonly 3-4 rather than 2-3-pinnatisect, and the corolla is not often more than 5 mm. in length.

! Flores albi, vix roseo-tincti; sepala sæpissime albida; petali superioris alæ quam in typo angustiores.

β. Symei, Pugsley, l. c. 65 (1912).

F. Vaillantii, Bab. in Trans. Bot. Soc. Edin. i. 36 (1844); et Eng. Bot. Suppl. 2877 (1844), ex parte, non Lois.

Icon. Eng. Bot. Suppl. 2877, ut *F. Vaillantii* (partim—f. flor. albis).

Exsicc. Reverchon, Pl. de l'Andalousie, No. 557, ut *F. parviflora* !

In addition to the short leaf-segments, relatively large sepals, and finally retuse fruits characteristic of this variety, it may be distinguished by its racemes, which, both in flower and in fruit, are normally laxer than in the other forms of this species.

Other examples collected in Spain (Bourgeau, Pl. d'Espagne, 1850, No. 537 !), in Morocco (Hooker, Casa Blanca, 1871, in Hb. Kew !), and in the Canaries (Lowe, No. 21bis, Orotava, 1858, in Hb. Mus. Brit., ut *F. parviflora* fl. albis !) are closely related to, if indeed separable from this variety.

γ. latisecta, Haussk. l. c. 460 (1873).

Exsicc. Schimper, No. 410, Mt. Sinai, 1835, ut *F. parviflora* ! Macdonald, Arabia Petræa, 1849, in Hb. Kew, sub *F. parviflora* !

Planta satis robusta, suberecta, haud scandens; folia vix glaucescentia, ampla, laciniis linearibus vel oblongo-linearibus, 1-2 mm. (ad 3 mm. ap. Haussk.) latis, fere planis, obtusis obtusiusculisve prædita. Racemi sessiles,

densi (etiam fructiferi), quam folia opposita multo breviores; bracteæ pedicellos brevissimos (circa 1 mm. longos) plane superantes. Corolla 4·5–5 mm. longa, albida; petalo superiore anguste alato. *Fructûs* parvi, vix 2 mm. longi ac lati, subrotundi, obtusi vel subretusi, brevissime apiculati, siccitate *sublæves*. Aliter ut in typo.

This variety, which is well represented at Kew, is notable for its ample foliage with broad and nearly flat leaf-segments, for its very short and dense racemes, and for its nearly smooth instead of rugose fruits.

Tommasini's specimen from Trieste, in Herb. Boissier, included in Haussknecht's citations for this variety, shows poor flowers and fruits, but has the aspect of a form of *F. Vaillantii*, as labelled. A few other European *exsiccata*, as "Reverchon, Pl. de Sardaigne, No. 91," approach this variety in foliage.

♂. *persica*, var. nov.

Exsicc. Sintenis, Iter Transcaspico-Persicum, 1900–01, No. 1548, ut *F. asepala*! Bornmüller, Iter Persicum alterum, 1902, No. 6112, Persia borealis, ut *F. parviflora*! Kotschy, No. 314, Schiras, 1842, ut *F. parviflora*! Fl. Baluchistan, No. 3521, ut *F. parviflora* (partim—pl. fl. albis)! Kotschy, No. 17, Mons. Taurus, 1836, in Hb. Kew, ut *F. parviflora* (partim)! Postian, Pl. Mont. Syriæ borealis, Aintab, in Hb. Mus. Brit., ut *F. asepala*!

Planta robusta, ramosior, haud scandens; folia plus minusve glauca, ampla, laciniis linearibus vel oblongo-linearibus (raro plus 1 mm. latis), confertis, brevibus, crassiusculis, subcanaliculatis, acutis subacutisve prædita. Racemi sæpissime sessiles, breves, floriferi densi, fructiferi paulo elongati; bracteæ pedicellos brevissimos (circa 1 mm. longos) multo superantes. *Sepala absentia aut minuta* (circa 5 mm. longa), triangulari-ovata, acuminata, albida. *Corolla minima*, 4–4·5 mm. longa, alba; petali superioris alis angustis vulgo sine maculâ purpureâ; petalorum interiorum apice purpureo vel viridiusculo. *Fructûs* 2 mm. longi et paululum latiores, subrotundo-obovati, *obtusissimi* vel subtruncati, obscure brevissime apiculati, in sicco rugosi.

Hæc varietas quæ per foliorum amplorum lacinias breviores confertas et per fructûs obtusissimos a typo longe distat varietati *latisecta* similis est, sed foliorum laciniis brevioribus angustioribus, sepalis absentibus vel minutis, corollâ minimâ, fructibusque obtusissimis rugosis potius quam sublævibus satis differre videtur.

!! Flores tandem roseo-tincti; sepala rosea; petali superioris alæ sæpius latiores.

ε. *glauca*, Clavaud in Act. Soc. Linn. Bordeaux, xxxv. 4 sér. v. 277 (1881), et Fl. Gironde, 53 (1882); Nicotra, Le Fum. Ital. 69 (1897). *F. glauca*, Jordan, Pugillus, 8 (1852)?

Exsicc. Schultz, Herb. Norm. No. 415 ter, ut *F. parviflora*! Bourgeau, Env. de Toulon, No. 18, in Hb. Kew, ut *F. parviflora*! Kralik, Pl. Tunet.

1854, No. 8, in Hb. Mus. Brit., ut *F. parviflora* ! Bornmüller, Iter Persico-Turcicum, 1892-3, No. 2030, Persia borealis, ut *F. parviflora* !

Planta quam typus *humilior*, haud scandens. *Folia* valde glauca, *laciniis anguste linearibus*, *brevibus*, canaliculatis, sæpe crassiusculis. Racemi floriferi densi ; flores quam in hujus speciei aliis formis magis patentes. *Corolla* usque ad 5 mm. longa, sæpius *late roseo-tincta* ; *petali superioris alæ* quam in typo latiores, præsertim *apicem versus dilatata* ; petalo inferiore sæpe subtruncato et libero deflexo. *Fructûs* vix 2 mm. longi latique, subrotundi, *obtusiusculi brevissime apiculati*, rarius subrotundo-ovati acutiusculi. Aliter ut in typo.

The corolla of this pretty variety differs somewhat in shape from that of the other forms of this species, and at the time of flowering is generally less erect in the raceme.

Plants occur (cf. Bourgeau, Pl. d'Espagne, 1849, No. 22, in Hb. Mus. Brit. !) having the habit and flowers of var. *glauca* with the more attenuate fruit of var. *acuminata*.

ζ. *acuminata*, Clavaud, *l. c.* 277 et 53 (1881 et 1882) ; Pugsley, *l. c.* 64 (1912).

Icon. Smith, Eng. Bot. 590, ut *F. parviflora*.

Exsicc. Schultz, Herb. Norm. Nos. 415 & 415 bis, ut *F. parviflora* ! Sinteniz, Iter Trojanum, 1883, No. 301, Kenkoei, ut *F. parviflora* !

Planta ut var. *glauca humilis*, haud scandens. *Folia* intense glauca, *laciniis* tenuiter linearibus vel *subcapillaceis* canaliculatis. Racemi floriferi densiusculi. *Corolla relative majuscula*, 5-6 mm. longa, tandem roseo-tincta ; petalorum exteriorum margines quam in typo paululum latiores. *Fructûs* 2·25-2·5 mm. longi et 2 mm. lati, *subrotundo-ovati*, cum apiculo brevissimo persistente *acutiusculi vel acuminati*, in sicco apicis foveolis fere obsoletis rugosi.

This variety is notable not only for its more acuminate fruits but for its very fine, almost capillary leaf-segments ; and its flowers are somewhat larger than those of any other form of the species.

η. *sinaitica*, Haussk. *l. c.* 460 (1873).

Exsicc. Boissier, Jardin du Sinai, Arabia Petræa, 1846, in Hb. Boissier !

Planta *nana*, vix 4 cm. alta, satis ramosa. *Folia* intense glauca, inferiora caules fere æquantia, *laciniis obtusis brevissimis* (superioribus vix 1 mm. longis) prædita. *Corolla roseo-tincta*. *Fructûs* ut in typo.

This seems to be a very rare plant, known only from Mt. Sinai.

θ. *indicoides*, var. nov.

Exsicc. Bornmüller, Iter Persico-Turcicum, 1892-3, No. 9, Persia australis (Farsistan), ut *F. parviflora*, transiens ad *F. segetalem*, Hamm. ! Bagdad, Samaur, (ex Herb. Schäffli) in Hb. Kew ! Russell, Aleppo, in Hb. Mus. Brit. !

Planta internodis longis robusta, suberecta vel diffusa. *Folia* glauca, *lacinii* linearibus vel oblongo-linearibus, breviusculis, acutiusculis, canaliculatis. *Racemi* etiam floriferi *haud densi*; bracteæ pedicellos crassos breves (circa 1.5 mm. longos) plane superantes. Sepala 1-1.5 mm. longa, subrotundo-ovata, acuminata, dentata. *Corolla* vix 5 mm. longa, *dilute rosea*; *petali superioris alis* latis omnino roseis; *petalorum interiorum apice viridiusculo* potius quam purpureo. *Fructûs* 2-2.25 mm. longi et lati, *subrotundo-obovati, obtusissimi*, obscure brevissime apiculati, præsertim apicem versus *conspicue carinati*, in sicco apicis foveolis obscuris rugosi.

Hæc varietas per flores sine apice atropurpureo obscure roseos et per fructûs majores obtusissimos apicem versus conspicue carinatos a *F. parvifloræ* aliis formis separanda est et transitum ad *F. indicam* denotare videtur, sed foliorum laciniae breviores, racemi subsessiles et præsertim corolla brevior alis patentibus calcareque rotundato adscendente prædita ejus cum *F. parviflorâ* propinquitatem certissime monstrant.

An example in Herb. Mus. Brit. (Haussknecht, *Iter Orient.* Schiras, ut *F. parviflora*!), with small rosy-white flowers and obscure sepals, seems intermediate between this variety and *δ. persica*.

Hammar's variety *segetalis* (Mon. p. 17), distinguished by sepals one fourth as long as the corolla and as broad as its tube, has been shown under *F. Reuteri* to belong to that species and not to *F. parviflora*.

Haussknecht, who does not seem to have seen Lange's specimen on which this variety was founded, regards it as a form of true *F. parviflora*, and cites for it several fresh exsiccata, of which those from Segura de la Sierra, Murcia, and from Aintab have been examined, and are found to resemble closely Clavaud's variety *glauca*.

The original specimens of *F. cæspitosa*, Loscos (Loscos, Series Exsicc. Fl. Aragon, Centuria prima, No. 2) are referred by Haussknecht in Oesterr. Bot. Zeit. xxvii. p. 50 (1877), to *F. parviflora* f. *erecta*, Haussk. This plant is admitted as a distinct species in Willkomm & Lange's Fl. Hispanica, iii. p. 884, but in their Supplement (p. 311) it is reduced to a variety of *F. Vaillantii* with the remark "*vix varietas dicenda*." The example in Herb. C. Bailey is an early-flowering form of *F. parviflora*, probably identical with the material seen by Haussknecht, but as already noticed under *F. Schrammii*, the specimens in Herb. Boissier and Herb. Zürich are quite different, so that some confusion presumably occurred among the plants sent out under this name. The original description by Loscos and by Willkomm & Lange point, on the whole, to a form of *F. Vaillantii*.

Another plant allied to *F. parviflora* is *F. Trabuti*, Battandier & Trabut, Fl. de l'Algérie, i. 29 (1888), of which no material has been seen. It is described as follows:—

Fumaria verisimiliter annua caulibus curtis robustis. Folia inferiora

multa, conferta, angusta, oblonga, laciniis curtis lanceolatis paulo latis haud canaliculatis prædita, eis sectionis *Petrocapnos* quarundam specierum similia; folia superiora ut in *F. parviflorâ*. Flores satis magni, 6 mm. longi, albi; sepala lata. Fructûs magni, obtusi, apiculati. Habitat in provinciâ Oran Algeriæ.

A further variety of *F. parviflora*, established as *S. macrocarpa* in J. Perez Lara's *Florula Gaditana*, pars 5, p. 64, in *Anales de Hist. Nat. Soc. Espagn.* (1898), is said to have rosy flowers and fruits two or three times as large as in the type.

Like *F. Vaillantii*, *F. parviflora* is one of the most widely spread members of the genus, having a somewhat similar range extending from Spain across Europe to Afghanistan and Beloochistan. It is clearly, however, a more southern species and one more impatient of cold. In Europe it is commonest in the Mediterranean region, and does not occur so far to the north and east as *F. Vaillantii*, being little known in Russia except in the Crimea (Herb. Pallas). Similarly in Asia it is absent from the districts between the Caspian and Mongolia, where *F. Schleicheri*, *F. Vaillantii*, and *F. Schrammii* have all been found. On the other hand, it is known from all the countries of North Africa from Morocco to Egypt, as well as from the Canaries.

The commonest form of this polymorphic plant is no doubt the specific type, varying considerably in the form of its fruit and connected with most of the varieties by numerous intermediate forms. This occurs from the Canaries, Morocco and Spain eastwards to Syria and Mesopotamia. The variety *Symeii* is known from Britain and Spain, and probably grows elsewhere; var. *acuminata* is mostly a plant of Western Europe, but has been collected also in Asia Minor; var. *glauca* is pre-eminently a Mediterranean form, growing on the African as well as the European side and extending into Syria and Persia. Haussknecht's varieties *latisecta* and *sinaitica* are both Arabian forms, probably collected in natural habitats, and examples which he obtained in the desert near Bagdad seem almost identical with var. *latisecta*, which Haussknecht records also for Dalmatia. The two remaining varieties, both characterized by very obtuse fruits though dissimilar in other respects, are the most eastern forms of the species. The variety *persica* appears to be a prevalent form in Persia, growing also in Beloochistan, Syria, and the Taurus Mts.; var. *indicoides*, which is presumably a rarer form, ranges, so far as is known, from Syria across Mesopotamia to Southern Persia.

RUPICAPNOS.

Rupicapnos, Pomel, Mat. Fl. Atlant. 16 (1860); Nouv. Mat. Fl. Atlant. i. 240 (1874). *Fumaria* sect. *Petrocapnos*, Cosson & Durieu in Bull. Soc. Bot. France, ii. 305 (1855); Willkomm & Lange, Fl. Hisp. iii. 878 (1880); Cosson, Comp. Fl. Atlant. ii. 80 (1883-1887).

Plantæ perennes caudice decumbente caulibusque brevissimis aut rarius annue nane caule suberecto brevissime ramoso. Folia in speciebus perennibus pleraque subradicalia, in omnibus semper longe petiolata, foliolis breviter petiolatis vel subsessilibus 1-2-pinnatisectis vel inciso-flabellatis irregulariter pinnata (*R. muricariâ* exceptâ); segmenta secundaria decurrentia; petioli nunquam cirrhosi. Inflorescentia pedicellis fructiferis gracilibus elongatis tandem deflexis racemoso-corymbiformis. Bractæ pedicellis fructiferis multoties breviores. Corolla uni- vel inæque bicalcarata; petalorum exteriorum margines apicem versus in statu juvenili jam multo explicati ut in genere *Sarcocapnos*; petalum superius subplanum potius quam semi-cylindricum, calcaratum, superne gibbum format qui apicem vix attingit et margines sæpissime patentes in limbum latum interdum dilatatos nunquam purpureos habet sed non alas in jugum laterale productas; petalum inferius inferne gibbum apicem vix attingentem marginibus patentibus circumdatum formans sæpe basi ipsâ breviter calcaratum vel saccatum fit; petalorum interiorum nervus medius apicem versus sæpe conspicue alatus est. Floris characteres reliqui ut in genere *Fumariâ*. Fructus monospermus, indeh. scens, nuciformis, semper mucronatus vel rostratus sed haud apice bifoveolatus (sine rimis in mesocarpio) est; exocarpium tuberculis rugosum; endocarpium omnino ad mesocarpium adherens; semen apice rotundatum vel paulo depressum, sine rugâ longâ infra micropylam.

Perennial, or more rarely annual plants, always with short stems, growing in rock-clefts. Inflorescence corymbiform with pedicels which lengthen in fruit and become deflexed so as to carry the seeds to the cavities of the rocks on which the plants grow. Lower petal often shortly spurred. Fruit without apical pits.

In the perennial species of *Rupicapnos* the root is quickly elongated and the leaves are at first all radical, forming a close tuft. After the first year, the plant develops a thick, branched, decumbent rootstock, from which arise very short, branched stems, bearing long-petioled leaves and subterminal corymbiform racemes. The foliage is usually less decompound than in *Fumaria*, and the leaf-segments are much more shortly petioled and more decurrent, the secondary petioles never being cirrhose. The flower-buds of all the species resemble those of the genus *Sarcocapnos* rather than *Fumaria*, having well developed margins to the two outer petals, while the spur of the upper one is very small. This spur, as seen in perfectly developed flowers, varies greatly in different species and is of importance for affording specific

characters, but in shade-grown plants of some species it does not always attain its normal development. So far as can be judged from the limited material examined, the corolla is more uniform in the species of this genus than in *Fumaria*, and shows little tendency to cleistogamy.

CONSPECTUS OF SPECIES.

SECTION I. MURICARIA.

Suberect annual plants with cauline leaves and few-flowered racemes. Flowers small or rather so, 4-8 mm. long, white; outer petals rarely dilated apically into a spreading, suborbicular limb, little longer than the inner petals, which are tipped with dark purple. Fruit very large, or at least of moderate size.

- * Leaves 2-trisect. Racemes subsessile.
1. *R. muricaria*. Flowers 7-8 mm. long; lower petal spatulate. Fruit very large, subrotund, marginally muricate, with long, large beak.
- ** Leaves 2-pinnatisect. Racemes peduncled.
2. *R. delicatula*. Leaves with multifid leaflets. Flowers 4 mm. long; outer petals apically dilated. Fruit subglobose, muricate, apiculate.
- 3. *R. longipes*. Leaves deltoid. Flowers 6-8 mm. long; lower petal dilated into a suborbicular limb. Fruit very large, subrhomboid, muricate, with large, broad beak. Pedicels very long.
- 4. *R. prætermissa*. Leaves deltoid. Flowers 6-7 mm. long; lower petal spatulate. Fruit rather large, ovate-elliptical, finely rugose, with compressed beak.
- 5. *R. sublevis*. Leaves oval, with closer leaflets. Flowers . . . Fruit of moderate size, narrowly obovate, finely rugose, with small beak.

SECTION II. SARCOCAPNOIDES.

Decumbent perennial plants with quinate-pinnate, mostly subradical leaves and many-flowered racemes. Flowers small or rather so, 4-10 mm. long; outer petals each apically dilated into a spreading, suborbicular limb, distinctly longer and broader than the inner petals, which are tipped with dark purple. Fruit small.

- 6. *R. sarcocapnoides*. Lobes of leaflets elliptical. Flowers 4-5 mm. long, white; lower petal not saccate.
- 7. *R. Reboudiana*. Lobes of leaflets cuneiform. Flowers 9-10 mm. long, rosy-white lower petal saccate.

SECTION III. TRIPTERYX.

Decumbent perennial plants with 2-3-pinnatisect, mostly subradical leaves and many-flowered racemes. Flowers small or rather so, 4-10 mm. long, whitish and more or less tinted with yellow; outer petals more or less apically dilated into spreading, suborbicular limbs, little longer than the inner petals, which are conspicuously winged and at most obscurely tipped with dark purple. Fruit small to rather large.

- * Flowers 4-5 mm. long; lower petal not saccate.
! Lower petal gradually dilated apically.
- 8. *R. numidica*. Leaves subdeltoid with remote leaflets. Spur of upper petal very small, straight. Fruit oblong-obovate.

9. *R. Cossonii*. Leaves oval with closer leaflets. Spur of upper petal rather large, curved. Fruit subrotund-obovate.
- !! Lower petal more abruptly dilated apically; spur of upper petal moderate.
10. *R. tenuifolia*. Leaves oblong, with finely cut leaflets. Wings of inner petals not exceeding outer petals. Fruit subrotund.
11. *R. caput-plataleæ*. Leaves subdeltoid, with remote, cuneiform segments. Wings of inner petals much exceeding outer petals. Fruit elliptical.
- ** Flowers 6-10 mm. long; lower petal subsaccate.
12. *R. erosa*. Leaves oblong; leaflets with broad segments. Spur of upper petal rather long. Fruit subrotund, sometimes rather large.

SECTION IV. CALLIANTHOS.

Decumbent perennial plants, usually larger than those of the other sections, with 2-3-pinnatisect, mostly subradical leaves and many-flowered racemes. Flowers large, 12-16.5 mm. long, white or pale purple; outer petals never apically dilated into a spreading, suborbicular limb, little exceeding the inner petals, which are tipped with dark purple; lower petal saccate. Fruit very large to moderate in size.

Subsection AFRICANÆ.

Lobes of leaf-segments relatively narrow. Flowers white.

13. *R. africana*. Leaves subdeltoid, with narrowly oblong lobes. Sepals ovate-lanceolate. Spur of upper petal very long. Fruit of moderate size, obovate-elliptic, shortly mucronate.
14. *R. decipiens*. Leaves deltoid, with subelliptical lobes. Sepals oval. Spur rather long. Fruit very large, obovate, shortly mucronate.
15. *R. platycentra*. Leaves deeply divided, with small, obovate lobes. Sepals orbicular. Spur rather long. Fruit . . . oval-elliptic.
16. *R. cerefolia*. Leaves more decomposed, with small, narrow lobes. Sepals ovate-lanceolate. Spur long. Fruit of moderate size, elliptic, acuminate.
17. *R. speciosa*. Leaves with broadly oblong lobes. Sepals orbicular. Spur short. Fruit . . . lanceolate-obovate, long-mucronate.

Subsection POMELIANÆ.

Lobes of leaf-segments broad. Flowers pale purple.

18. *R. Pomeliana*. Leaf-segments subimbricate, with rounded lobes. Sepals orbicular. Spur very short. Fruit rather large, subrotund-obovate.
19. *R. oranensis*. Leaf-segments with broad lobes but not imbricate. Sepals small, ovate. Spur long. Fruit large, oval-obovate.
20. *R. ochracea*. Leaf-segments not imbricate, with small, obovate lobes. Sepals small, lanceolate. Corolla smaller, with long spur. Fruit narrow, oblong.

SECTIO I. MURICARIA.

Plantæ annuæ, suberectæ. Racemi pauciflori. Flores parvuli, rarius parvi, 4-8 mm. longi, albi; petalis exterioribus quam interiora sæpius fere recta apice planè alata atropurpurea vix longioribus, marginibus eorum apice subpatentibus nonnunquam in limbos suborbiculares dilatatis; stylus

malleiformis lobis divaricatis (an semper?). Fructûs maximi ad modici, sæpius valde compressi, pericarpio quam in sectionibus sequentibus verisimiliter tenuiore præditi.

1. RUPICAPNOS MURICARIA, Pomel, Nouv. Mat. Fl. Atlant. i. 245 (1874).

Fumaria muricaria, Batt. & Trabut, Fl. d'Alger. i. 26 (1888).

(Pl. 14, fig. 1.)

Exsicc. Chevallier, Pl. Saharæ Alger. 1902, No. 397, Ghardaia, ut *Fumaria longipes*!

Rupicapnos, ut videtur, annua, radice longâ et caule suberecto (4–8 cm. alto) brevissime ramoso prædita. Cotyledones in statu foliaceo maximæ, circa 4 cm. longæ, lineari-oblanccolatæ, tenuiter acuminatæ, diu persistentes. *Folia* caulina haud crassa, omnia longissime petiolata, cum petiolo 5–7.5 cm. longa, *deltoidea*, foliolis subtrifidis longiuscule petiolatis et segmentis secundariis in *lucinis parvas oblongas vel lanceolatas* longe mucronatas vel *fere aristatas* irregulariter multifidis *trisecta*. *Racemi* corymbiformes, *pauci-* (2–5-) *flori*, brevissime pedunculati vel *subsessiles*, *foliis plus duplo breviores*. *Bractear* 1–2 mm. longæ, *subulatæ*, tenuiter acuminatæ; *pedicelli fructiferi filiformes*, apice vix incrassati, flexuosi, *ad 15 mm. longi*. *Sepala parva*, circa 1 mm. longa, .5–.6 mm. lata, *ovata* vel *lanceolata*, vix peltata, acuta, *parce dentata* vel subintegra, albida. *Corolla* 7–8 mm. longa, præter carinas virides *alba* vel leviter roseo-tincta; *petalo superiore* apice marginibus latiusculis subpatentibus *anguste oblongo, truncato* obtusissimo vel etiam retuso, *calcure* gracili longo deflexo, [nectario flexuoso longissimo ap. Pomel]; *petalo inferiore* apice marginibus latiusculis patentibus *spathulato, obtusissimo, basi* verisimiliter *obscure saccato*; *petalis interioribus* paulo sursum curvatis apice *plane alatis atropurpureis*. Stylus malleiformis. *Fructûs maximi*, sine rostro 2.75–3 mm. longi et 3–3.25 mm. lati, *subrotundi* sed latiores quam longi, *cum rostro magno* 1.5–2 mm. longo quadrangulato-subulato obtusissimi et inferne subtruncati, valde compressi et acute carinati, pericarpio satis tenui præditi, in sicco (sine apicis foveolis) *carinam versus* subregulariter grosse et acute tuberculato-rugosi vel *muricati*, infra rostrum et ad fructûs medium vix tuberculati.

Hæc *Rupicapnos* distinctissima per folia trisecta, per racemos corymbiformes subsessiles paucifloros et præsertim per fructûs maximos grosse rostratos carinam versus muricatos ab generis omnibus aliis speciebus facile dignoscitur.

R. muricaria Metlili (ap. Pomel), Ghardaia et forsan alios locos in regione Saharæ Algeriensis habitat, ubi in fissuris rupium crescit.

This species is unique in the genus on account of its trisect leaves, its subsessile, 2–5-flowered corymbs, and its very large, long-beaked fruits, muricate only towards their margins. Chevallier's exsiccata, which form the basis of the foregoing description and from which the accompanying plate is

drawn, were presumably referred to *Fumaria longipes*, Cossou, owing to that plant being originally described as an annual with somewhat similar flowers. Their agreement with the account of *R. muricaria* furnished by Pomel is unmistakable.

- [2. *RUPICAPNOS DELICATULA*, Pomel, Nouv. Mat. Fl. Atlant. i. 246 (1874) ; n. v. *Fumaria delicatula*, Batt. & Trabut, Fl. d'Alger. i. 26 (1888).

Rupicapnos annua. Folia foliolis multijidis in lobos sæpius parvos obovatos vel oblongos, obtusos vel subacutos, divaricatos fissis verisimiliter 2-pinnatisecta. Racemi corymbiformes, breves sed floribus pluribus quam in *R. muricaria* præditi. Bractee lanceolatae, acuminatae; pedicelli capillares, apice incrassati. Sepala lanceolata, denticulata. Corolla minima, 4 mm. longa, albida; petalis exterioribus apice dilatatis, calcare superioris brevissimo recto paululum attenuato; nectario brevissimo; petalis interioribus, ut videtur, apice purpureis. Fructus subglobosi, leviter apiculati, parum compressi, siccitate acute tuberculato-rugosi vel muricati.

R. delicatula rupes calciferas ad Ksar-el-Maïam Algeriæ australis habitat.

This plant appears to differ considerably from the other known annual species, and some of its features recall *R. tenuifolia*. Judging from Pomel's knowledge of these plants, however, it is unlikely that he would have confused it with a perennial species, although his diagnosis makes no mention of its different habit; and the species has therefore been provisionally adopted.]

3. *RUPICAPNOS LONGIPES*, Pomel, Mat. Fl. Atlant. 16 (1860) ; Nouv. Mat. Fl. Atlant. i. 245 (1874). *Fumaria longipes*, Coss. & Dur. in Bull. Soc. Bot. Fr. ii. 305 (1855) ; Batt. & Trabut, Fl. d'Alger. i. 26 (1888) ; *F. numidica* var. *longipes*, Coss. Comp. Fl. Atlant. ii. 82 (1883-1887). (Pl. 15, fig. 1.)

Exsicc. Balansa, Pl. d'Algérie, 1853, Mnechounès, near Biskra, in Hb. Mus. Paris (partim), ut *F. longipes* !

Rupicapnos, ut videtur, annua, radice longâ et caule suberecto (5-10 cm. alto) brevissime ramoso prædita. Folia caulina, haud crassa, omnia longe petiolata, cum petiolo 5-12 cm. longa, deltoidea, foliolis infimis breviter petiolatis, reliquis subsessilibus, et segmentis secundariis in lacinias oblongas lanceolatasve acutas irregulariter fissis 2-pinnatisecta subquinata, vel primaria simpliciora pinnata. Racemi corymbiformes, pauci-(3-8-) flori, cum pedunculo (ad 35 mm. longo) foliis multo breviores. Bractee 1-2 mm. longæ, ovales, acutæ, subintegræ; pedicelli fructiferi fere filiformes, apice incrassati, flexuosi, longissimi (usque ad 60 mm. longi). Sepala circa 2 mm. longa, 1 mm. lata, ovalia, peltata, acuta, subintegra vel leviter crenato-dentata, nervo dorsali viridiusculo alba. Corolla

6-8 mm. longa, alba; petalo superiore apice marginibus latis subpatentibus ultra carinæ apicem productis obovato-oblongo, truncato vel retuso, carinâ crassâ, viridi vel purpurascente, calcare longiusculo deflexo; petalo inferiore (quam superius latiore) apice marginibus latis patentibus in limbum suborbicularem obtusissimum vel retusum abrupte dilatatis et carinâ viridi prædito, basi subsaccato; petalis interioribus fere rectis apice plane alatis atropurpureis. Fructûs maximî, sine rostro 3.5 mm. longi, 3 mm. lati, subrhomboidei, cum rostro magno (1 mm. longo), latissimo, striato, quadrangulato, compresso subacuti et inferne attenuati, conspicue compressi et acute carinati, pericarpio satis tenui præditi, siccitate præter rostrum omnino grosse et acute tuberculato-rugosi vel muricati.

R. longipes in fissuris umbrosis rupium ad Mnechounès, prope Biskram, ad Elkantaram (Cosson) et in Montium Aurasiorum regione montanâ inferiore prope Beni Souik (Cosson) in provinciâ Constantinâ Algeriæ invenitur.

This species was originally described by Cosson & Durieu (l. c.) as a *Fumaria*, and was founded on exsiccata collected by Balansa near Biskra and by Gallierand near Beni Souik, both in the southern part of the province of Constantine. The annual nature of the plant and its floral characters were defined in the original description, but no mention was made of its peculiar fruit; and later, in the Compendium, it was reduced by Cosson to a variety of his perennial *F. numidica*. Pomel admitted it as a species, although the actual plant was unknown to him.

The sheet of Balansa's Biskra plant named *Fumaria longipes* in Herb. Mus. Paris contains four specimens, two of which agree with Cosson's diagnosis, so far as it goes, and possess the remarkable fruit described above. From these the foregoing description and the accompanying figure have been taken. The other two specimens, which are not alike, possess somewhat similar foliage but are clearly shown by their widely different fruits to be specifically distinct. These are separated under the names of *R. prætermissa* and *R. sublevis*.

4. RUPICAPNOS PRÆTERMISSA, sp. nov. (Pl. 14, fig. 2.)

Exsicc. Balansa, Pl. d'Alger. 1853, Mnechounès, near Biskra, in Hb. Mus. Paris (partim), ut *Fumaria longipes*!

Rupicapnos annua, habitu foliisque *R. longipedis* sed, ut videtur, planta minor. Racemi corymbiformes, pauci-(3-5-)flori, cum pedunculo (sub-20 mm. longo) foliis plus duplo breviores. Bractee 1-1.5 mm. longæ, oblongæ, apice truncatæ sæpius tridentatæ; pedicelli fructiferi filiformes apice paululum incrassati, flexuosi, usque ad 30 mm. longi. Sepala circa 1 mm. longa, .75 mm. lata, suborbicularia, peltata, subacuta, irregulariter crenato-dentata, alba. Corolla 6-7 mm. longa, alba; petalo superiore apice marginibus latiusculis subpatentibus oblongo, truncato emarginatove, carinâ crassâ purpurascente, calcare gracili longiusculo deflexo; petalo inferiore apice marginibus latiusculis

patentibus *spathulato*, *obtusissimo* vel *retuso*, *carinâ* *viridi* *prædito*, *basi* *verisimiliter subsaccato*; *petalis interioribus* fere *rectis* *apice modice alatis atropurpureis*. *Fructûs majusculi*, cum *rostro* 3 mm. *longi*, 2-2.25 mm. *lati*, *ovato-elliptici*, *superne* in *rostrum* *latiusculum compressum angustati subacuti*, *inferne* *abrupte angustati* (*haud attenuati*), *valde compressi et acute carinati*, *siccitate omnino tuberculato-rugulosi*.

Hæc species *R. longipedi* plane affinis est, sed per *pedicellos fructiferos* *subduplo breviores* cum *bracteis truncatis*, per *sepala minora magis dentata*, per *corollas angustiores* et per *fructûs subduplo minores, læviores*, *inferne* *haud attenuatos* *satis differt*.

R. prætermissa in *fissuris umbrosis rupium* ad *Mnechounès* *prope Biskram*, in *provinciâ Constantinâ Algeriæ*, ubi cum *R. longipede* *crescit*, a *cl. Balansa* *inventâ* est.

This rare and obscure plant has been described and figured from the single specimen included in Balansa's sheet of *Fumaria longipes* in Herb. Mus. Paris, to which reference has already been made. Its points of distinction from *R. longipes* were apparently overlooked both by Balansa and by Cosson, owing probably to the similarity of its foliage and the inconspicuous nature of its few-flowered clusters of small, pale flowers. It appears to possess, however, a number of minor differences in addition to the widely divergent fruit.

5. RUPICAPNOS SUBLÆVIS, sp. nov. (Pl. 15, fig. 2.)

Exsicc. Balansa, Pl. d'Alger. 1853, Mnechounès, near Biskra, in Hb. Mus. Paris (partim), ut *Fumaria longipes*!

Rupicapnos *verisimiliter annua*, *caule suberecto* (*circa* 4 cm. *alto*) *brevissime ramoso prædita*. *Folia* *pleraque caulina*, *haud crassa*, *longe petiolata*, cum *petiolo subalato* 4-6 cm. *longa*, *ovalia* vel *subdeltoidea*, *foliolis* *infinis subpetiolatis reliquis sessilibus omnibus paulo confertis*, et *segmentis secundariis in laciniis lanceolatis acutis irregulariter fissis 2-pinnatisecta subquinata*. *Racemi corymbiformes, pauci-(4-8-) flori*, cum *pedunculo* (*ad* 15 mm. *longo*) *foliis subduplo breviores*. *Bracteæ* 1.5-2 mm. *longæ, oblongæ, acutæ*, *interdum apice sparsim dentatæ*; *pedicelli fructiferi filiformes* *apice incrassati, flexuosi, usque ad* 40 mm. *longi*. *Flores* *haud visi*. *Fructûs modici*, cum *rostro* 3 mm. *longi*, 1.75-2 mm. *lati, anguste obovati*, *superne* in *rostrum parvulum breviter angustati, subacuti*, *inferne* *multo attenuati, satis compressi et plane carinati, siccitate infra-rostrum omnino leviter tuberculato-rugulosi*.

Hæc species, *cujus flores non visi sunt*, *habitu ad R. longipedem accedit* sed *folia ut in R. Cossonii* *fissa et fructûs rugulosos modicos nec maximos monstrat*. *R. prætermissa* *pedicellis brevioribus, bracteis truncatis, fructibus magis compressis ovato-ellipticis potius quam obovatis etiam differt*.

R. sublaevis in fissuris rupium ad Mnechounès prope Biskram in provincia Constantinâ Algeriæ, ubi cum *R. longipede* et *R. prætermisâ* crescit, invenitur.

The diagnosis of this rare plant is taken from the solitary example on Balansa's sheet of *Fumaria longipes* in Herb. Mus. Paris, which unfortunately now shows no flowers. Except for the slightly winged petioles, its foliage bears a resemblance to that of *R. Cossonii* rather than *R. longipes*, and its narrow, finely rugose fruit is very distinct.

SECTIO II. SARCOCAPNOIDES.

Plantæ perennes, decumbentes. Racemi multiflori. Flores parvi vel parvuli, 4–10 mm. longi, albi vel rosco-albidi; petalis exterioribus quam interiora fere recta apice modice alata atropurpurea conspicue longioribus et latoribus, in limbos patentes suborbiculares apice dilatatis ut in genere *Sarcocapnos*; stylus fere malleiformis lobis curvatis subpatentibus. Fructûs parvi.

6. RUPICAPNOS SARCOCAPNOIDES, Pomel, Mat. Fl. Atlant. 16 (1860); Nouv. Mat. Fl. Atlant. i. 245 (1874). *Fumaria sarcocapnoides*, Coss. & Dur. in Bull. Soc. Bot. Fr. ii. 306 (1855); *F. numidica* subvar. *sarcocapnoides*, Coss. Comp. Fl. Atlant. ii. 82 (1883–1887). (Pl. 16.)

Esicc. Balansa, Pl. d'Alger. 1853, No. 995, in Hb. Mus. Paris (partim), ut *Fumaria corymbosa*!

Rupicapnos perennis sed probabiliter a primo anno florens, caudice brevi crassiusculo ramoso decumbente et caulibus brevissimis prædita. Folia pleraque subradicalia, plus minusve glauca, haud crassa, 6–10 cm. longa (petiolo incluso), longe petiolata, oblongo-deltoidæa, foliolis breviter petiolatis trifido-flabellatis et segmentis secundariis in lobos oblongo-ellipticos subacutos irregulariter fissis quinato-pinnata. Racemi corymbiformes, circa 20-flori, sæpe furcati, cum pedunculo gracili foliis subduplo breviores. Bractee circa 1.5 mm. longæ, late ovales, cuspidatæ, apice dentatæ; pedicelli fructiferi capillares apice paululum incrassati flexuosi, infimi usque ad 25 mm. longi. Sepala circa 1 mm. longa, .75 mm. lata, late ovata vel suborbicularia, peltata, acuta, dentata, alba. Corolla minima, 4–5 mm. longa, carinis crassis viridibus alba; petalis exterioribus quam interiora multo (saltem 1 mm.) longioribus et latoribus, superiore marginibus latissimis patentibus ultra carinæ apicem productis apice in limbum magnum suborbicularem vel sæpius obcordatum dilatato, calcare brevi (1 mm. longo) obovato recto; inferiore, ut superius, apice in limbum patentem suborbicularem dilatato, basi haud saccato; petalis interioribus rectis apice plane dilatatis modice alatis atropurpureis. Stylus fere malleiformis lobis curvatis subpatentibus. Fructûs parvi, sine mucrone circa 2 mm. longi et 1.5 mm. lati, oblongo-obovati, cum mucrone brevi obtusi

et inferne multo angustati, satis compressi et plane carinati, siccitate omnino *dense tuberculato-rugulosi*.

Hæc species distinctissima per petala exteriora interioribus longiuscule longiora et latiora affinitatem conspicuam cum genere *Sarcocapnos* monstrat sed fructum monospermum tuberculatum generis *Rupicapnos* habet.

R. sarcocapnoides regionem montanam Algeriæ australis in provinciâ Constantinâ (Djebel Tougour prope Batnam) habitat, ubi in fissuris rupium crescit.

This plant was originally described by Cosson in 1855 from a specimen observed among the exsiccata sent out by Balansa under the number 995 and otherwise referred to *Fumaria numidica*, Cosson noting that the plant constitutes a true passage between the genera *Fumaria* and *Sarcocapnos* owing to the form of its corolla. Later, however, in *Illustr. Fl. Atlant.* i. 15 (1882), Cosson remarks that *F. sarcocapnoides* appears to be a shade-form only of *F. numidica*, adding that shade-forms of *Sarcocapnos* similarly deviate from the type; and in the *Compendium* it becomes a sub-variety of *F. numidica*. It is not easy to understand how shade-conditions could transform the corolla-characters of *F. numidica* into those of *F. sarcocapnoides*, developing the margins of the outer petals while rendering depauperate the wings of the inner ones, and as moreover it is not only in their flowers that the two plants differ, the earlier view of Cosson is here followed.

R. sarcocapnoides seems to be a very rare plant, and it is not known to have been collected except by Balansa, from whose specimen at Paris the above diagnosis is taken and the accompanying figure drawn. It was unknown to Pomel, who adopted the species from Cosson.

[7. *RUPICAPNOS REBOUDIANA*, Pomel, *Nouv. Mat. Fl. Atlant.* fasc. ii. 379 (1876); n. v. *Fumaria Reboudiana*, Batt. & Trabut, *Fl. d'Alger.* i. 26 (1888).

Rupicapnos perennis, fragilis, *R. sarcocapnoidi* affinis. *Folia* viridia, foliolis in *segmenta cuneiformia* vel oblonga, *obtusa* fissis *quinato-pinnata*. *Bractee oblongæ*; pedicelli apice incrassati. *Sepala obovata* vel suborbicularia, *valde dentata*. *Corolla* 9–10 mm. *longa, roseo-albida*; *petalis exterioribus* marginibus latis patentibus in *limbos suborbiculares retusos dilatatis*, superioris *calcare obovato longiusculo, inferioris basi valde saccatâ*; *petalis interioribus apice atropurpureis* haud conspicue alatis. *Fructûs parvi, obovati, breviter mucronati*, in sicco *tuberculato-rugosi*.

R. Reboudiana rupes ad Bou-Taleb (Reboud) Algeriæ australis habitat.

This plant appears distinct from Pomel's brief description, and is retained as a species although no material of it has been seen. It is evidently, as stated by Pomel, a relatively large-flowered ally of *R. sarcocapnoides*.]

SECTIO III. TRIPTERYX.

Plantæ perennes decumbentes. Racemi multiflori. Flores parvi vel parvuli, 4–10 mm. longi, albidī, plus minusve luteo-tincti; petalis exterioribus quam interiora fere recta apice ut interdum exteriora superant conspicue alata, haud atropurpurea (nisi interne vel brevissime ad apicem ipsum) vix longioribus, marginibus eorum apice patentibus sæpe in limbos suborbiculares dilatatis; stylus furcæformis lobis adscendentibus. Fructûs parvi ad majusculi.

8. RUPICAPNOS NUMIDICA, Pomel, Mat. Fl. Atlant. 16 (1860), ex parte; Nouv. Mat. Fl. Atlant. i. 243 (1874). *Fumaria numidica*, Coss. & Dur. in Bull. Soc. Bot. Fr. ii. 306 (1855), ex parte; Coss. Illustr. Fl. Atlant. i. 15 (1882), ex parte; Comp. Fl. Atlant. ii. 81 (1883–1887), ex parte; Batt. & Trabut, Fl. d'Alger. i. 25 (1888), ex parte. (Pl. 9, fig. 6.)

Exsicc. Cosson, Constantine, 1853, in Hb. Mus. Paris, ut *F. numidica*! Choulette, Fragm. Fl. Alger. Constantine, 1855, in Hb. Kew, ut *F. numidica*! Soc. Dauph. No. 285, Constantine, 1874, Dr. Reboud!

Rupicapnos perennis sed interdum a primo anno florens, caudice brevi crassiusculo ramoso decumbente tandem vestigiis petiolorum emarcidorum donato et caulibus brevissimis prædita. *Folia* pleraque subradicalia, crassiuscula, glaucescentia, 6–15 (raro ad 25) cm. longa (petiolo incluso), longe petiolata, *subdeltoidea*, foliolis 2–3-paribus haud confertis breviter petiolatis et segmentis secundariis in *lacinias* satis remotas *oblongas* vel *cuneatas obtusas* sæpe leviter mucronatas irregulariter fissis *2–3-pinnatisecta*. *Racemi* corymbiformes, densi, *multi*-(20–30-) *flori*, breviusculi, cum pedunculo (ad 4 cm. longo) *foliis saltem subduplo breviores*. *Bracteæ* 1–1.5 mm. longæ, *lanceolatæ*, acuminatæ, obscure denticulatæ; *pedicelli fructiferi fere capillares* apice incrassati flexuosi *infimi usque ad 25 mm. longi*. *Sepala* circa 1.5 mm. longa, .75 mm. lata, *oblongo-lanceolata*, peltata, acuta, basin versus *parce dentata*, albida. *Corolla minima*, circa 4 mm. (4–5 mm. ap. Pomel) *longa*, carinis viridibus vel lutescentibus *albida*; *petalo superiore* apice marginibus latiusculis subpatentibus *oblongo* vel anguste obovato, *obtusissimo* vel truncato, *calcare* minimo *brevissimo* (vix 1 mm. longo) recto; *petalo inferiore* apice marginibus latis patentibus sensim dilatato *cuneato-obovato obtusissimo*, *basi haud saccato*; *petalis interioribus* fere rectis apice *alâ latâ* lutescente rotundatâ inter petalorum exteriorum margines quos paululum superat subpatulâ præditis *obscure atropurpureis*. *Fructûs modici*, sine mucrone 2.75 mm. longi, 2 mm. lati, *oblongo-obovati* (obovati ap. Pomel), *cum mucrone brevi obtusissimi* et inferne attenuati, satis compressi et plane carinati, siccitate omnino *dense tuberculato-rugosi*.

R. numidica quæ per flores minimos apice dilatatos brevissime calcaratos

facile distinguenda est, in Algeriâ rupes calciferas prope urbem Constantinam et forsan alios locos habitat.

Pomel is here followed in restricting the *Fumaria numidica* of Cosson, which includes several distinct plants collected in different Algerian stations, to the form growing in the neighbourhood of Constantine, the first locality cited by Cosson in his original diagnosis of *F. numidica*.

There is a flowerless specimen of this plant in Herb. Kew, collected by Bové at Constantine in September, 1839, in which the leaves are more than 25 cm. in length.

9. *RUPICAPNOS* COSSONII, sp. nov.

Fumaria numidica, Coss. & Dur. in Bull. Soc. Bot. Fr. ii. 306 (1855), ex parte; Coss. Illustr. Fl. Atlant. i. 15 (1882), ex parte; Comp. Fl. Atlant. ii. 81 (1883-1887), ex parte; Batt. & Trabut, Fl. d'Alger. i. 25 (1888), ex parte.

Icon Cosson, Illustr. Fl. Atlant. i. tab. 9, figs. 1-11, ut *F. numidica*.

Esicc. Balansa, Pl. d'Alger. 1853, No. 995, in Hb. Mus. Paris (partim), Hb. Kew, Hb. Mus. Brit. et Hb. Manchester, ut *F. corymbosa*!

Rupicapnos perennis, caudice brevi crasso ramoso decumbente tandem vestigiis petiolorum emarcidorum donato atque caulibus brevissimis vel fere nullis prædita. *Folia* pleraque radicalia, crassa, plus minusve glauca, cum petiolo 5-10 cm. longa, longe petiolata, *oblonga vel ovalia*, foliolis (2-3-paribus) satis confertis, breviter petiolatis vel supremis subsessilibus, et segmentis secundariis in *lacinias* subdivaricatas *oblongas obtusas* obscure mucronatas *vel acutiusculas* irregulariter fissis 2-3-pinnatisecta. *Racemi* subcorymbiformes, multi-(15-30-) *flori*, pedunculis paulo breviores, cum pedunculo (ad 5 cm. longo) *folia suberquant* vel in formis umbrosis breviores. *Bractæ* 1-1.5 mm. longæ, lanceolata, acutæ vel acuminatæ, parce serrulatæ; *pedicelli fructiferi graciles* (fere filiformes), *anguste clavati*, apice incrassati, flexuosi, *infimi usque ad 25 mm. longi*. *Sepala* 1-1.5 mm. longa, .5-1 mm. lata, *ovalia vel ovata*, peltata, subacuta, plus minusve crenato-dentata, nervo dorsali viridiusculo albida. *Corolla parva*, 4-5 mm. longa, haud gracilis, præter carinas virescentes albida; *petalo superiore* apice marginibus latiusculis patentibus *anguste obovato obtusissimo* vel etiam retuso, *calcare satis longo* adscendente paululum curvato; *petalo inferiore* lato marginibus latis patentibus apice sensim dilatato *cuneato-obovato obtusissimo* (apice quàm petalum superius paulo latiore), *basi haud saccato*; *petalis interioribus* fere rectis apice vix coalitis *alâ latâ* lutescente præsertim ad apicem dilatatâ inter petalorum exteriorum margines quos paulo superat subpatulâ præditis verisimiliter interne et apice ipso brevissime purpureo-tinctis. *Stylus* furcæformis. *Fructûs modici*, sine mucrone 2-2.5 mm. longi, 1.75-2 mm. lati, *subrotundo-obovati* vel obovati, cum mucrone distincto *obtus*, plane compressi et valde carinati, siccitate omnino dense *tuberculato-rugosi* submuricati.

Hæc species *R. numidica* affinis est sed foliolis laciniisque minus remotis, racemis relative longioribus, pedicellis crassioribus, corollis majoribus longius calcaratis, fructibus cum mucrone longiore latioribus differt.

R. Cossonii fissuras rupium ad Djebel-Tougour, prope Batnam, in provinciâ Constantinâ Algeriæ habitat.

Cosson's original *Fumaria numidica* is partly founded on this plant and the plate in his 'Illustrationes Floræ Atlanticæ' is evidently drawn from it. As Pomel, however, has adopted this specific epithet for the form found at Constantine, and Balansa's plant from Batna appears to be an essentially distinct species with several points of difference, a new name becomes necessary, and it therefore seems fit to commemorate Cosson, who was the first to distinguish and describe the small-flowered species of the genus.

10. RUPICAPNOS TENUIFOLIA, Pomel, Nouv. Mat. Fl. Atlant. i. 244 (1874).

Fumaria tenuifolia, Batt. & Trabut, Fl. d'Alger. i. 26 (1888);

F. numidica, Coss. Comp. Fl. Atlant. ii. 81 (1883-1887), ex parte.

Exsicc. Bourgeau, Pl. d'Alger. 1856, No. 243, ut *F. numidica*!

Rupicapnos perennis caudice brevi crassiusculo ramoso decumbente et caulibus brevissimis ut in *R. Cossonii*. Folia pleraque radicalia, vix crassiuscula, plus minusve glauca, cum petiolo longo gracilissime 5-20 cm. longa, anguste oblonga, foliolis sæpius 3-paribus breviter petiolatis et segmentis secundariis (interdum subflabellatis) in laciniis confertas lineari-oblongas, vel oblongas in foliis primariis, acutas vel obtusiusculas (parvas obovatas obtusas ap. Pomel) irregulariter fissis 2-3-pinnatisecta. Racemi corymbiformes, densiusculi, multi-(20-40-) flori (pauciflori ap. Pomel), cum pedunculo gracili (ad 5 cm. longo) foliis subduplo breviores nisi in formis nanis. Bractee 1-1.5 mm. longæ, oblongæ, acuminatæ; pedicelli fructiferi capillares apice incrassati flexuosi infimi ad 20 mm. longi. Sepala circa 1.5 mm. longa, 5-7.5 mm. lata, lanceolata (ovata ap. Pomel), vix peltata, acuta, parce denticulata, albida. Corolla minima, 4-4.5 mm. longa, præter carinas lutescentes vel virescentes albida; petalo superiore apice marginibus latis patentibus in limbum suborbicularem obtusissimum dilatato, calcare breviusculo satis gracili fere recto sed apice dilatato, [nectario paulo arcuato calcar medium attingente ap. Pomel]; petalo inferiore apice marginibus latis in limbum suborbicularem obtusissimum vel truncatum abrupte dilatato, basi haud saccato; petalis interioribus fere rectis apice alâ latâ lutescente rotundatâ patulâ petalorum exteriorum margines subæquante præditis haud atropurpureis. Fructus parvi, sine mucrone 1.75-2 mm. longi, 1.5-1.75 mm. lati, subrotundi vel subrotundo-obovati (obovati ap. Pomel), cum mucrone gracili obtusissimi, paululum compressi et obscure carinati, siccitate omnino dense tuberculato-rugosi.

Hæc species duabus præcedentibus (*R. numidica* et *R. Cossonii*) affinis est, sed per folia graciliora magis dissecta, per petala exteriora in limbos

suborbiculares dilatata et per fructûs minores gracile mucronatos separanda est.

R. tenuifolia regionem montanam Algeriæ australis in provinciâ Oranensi ad Itimam (Pomel), prope Stitten et forsan ad alios locos habitat.

The diagnosis of *R. tenuifolia* has been taken from Bourgeau's exsiccata at Kew and in Herb. Manchester, which, while differing in some particulars from Pomel's original description, as indicated, seem to be essentially conspecific although perhaps varietally separable. The relationship of the two forms is indeterminable in the absence of authentic material of the Itima plant seen by Pomel, which appears to differ chiefly by its broader leaf-segments, fewer-flowered racemes, broader sepals, and less rotund fruits.

11. RUPICAPNOS CAPUT-PLATALEÆ, Pomel, Nouv. Mat. Fl. Atlant. i. 244 (1874). *Fumaria caput-plataleæ*, Batt. & Trabut, Fl. d'Alger. i. 25 (1888). (Pl. 9, fig. 7.)

Exsicc. Murbeck, Iter Alger.-Tunetanum, 1896, Dyr-el-Kef, Tunetia media, in Hb. Mus. Brit., ut *F. numidica* var. *longipes* !

Rupicapnos perennis, glauca, caudice crassiusculo et caulibus abbreviatis ut in *R. numidicâ*. Folia pleraque subradicalia, crassa, cum petiolo longissimo 10-15 cm. longa, *subdeltoidea*, foliolis flabellatis infimis petiolatis reliquis sæpius fere subsessilibus in *segmenta* remota *cuneiformia* vel obovata *obtusissima* rarius obscure mucronata fissis *irregulariter* 2-pinnatisecta *subquinata*. Racemi primo corymbiformes cito elongati, densi, *conspicue* multi-(30-50-) *flori*, cum pedunculo ad 8 cm. longo folia paulo *superantes* vel parum breviores. Bractee 1-1.5 mm. longæ, *lineari-lanceolatæ*, acuminatæ, subintegre; *pedicelli fructiferi filiformes* apice incrassati longissimi (infimi usque ad 50 mm. longi). Sepala circa 2 mm. longa, 1-1.5 mm. lata, ovata, peltata, acuminata, *integruscula* vel basi parce dentata, albida. Corolla parva, 4-5 mm. longa, præter carinas virescentes albida; petalo superiore apice marginibus latis patentibus late obovato vel suborbiculari truncato vel obtusissimo, *calcare breviusculo* fere recto, [nectario brevissimo calcar vix ineunte ap. Pomel]; petalo inferiore apice marginibus latissimis patentibus in limbum suborbicularem truncatum dilatato, basi haud saccato; petalis interioribus fere rectis apice alâ latissimâ lutescente rotundatâ in spatulæ formâ inter petalorum exteriorum margines quos longe superat patente præditis interne obscure atropurpureis. Fructûs mediocres, sine mucrone circa 2.25 mm. longi et 2 mm. lati, fere elliptici, cum mucrone obtusiusculi, satis compressi sed parum carinati, siccitate omnino dense tuberculato-rugosi.

R. caput-plataleæ valde *R. numidicæ* affinis, sed per alarum latitudinem in petalis interioribus quæ petalorum exteriorum margines longe superant mirabilis est. Foliorum segmentis cuneiformibus obtusioribus, racemis

conspicue multifloris cum pedicellis fructiferis ad 50 mm. longis et fructibus ellipticis ab hujus sectionis speciebus aliis insuper differt.

Hæc species ad El Ghicha in regione montanâ Djebel Amour Algeriæ australis (Pomel) primum inventa est atque prope Dyr-el-Kef Tunetiæ mediæ et forsân in aliis locis crescit.

This remarkable plant has been described from Murbeck's exsiccata in Herb. Mus. Brit., collated with the diagnosis of Pomel, with which it substantially agrees. The fanciful name "*caput-plataleæ*" or "spoonbill's head" is perhaps not inapt owing to the great apical dilation of the inner petals.

Murbeck's reference of his exsiccata to *Fumaria numidica* var. *longipes*, Cosson, is probably due to the great length of the fruiting pedicels, which characterizes this plant in common with *R. longipes*. In every other respect, however, *R. caput-plataleæ* is widely different from the annual species distinguished by Cosson.

12. RUPICAPNOS EROSA, Pomel, Nouv. Mat. Fl. Atlant. i. 243 (1874).

Fumaria erosa, Batt. & Trabut, Fl. d'Alger. i. 26 (1888); *F. numidica*, Coss. & Dur. in Bull. Soc. Bot. Fr. ii. 306 (1855), ex parte; Coss. Illustr. Fl. Atlant. i. 15 (1882), ex parte; Comp. Fl. Atlant. ii. 81 (1883-1887), ex parte.

Exsicc. Kralik, Pl. Alger. 1858, No. 3, ut *F. numidica*! Paris, Iter Bor.-Afric. 1886, No. 10, ut *F. numidica*! Chevallier, Pl. Saharæ Alger. 1897, No. 147, ut *F. numidica*!

Rupicapnos perennis *R. numidica* habitu sed caulibus nonnunquam crassioribus. Folia pleraque subradicalia, crassiuscula, glaucescentia, cum petiolo longo 3-15 cm. longa, *oblonga*, foliolis (vulgo 3-paribus) sæpius brevissime petiolatis et segmentis secundariis in lobos obovatos vel rotundatos *obtusissimos* (vix mucronatos) divaricatos sæpe incisos aut rarius oblongos subacutos fissis (pinnulis subflabellatis et earum lobis sæpe alternantibus) *irregulariter 2-3-pinnatisecta*. Racemi corymbiformes, 10-20-flori, cum pedunculo 2-5 cm. longo foliis multo breviores vel in formis apricis nanis folia subæquantes. Bractææ 1-1.5 mm. longæ, *lineari-lanceolata*, acuminatæ; *pedicelli fructiferi filiformes* apice abrupte incrassati flexuosi infimi *usque ad 25 mm. longi*. Sepala 1.5-2.5 mm. longa, 1-1.5 mm. lata, *ovata* vel *oblonga*, peltata, acuminata, plus minusve *dentata*, albida. Corolla 6-10 mm. longa, quam in hujus sectionis aliis speciebus relative angustior, præter carinas crassas apicem haud attingentes lutescentes vel pallide virescentes *alba*; *petalo superiore* apice marginibus latiusculis patentibus *oblongo-obcordato retuso*, *calcare longiusculo* deflexo ad basin angustato; *petalo inferiore* marginibus latis patentibus *in limbum suborbicularem retusum* abrupte dilatato, *basi obscure subsaccato*; *petalis interioribus* fere rectis apice *alâ latâ* lutescente præsertim ad apicem dilatatâ angulatâ subpatulâ petalorum exteriorum

margines subæquante præditis verisimiliter interne nec externe purpureo-tinctis. Fructûs parvuli, sine mucrone 2-2.25 mm. longi et circa 2 mm. lati, subrotundo-obovati vel subrotundi, cum mucrone breviusculo quadrangulato obtusissimi et inferne in stipitem obscurum angustati, paulo compressi et plane carinati, siccitate omnino dense tuberculato-rugosi.

β. major, var. nov.

Æsicc. Clary, no. 33, Ghada de Ghernenta, 1888, in Hb. Mus. Paris, ut *Fumaria numidica* (*Rupicapnos erosa*, Pomel)!

Planta multo major habitu laxiore. Folia haud crassa, viridia, cum petiolo longo gracili 20-30 cm. longa, subquinata. Racemi densi, multi-(15-30-) flori, cum pedunculo (ad 8 cm. longo) folia subduplo breviores. Bractee minimæ, circa 1 mm. longæ, ovato-lanceolatur, acuminatæ, obscure denticulatæ; pedicelli fructiferi capillares, apice incrassati, infimi ad 40 mm. longi. Sepala parva, 1-1.5 mm. longa, .75-1 mm. lata, acuta. Corolla 8-10 mm. longa. Fructûs majusculi, sine mucrone circa 2.5 mm. longi et 2.75 mm. lati, subrotundi, siccitate grosse et dense tuberculato-rugosi. Aliter ut in typo.

Hæc planta ab hujus sectionis aliis speciebus per foliorum 2-3-pinnatisectorum lobos latos divaricatos, per corollas angustiores pallidiores multo majores calcare longiore petaloque inferiore subsaccato præditas, et per fructûs subrotundos breviter mucronatos distinguenda est.

R. erosa regionem montanam Djebel Amour Algeriæ australis prope El Beida (ap. Pomel) et ad Laghouat habitat; varietas *major* hactenus ad Ghada de Ghernenta solum inventa est.

The oldest specimens of this plant, collected at Laghouat by Kralik, and also others in Herb. Kew received from Reboud, are late gathered and more or less exhausted individuals bearing small flowers, but are none the less clearly conspecific with the much finer examples obtained more recently in the same district by Paris and Chevallier. It is noteworthy that the foliage of the weaker plants shows relatively narrow and acute segments.

The variety *major* is a much larger plant, with finer flowers, almost recalling the section *Callianthos*. It appears, however, to possess all the essential features of the Laghouat form, except that its bracts and sepals are smaller and broader.

SECTIO IV. CALLIANTHOS.

Plantæ perennes decumbentes eis sectionum aliarum vulgo majores. Racemi multiflori. Flores magni, 12-16.5 mm. longi, albi vel pallide purpurei; petalis exterioribus quam interiora apice sursum curvata modice alata atropurpurea vix longioribus, marginibus eorum apice deflexis patentibus vel sursum recurvatis in limbos suborbiculares nunquam dilatatis; stylus malleiformis lobis divaricatis. Fructûs modici ad maximi,

SUBSECTIO **AFRICANÆ.**

Foliorum lobi relative angusti. Flores albid.

13. RUPICAPNOS AFRICANA, sp. nov. (non *R. africana*, Pomel).

Fumaria africana, Lamarek, Encycl. ii. 569 (1788); Coss. & Dur. in Bull. Soc. Bot. Fr. ii. 305 (1855), ex parte; Coss. Comp. Fl. Atlant. ii. 80 (1883-1887), ex parte; *F. corymbosa*, Desfontaines in Act. Soc. Hist. Nat. Paris, i. 26 (1792), et Fl. Atlant. ii. 124 (1800), non *F. corymbosa*, Hammar; *Rupicapnos graciliflora*, Pomel, Nouv. Mat. Fl. Atlant. i. 241 (1874); *Fumaria graciliflora*, Batt. & Trabut, Fl. d'Alger. i. 25 (1888).

Icon. Desfontaines, l. c. i. tab. 6, ut *F. corymbosa*.

Exsicc. Bourgeau, Pl. d'Alger. 1856, No. 181, Nedroma, in Hb. Mus. Paris (fructibus plerisque exclusis) et in herb. aliis (partim), ut *F. africana*!

Rupicapnos perennis, caudice crassiusculo ramoso decumbente sæpe paulo elongato tandem vestigiis petiolorum emarcidorum donato caulibusque semper brevibus. *Folia* pleraque subradicalia, plus minusve glaucescentia, 10-25 cm. longa (petiolo gracilimente incluso), longe petiolata, oblongo-deltoidæa, foliolis ambitu fere ovatis vulgo breviter petiolatis et segmentis secundariis subflabellatis in *laciniis oblongas* vel lineari-oblongas *acutas* rarius obtusas mucronatas irregulariter fissis 2-pinnatisecta subquinata. *Racemi* corymbiformes, 15-20-flori, cum pedunculo (ad 6 cm. longo) foliis subduplo breviores. *Bractee* 1.5-2.5 mm. longæ, lanceolatae, tenuiter acuminatae (denticulatae ap. Pomel); *pedicelli fructiferi filiformes* apice incrassati, infimi ad 50 mm. longi. *Sepala* circa 3 mm. longa, 2 mm. lata, ovalia vel ovato-lanceolata, peltata, acuminata, leviter dentata vel ad basin dentibus angustissimis sublacinata (subintegra ap. Pomel), præter nervum dorsalem latum viridiusculum albida. *Corolla* maxima, 14-16 mm. longa, gracilis, carinis viridibus albida; *petalo superiore* apice marginibus parum dilatatis subpatentibus vel deflexis nonnunquam leviter purpureo-tinctis anguste oblongo obtusissimo, calcare longo (circa 5 mm.) deflexo basi angustato apice rotundato, [nectario longissimo haud incurvato ap. Pomel]; *petalo inferiore* marginibus patentibus apice vix dilatatis lineari-oblongo, obtusiusculo, ad basin ipsam inconspicue (valde ap. Pomel) gibboso-saccato; *petalis interioribus* apice sursum curvatis modice alatis atropurpureis. *Stylus* malleiformis. *Fructus* modici, sine mucrone circa 2.5 mm. longi, 2 mm. lati, obovato-elliptici (elongato-elliptici ap. Pomel), cum mucrone brevissimo obtusissimi vel obtusi, inferne in stipitem angustum obscurum breviter angustati, paulo compressi et acute carinati, siccitate omnino tenuiter tuberculato-rugosi.

Hæc species prope Mascaram (Desfontaines) et in rupibus dolomiticiis ad Nador prope Tiaret (Pomel) in parte orientali atque prope Tlemcen (Desfontaines) et ad Nedromam in parte occidentali provinciæ Oranensis

in Algeriâ crescit; etiam in locis aliis hujus provinciæ sine dubio videnda est.

This plant was discovered by Desfontaines prior to 1788 near Tlemcen and Mascara, and specimens of it were brought to France for cultivation. Its earliest description appears in Lamarck's Encyclopedia under the name of *Fumaria africana*, and four years later it was re-described by its discoverer as *F. corymbosa*. Both of the descriptions are in some detail and in virtual agreement, and with these and Desfontaines' very fair figure, the diagnostic characters of the species can be determined with some accuracy. The plant is evidently one with rather finely cut leaf-segments, ovate sepals, slender whitish corolla with a long spur, and slightly pointed fruits. It is not known whether any original specimen of Lamarck's or Desfontaines' is now in existence.

In 1855 Cosson, in establishing the section *Petrocapnos* of *Fumaria*, again briefly describes this species, but extends its definition to include the purple-flowered plant occurring about Oran; and Hammar, in his Monograph of *Fumaria*, bases his description on the Oran form.

In Pomel's revision of his genus *Rupicapnos* (Nouv. Mat. Fl. Atlant. i. p. 240) six species of this group are established, and the name *R. africana*, with which *Fumaria africana* Lamarck is identified, is restricted to a purple-flowered form, characterized by very broad leaf-segments, large, orbicular sepals, and a very short spur to the upper petal. This plant is said to grow at Garrouban, Tlemcen, Gorges de la Tafna, Nedroma, and Oran, Tlemcen being one of Desfontaines' stations. Only one undoubted example of Pomel's plant, however, obtained in the first-named of these localities, has come under observation, the exsiccata examined from Tlemcen, Nedroma, and Oran being clearly different.

It is not easy to see what led Pomel to apply the epithet *africana* to this apparently uncommon purple-flowered form rather than to Desfontaines' white-flowered plant, but it is likely that when Pomel's account of these plants was written, he had not been able to consult the works of Lamarck and Desfontaines, a reference to which would have shown the distinctness of the original *F. africana* from the form to which he restricted this specific name.

As Article 48 of the current Rules of Nomenclature requires that original specific epithets must be retained (or restored) for the species to which they were first given, it becomes necessary reluctantly to differ from Pomel and to regard his *Rupicapnos africana* as a stillborn name, transferring it to the plant originally described by Lamarck. This appears to be conspecific with Pomel's *R. graciliflora*.

The above diagnosis of this species is based on Bourgeau's sheet of *F. africana* from Nedroma (No. 181) in Herb. Mus. Paris (excluding the detached fruits, which are a mixture), together with the small examples on the sheets of the same set in Herb. Manchester, Herb. Kew, and Herb.

Mus. Brit. These have been collated with the original accounts of *Fumaria africana*, *F. corymbosa*, and *Rupicapnos graciliflora* by Lamarek, Desfontaines, and Pomel respectively.

The admixture of this species and of the purple-flowered Oran form on Bourgeau's sheets of *F. africana* may be taken as evidence that these two plants grow in company at Nedroma, as has already been seen sometimes to happen in the case of some of the small-flowered species.

14. *RUPICAPNOS DECIPIENS*, sp. nov.

Fumaria corymbosa, Boissier, Voy. Bot. Esp. ii. 19 (1839-1845), non Desfontaines; *F. africana*, Willkomm & Lange, Fl. Hisp. iii. 878 (1880), non Lamarek; Coss. Comp. Fl. Atlant. ii. 80 (1883-1887), ex parte.

Exsicc. Huter, Porta & Rigo, Iter Hisp. 1879, No. 516, ut *F. africana* ! Reverchon, Pl. d'Andalousie, 1890, Grazalema, ut *F. africana* ! Porta & Rigo, Iter IV Hisp. 1895, No. 23, ut *F. africana* !

Rupicapnos perennis, glauca, radice longissimo, caudice crassiusculo ramoso decumbente et caulibus semper brevibus ut in *R. africanâ*. *Folia* pleraque subradicalia, glaucescentia, plus minusve carnosa, 10-25 cm. longa (petiolo incluso), longissime petiolata, *deltoidea*, foliis subdeltoideis (duobus infimis multo majoribus petiolatis reliquis sæpissime subsessilibus) et segmentis secundariis subflabellatis in lobos oblongos ellipticos vel cuneatos acutos vel obtusos vix mucronatos irregulariter fissis 2-pinnatisecta subquinata. *Racemi* corymbiformes, 10-25-flori, cum pedunculo (ad 5 cm. longo sæpius multo brevior) foliis subduplo breviores. *Bractee* 2-3 mm. longæ, albido-virescentes, oblongæ, acutæ vel acuminatæ, interdum sparsim serrulatæ; *pedicelli fructiferi* graciles, apice abrupte incrassati, flexuosi, longissimi (infimi ad 65 mm. longi). *Sepala* 2.5-4 mm. longa, 2-3 mm. lata, late ovata rarius suborbicularia, peltata vel cordata, acuta, basin versus leviter crenatodentata, nervo dorsali lato viridiusculo albida. *Corolla* maxima, 12-16 mm. longa, carinis viridiusculis albida; *petalo superiore* marginibus apice plane dilatatis subpatentibus sæpe pallide purpurascentibus fere oblongo vel oblongo-ovato, obtusissimo vel etiam retuso, carinâ apicem versus attenuatâ, *calcare modico* (circa 4 mm. longo) vix curvato apice rotundato; *petalo inferiore* marginibus patentibus apice valde dilatatis *spathulato obtusissimo*, ad basin ipsam sæpius gibboso-saccato; *petalis interioribus* sursum curvatis apice modice alatis atropurpureis. *Fructûs* maximi, sine mucrone 3-3.25 mm. longi, circa 3 mm. lati, subrotundo-obovati vel subrotundi, cum mucrone brevi quadrangulato obtusi vel obtusissimi et inferne parum angustati, paulo compressi et valde carinati, siccitate omnino dense et elevato tuberculato-rugosi.

β. mauritanica, var. nov.

Exsicc. J. Ball, Tetuan, 1851, in Hb. Kew, ut *Fumaria corymbosa* ! Hooker, Tetuan, 1871, in Hb. Kew, ut *F. africana* !

Margines petalorum exteriorum quam in typo paulo latiores. *Fructûs* sine mucrone brevissimo 3-3.25 mm. longi, 2-2.5 mm. lati, oblongo-obovati, eis typi multo angustiores. Aliter ut typus.

Hæc rara planta certe *R. africana* valde affinis est, sed foliis brevioribus deltoideis lobis latioribus præditis, bracteis sepalsisque latioribus, corollâ minus gracili, petalorum exteriorum marginibus apice latioribus, calcare brevior, fructibus majoribus valdius tuberculatis separanda est atque specificè differre videtur.

R. decipiens in fissuris rupium, ad 400 m. adscendens, regionis Sierra de Alora et Pizarra in provinciâ Malacitanâ atque prope Grazalemam in provinciâ Gaditanâ Hispaniæ invenitur; varietas *mauritanica* prope Tetuan in Mauritaniâ et forsân ad Aloram cum typo crescit.

The specimens of this plant collected originally by Boissier at Alhaurin (=Alora?), now in the herbaria at Kew and the British Museum, are shade-forms with relatively broad leaf-segments and poorly developed flowers. Their fruits are found—rather unexpectedly—to differ from those of the exsiccata collected at Alora by Huter, Porta & Rigo (No. 516), and rather to resemble those of the Tetuan form.

- [15. RUPICAPNOS PLATYCENTRA, Pomel, Nouv. Mat. Fl. Atlant. i. 242 (1874); n. v. *Fumaria platycentra*, Batt. & Trabut, Fl. d'Alger. i. 25 (1888).

Foliorum segmenta in lobos parvos obovatos vel lanceolatos profunde fissa. *Bractee* oblongæ, denticulatæ; pedicelli apice incrassati. *Sepala* orbicularia, valde dentata, corollæ tubum æquantia. *Corolla* 14 mm. longa, albida; petali superioris margines apice paulo dilatati, calcar circa 4 mm. longum vix curvatum apice abrupte rotundatum, nectarium flexuosum, incurvatum; petala interiora apice purpurea. *Fructûs* cum mucrone quadrangulato ovali-elliptici, siccitate tuberculato-rugosi.

Hæc species rupes ad Kef Iroad prope Toucriam in Algeriâ habitat.

This plant is maintained as a separate species in deference to the views of Pomel, although no material of it has been available for examination. It appears to be closely allied to *R. decipiens*, differing chiefly in its more finely divided foliage and its strongly toothed, orbicular sepals.]

16. RUPICAPNOS CEREFOLIA, Pomel, Nouv. Mat. Fl. Atlant. i. 242 (1874).

Fumaria cerefolia, Batt. & Trabut, Fl. d'Alger. i. 25 (1888); *F. africana*, Coss. Comp. Fl. Atlant. ii. 80 (1883-1887), ex parte, non Lamarek.

Exsicc. Cosson, Djebel Zaccar, près Milianah, 1854, in Hb. Kew, ut *Fumaria corymbosa*! Joad, Milianah, 1873, in Hb. Kew, ut *F. africana*! Cosson, Milianah, 1875, in Hb. Kew, ut *F. africana*! Soc. Dauphinoise, No. 672, Milianah, ut *F. africana*!

Rupicapnos perennis, plus minusve glauca, caudice crassiusculo caulibusque

brevibus ut in *R. africanæ*. *Folia* pleraque subradicalia, glaucescentia, 10–20 cm. longa (petiolo gracili incluso), longe petiolata, *oblonga*, foliolis 3-paribus subdeltoideis brevissime petiolatis et segmentis secundariis in *lacinias* satis remotas, *parvas*, *lineari-oblongas*, *acutas* mucronatasve profunde incisus 2–3-pinnatisecta. *Racemi* racemoso-corymbiformes, 20–25 *flori*, cum pedunculo (ad 7 cm. longo) *foliis* sæpissime paulo rarius subduplo breviores. *Bractee* 1.5–4 mm. longæ, *oblonge* (lineares ap. Pomel), acuminatæ; *pedicelli fructiferi filiformes* apice vix incrassati longissimi (*infimi* ad 60 mm. longi). *Sepala* 3 mm. longa, 1.5–1.75 mm. lata, *ovata vel lanceolato-ovata*, peltata, acuta vel acuminata, plus minusve irregulariter *dentata* vel basi laciniata, præter nervum dorsalem angustum viridiusculum albida. *Corolla maxima*, sæpe gracilis, 14–16.5 mm. longa (12 mm. ap. Pomel), carinis gracilibus viridiusculis albida vel roseo-albida; *petalo superiore* marginibus apice paulo dilatatis sursum recurvatis vel patentibus *anguste oblongo obtusissimo*, *calcare longo* (circa 5 mm.) deflexo ad basin angusto sed apicem versus rotundato; *petalo inferiore* marginibus latis patentibus apice satis dilatatis *subspathulato obtuso*, nonnunquam ad basin ipsam *obscure saccato*; *petalis interioribus* sursum curvatis apice *modice alatis* subtruncatis *breviter* sed læte *atropurpureis*. *Fructûs modici*, sine mucrone circa 2.5 mm. longi et 2 mm. lati, *obovato-elliptici*, cum mucrone longo *acuminati*, valde compressi et plane carinati, siccitate omnino *grosse tuberculato-rugosi*.

Hæc pulchra et distinctissima species per foliorum magis decompositorum lacinias parvas angustas, per corollas maximas roseo-albidas apice breviter sed conspicue atropurpureo-maculatas et per fructûs modicos subellipticos acuminatos inter hujus sectionis alias species notabilis et facile distinguenda est.

R. cerefolia prope Milianah atque Mazis (ap. Pomel) in provinciâ Algeriensi Algeriæ invenitur.

The above description, which has been drawn up from the exsiccata cited, agrees with Pomel's diagnosis except that in the material examined the bracts and sepals seem rather broader, and the corolla is larger, the flowers being especially fine in Soc. Dauph. No. 672, and the specimen at Kew collected by Joad. Pomel's diagnosis seems to have been taken from poorly grown plants, and is corrected by Battandier & Trabut (*l. c.*), who observe that the flowers of *F. cerefolia* are very large, not less than 15 mm. in length.

The flower and dissections of *Fumaria africana* in Cosson's Illustr. Fl. Atlant. i. tab. 9, figs. 12–20, appear to have been drawn from a plant of this species.

17. RUPICAPNOS SPECIOSA, Pomel, Nouv. Mat. Fl. Atlant. i. 241 (1874).

Fumaria speciosa, Batt. & Trabut, Fl. d Alger. i. 25 (1888); *F. africana*, Coss. Comp. Fl. Atlant. ii. 80 (1883–1887), ex parte, non Lamareck.

Exsicc. Warion, Saida, 1872, in Hb. Kew (sine fructibus), ut *F. africana*!

Rupicapnos perennis habitu *R. africanæ*. Folia fere ut in *R. africanæ* (maxima ap. Batt. & Trab.) sed *oblonga*, segmentis secundariis subflabellatis in lacinias latiuscule *oblongas*, *subacutas* vel mucronatas fissis 2-pinnatisecta. Racemi *F. africanæ*. Bractee 2-4 mm. longæ, *lanceolatae*, *acuminatae*; *pedicelli fructiferi filiformes* apice incrassati. Sepala circa 3 mm. longa *acuta*, fere *orbicularia* (corollæ tubum subæquantia), *peltata*, *acuta* vel breviter *acuminata*, *valde dentata*, *albida*. Corolla magna, 14-15 mm. longa, carinis viridibus *albida*; petalo superiore marginibus apice vix dilatatis dilute purpureis *oblongo obtuso*, *calcare brevi* (circa 3 mm. longo) apice *rotundato*, [nectario lineari incurvato ap. Pomel]; petalo inferiore marginibus patentibus apice paulo dilatatis *lineari-oblongo obtuso*, basi *gibboso-saccato*; petalis interioribus apice *violaceo-atropurpureis*. Fructus verisimiliter *modici*, cum mucrone *longo lanceolato-obovati*, siccitate omnino *valde tuberculato-rugosi*.

Hæc species habitu foliisque *R. africanam* refert, sed per foliorum segmenta latiora, per sepala orbicularia nec ovalia, per corollam haud gracilem *calcare brevi præditam* satis differt. *R. decipiens* foliis deltoideis, sepalis ovalibus, corollâ longius *calcaratâ*, fructibus multo majoribus facile separanda est, atque *R. cerefolia* per folia magis decomposita laciniis parvis angustis prædita, per sepala angusta, per corollam longe *calcaratam* apice breviter *purpureo-maculatam* et per fructus subellipticos *acuminatos* omnino diversa est.

R. speciosa rupes ad fluminis Minæ cataractam prope Mascaram (ap. Pomel), ad Saidam et forsân ad locos alios in provinciâ Oranensi Algeriæ habitat.

No authentic or satisfactory material of this plant has been seen, but Warion's Saida example at Kew, although in a fragmentary condition, appears clearly referable to it and has been cited accordingly. The specific diagnosis given above is based on the work of Pomel, collated with this exsiccata. Another example at Kew, one of two labelled "*F. corymbosa*—Munby, Tlemcen," may also belong to this species, which it closely resembles in foliage, while its fruits, which are not large, agree in form with Pomel's description. Unfortunately this specimen now shows no trace of flowers.

SUBSECTIO POMELIANÆ.

Foliorum lobi lati. Flores pallide purpurei.

18. RUPICAPNOS POMELIANA, sp. nov. (Pl. 9, fig. 4.)

R. africana, Pomel, Nouv. Mat. Fl. Atlant. i. 240 (1874), nomen abortivum; *Fumaria africana*, Coss. Comp. Fl. Atlant. ii. 80 (1883-1887), ex parte; Batt. & Trabut, Fl. d'Alger. i. 25 (1888); non *F. africana*, Lamarck.

Exsicc. Bourgeau, Pl. d'Alger. 1856, Garrouban, in Hb. Mus. Paris (pro maj. parte), ut *Fumaria corymbosa*!

Rupicapnos perennis, glauca, caudice crassiusculo, ramoso, brevi vel paulo elongato, decumbente, tandem vestigiis petiolorum emarcidorum donato, caulibusque semper brevibus. *Folia* pleraque subradicalia, glauca, carnosa, 10–20 cm. longa (petiolo incluso), longe petiolata, *oblonga*, foliolis late obovatis breviter petiolatis et segmentis secundariis subimbricatis raro alternantibus in *lobos rotundatos* vel obovatos *obtusos* vix mucronulatos sæpe incisos irregulariter fissis *2-pinnatisecta subquinata*. *Racemi* corymbiformes, *multi*-(circa 20-) *flori*, cum pedunculo (ad 6 cm. longo) *foliis subduplo breviores*. *Bractee* 2–2.5 mm. longæ, *late ocales*, cuspidatæ, apicem versus dentatæ; *pedicelli fructiferi graciles* (fere filiformes), apice incrassati, flexuosi, *infrimi* ad 25 mm. longi. *Sepala* 3–3.5 mm. longa, fere 3 mm. lata, *suborbicularia* (corollæ tubo latiora), peltata vel cordata, breviter acuminata, præsertim basin versus *inciso-dentata*, præter nervum dorsalem latum rubicundum purpurascentia. *Corolla magna*, 12–14 mm. (15 mm. ap. Pomel) *longa*, plus minusve gracilis, *pallide purpurea*; *petalo superiore* marginibus apice parum dilatatis subpatentibus vel deflexis (nonnunquam paulo sursum recurvatis) *anguste oblongo obtuso*, carinâ viridiusculâ petali apicem vix attingente, *calcare brevissimo* (2–3 mm. longo) rotundato curvato; *petalo inferiore* marginibus patentibus apicem versus vix dilatatis *lineari-oblongo* nec subspathulato, *obtusiusculo*, ad basin ipsam *gibboso-saccato*; *petalis interioribus* sursum curvatis *apice modice alatis atropurpureis*. *Fructûs majusculi*, sine mucrone 2.5–2.75 mm. longi ac lati, verisimiliter *subrotundo-obovati* (fere ovaies ap. Pomel), cum mucrone *brevi obtusissimi* et inferne angustati, satis compressi et valde carinati, siccitate omnino *grosse* et elevato *tuberculato-rugosi*.

Hæc planta per foliorum lobos latissimos rotundatos, per bracteas latissimas atque per flores purpureos brevissime calcaratos sepalis suborbicularibus præditos ab hujus gregis speciebus aliis specificè differre videtur.

R. Pomeliana rupes ad Garrouban et forsan ad locos alios in provinciâ Oranensi Algeriæ habitat.

This plant is identified by Pomel with the original *Fumaria africana*, Lamk. It has been shown, however, that the descriptions of Lamarck and Desfontaines can be definitely determined to refer to another species, albeit the name of *F. africana* was subsequently extended by Cosson to cover in an aggregate sense practically all the forms of the present section. As the specific epithet "*africana*" must be retained for the form originally so described, and the plant so named by Pomel is distinct and has not been otherwise distinguished, a fresh epithet becomes necessary for the latter. It is therefore proposed to commemorate Pomel in its new name.

It is noteworthy that while Pomel's diagnosis of this plant agrees well with the Garrouban exsiccata in Herb. Mus. Paris, the examples seen from other localities which he cites (Tlemcen, Nedroma, and Oran) show different characters and seem to belong to other species. Of these, the Oran plant

which is less sparingly represented in herbaria than the other forms of the genus and agrees with none of Pomel's diagnoses, is accordingly separated as a new species. It is of course possible that the forms from these localities that came under the notice of Pomel were identical with the Garrouban example, for it is almost certain from the mixtures observed in exsiccata that different species of this genus grow in company. But if so, it is curious that Pomel, who apparently knew Oran well, should not have met with the plant that has been most generally obtained there by other collectors.

19. *RUPICAPNOS ORANENSIS*, sp. nov. (Pl. 9, fig. 5.)

Fumaria africana, Coss. & Dur. in Bull. Soc. Bot. Fr. ii. 305 (1855), ex parte; Coss. Comp. Fl. Atlant. ii. 80 (1883-1887), ex parte, non Lamarek; *F. corymbosa*, Hammar, Mon. Fumar. 42, excl. syn. et loc. Alhaurin (1857), non *F. corymbosa*, Desfontaines.

Icon. Hammar, l. c. tab. v, ut *F. corymbosa* (sed petalo inferiore haud saccato).

Exsicc. Balansa, Pl. d'Alger. 1852, No. 337, ut *F. corymbosa*! Munby, Pl. Alger. 1850, No. 38, ut *F. corymbosa*! Bourgeau, Pl. d'Alger. 1856, No. 181, Nedroma (partim, sed non in Hb. Mus. Paris), ut *F. africana*! Faure, Pl. d'Alger. 1904, Oran, ut *F. africana*!

Rupicapnos perennis sed a primo anno jam florens, glauca, radice elongatâ, caudice crassiusculo ramoso decumbente brevi vel paulo elongato, caulibus semper brevibus nonnunquam fere nullis. *Folia* pleraque subradicalia, glauca vel glaucescentia, plus minusve carnosa, 10-30 cm. longa (petiolo incluso), longe petiolata, *oblonga*, foliolis fere ovatis infimis breviter petiolatis reliquis subsessilibus et segmentis secundariis subflabellatis sæpius alternantibus in lobos obovatos vel oblongos *obtusos mucronatos* vel subacutos sæpe incisos irregulariter fissis *2-pinnatisecta*. *Racemi* corymbiformes, *multi* (10-30-, sæpius plus 20-), *flori*, cum pedunculo (ad 5 cm. longo) *foliis* sæpiissime *plus duplo breviores*. *Bractee* 1.5-3 mm. longæ, *oblongæ*, acutæ rarius acuminatæ, interdum sparsim serrulatæ, verisimiliter purpurascentes; *pedicelli fructiferi graciles* (fere filiformes), apice incrassati, flexuosi, infimi usque ad 40 mm. longi. *Sepala minima*, 2-2.5 mm. longa, 1.5-1.75 mm. lata, ovata, peltata vel cordata, acuta, basin versus irregulariter *crenato-dentata*, præter nervum dorsalem latum rubicundum purpurascentia, facile caduca. *Corolla maxima*, 12-16 mm. longa, ut videtur carinis viridibus *pallide purpurea*; *petalo superiore* marginibus apicem versus paulo dilatatis sæpius sursum recurvatis purpurascentibus *oblongo obtusissimo, calcare longiusculo* (4-5 mm. longo) *curvato apice rotundato* (in formis umbrosis brevioribus); *petalo inferiore* marginibus latiusculis patentibus apicem versus sensim paulo dilatatis *lineari-oblongo* vix subspathulato *obtusiusculo, ad basin ipsam sæpiissime plane gibboso-saccato*; *petalis interioribus* sursum curvatis *apice modice alatis atropurpureis*.

Stylus malleiformis. *Fructūs magni*, sine mucrone 3-3.25 mm. longi, 2.5-2.75 mm. lati, *ovali-obovati*, cum mucrone conspicuo *obtusissimi* et inferne multo angustati (supra medium latissimi), plane compressi et valde carinati, siccitate omnino *grosse tuberculato-rugosi*.

Hæc species foliorum lobos latos et flores pallide purpureos *R. Pomeliance* habet sed bracteis sepalisque multo angustioribus, petali superioris calcare subduplo longiore et fructibus plane longioribus satis differre videtur.

R. oranensis vicinitatem oppidi Oran, Nedromam, Tlemcen ut videtur, et probabiliter alios locos in parte septentrionali provinciæ Oranensis Algeriæ habitat.

This plant, which is better represented in the herbaria consulted than any other member of the genus, is rather inexplicably unnoticed by Pomel, unless it is intended to be included with the previous species *R. Pomeliana*, as may perhaps be inferred from the localities cited. It is not easy to adopt this view, however, seeing how clearly Pomel's description accords with the features of the Garrouban plant in Herb. Mus. Paris and how widely it differs in several particulars from *R. oranensis*. On the other hand, as already remarked under *R. Pomeliana*, it seems impossible that Pomel was unacquainted with this plant in the neighbourhood of Oran.

In shaded situations the foliage of *R. oranensis* becomes lax with relatively thin leaflets, somewhat acutely and by comparison narrowly lobed, while its flowers tend to be reduced in size, with no upward recurving of the margins of the upper petal, and a shorter, straighter spur. These features may be seen in some of the specimens sent out by Balansa, by Bourgeau, and by Faure. Munby's plants, on the other hand, are mostly very dwarf examples, probably collected in dry and exposed rock-fissures, and their clusters of well-developed flowers almost equal the much reduced leaves, of which the segments are thick in texture and very small.

Judging from exsiccata, the flowers of *R. oranensis* appear to be of a paler purple colour than those of *R. Pomeliana*, and they are less concolorous, the margins of the upper petal being sometimes distinctly flushed with a deeper tint, recalling the coloration of the flowers of *Fumaria agraria*.

There is a specimen of this plant at Kew from Munby's herbarium, associated with another which may be *R. speciosa* and labelled "Tlemcen," but it appears uncertain from the arrangement of other examples on the sheet whether it really came from this habitat or whether a transposition of specimens has not at some time taken place.

- [20. RUPICAPNOS OCHRACEA, Pomel, Nouv. Mat. Fl. Atlant. i. 242 (1874);
n. v. *Fumaria ochracea*, Batt. & Trabut, Fl. d'Alger. i. 25 (1888);
F. africana, Coss. Comp. Fl. Atlant. ii. 80 (1883-1887), ex parte,
non Lamarek.

Foliorum segmenta in lobos parvos obovatos vel oblongos spathulatos fissa.

Bractæ lanceolatae, integræ; *pedicelli graciles* apice breviter incrassati. *Sepala minima, lanceolata, valde denticulata*, quam corollæ tubus multo angustiora. *Corolla* circa 12 mm. longa, gracilis, *pallide ochraceo-purpurea*; petali superioris margines apice parum dilatati; *calcar longiusculum* (circa 4 mm. longum), apice rotundatum; *petala interiora apice purpurea*. *Fructûs* angusti, cum mucrone gracili fere oblongi, inferne in stipitem distinctum angustati, siccitate rugosi.

R. ochracea rupes calciferas ad Goudjilam prope Tiaret in parte orientali provinciæ Oranensis Algeriæ habitat.

This plant, of which no material has been seen, seems essentially distinct from the other species of this section owing to its peculiarly coloured and much smaller flowers, and its narrow fruits. It may possibly be regarded as intermediate in characters between *R. oranensis* and *R. erosa*.]

EXPLANATION OF THE PLATES.

PLATE 9.

- Fig. 1. Flower of *Fumaria agraria*, Lag., with transverse section near the apex.
 Fig. 2. Flower of *F. capreolata*, Linn., do. do.
 Fig. 3. Flower of *F. Gussonei*, Boiss., do. do.
 Fig. 4. Flower of *Rupicapnos Pomeliana*, sp. nov., do. do.
 Fig. 5. Flower of *R. oranensis*, sp. nov., do. do.
 Fig. 6. Flower of *R. numidica*, Pomel, do. do.
 Fig. 7. Flower of *R. caput-plataleæ*, Pomel, do. do.
 Fig. 8. A fully developed flower of *Fumaria sepium*, Boiss.; drawn from a specimen collected at the *locus classicus*.
 Fig. 9. A depauperate flower of the same.
 Fig. 10. A completely cleistogamic flower of *F. muralis* subsp. *Boræi*; from a cultivated specimen.
 Detached flowers all enlarged $\times 2.5$. A=keel; B=wing or margin.

PLATE 10.

Fumaria Ballii, sp. nov., natural size, with detached flower and dried fruit ($\times 2.5$); drawn from the unique specimen at Kew.

PLATE 11.

- Fig. 1. *Fumaria berberica*, sp. nov., natural size, with detached flower and dried fruit ($\times 2.5$); drawn from a specimen at Kew.
 Fig. 2. *F. montana*, J. A. Schmidt, natural size, with detached flower and dried fruit ($\times 2.5$); drawn from Schmidt's original specimen at Vienna.

PLATE 12.

Fumaria coccinea, sp. nov., natural size, with detached flower and dried fruit ($\times 2.5$); drawn from a specimen collected by Messrs. Sprague and Hutchinson (no. 1265).

H. W. P. del.

Grout, sc.

1-3 & 8-10. FLOWERS OF FUMARIA. 4-7. FLOWERS OF RUPICAPNOS.

H. W. P. del.

Grout, sc.

FUMARIA BALLII, sp. nov.

H. W. P. del.

Grout, sc.

1, *FUMARIA BERBERICA*, sp. nov.

2, *F. MONTANA*, J. A. Schmidt.

H. W. P. del.

FUMARIA COCCINEA, sp. nov

Grout, sc.

H. W. P. del.

Grout. sc.

FUMARIA AUSTRALIS, sp. nov.

H. W. P. del.

Grout, sc.

1, *RUPICAPNOS MURICARIA*, Pomel.

2. *R. PRÆTERMISSA*, sp. nov.

H. W. P. del.

(Grout, sc.)

1, *RUPICAPNOS LONGIPES*, Pomel.

2, *R. SUBLÆVIS*, sp. nov.

H. W. P. del.

Grout, sc.

RUPICAPNOS SARCOCAPNOIDES, Pomel.

PLATE 13.

Fumaria australis, sp. nov., natural size, with detached flower and dried fruit ($\times 2.5$); drawn from a specimen at Kew (Volken, no. 953).

PLATE 14.

Fig. 1. *Rupicapnos muricaria*, Pomel, natural size, with detached flowers and dried fruit ($\times 2.5$); drawn from a specimen in Herb. Mus. Manchester (Chevallier, no. 397).

Fig. 2. *R. prætermissa*, sp. nov., natural size, with detached flowers and dried fruit ($\times 2.5$); drawn from a specimen in Herb. Mus. Paris.

PLATE 15.

Fig. 1. *Rupicapnos longipes*, Pomel, natural size, with detached flowers and dried fruit ($\times 2.5$); drawn from a type-specimen in Herb. Mus. Paris.

Fig. 2. *R. sublævis*, sp. nov., leaf and fruit ($\times 2.5$); drawn from a specimen in Herb. Mus. Paris.

PLATE 16.

Rupicapnos sarcocapnoides, Pomel, natural size, with detached flowers and dried fruit ($\times 2.5$); drawn from a type-specimen in Herb. Mus. Paris.

INDEX

OF

SPECIES AND VARIETIES RECOGNIZED AS VALID IN THE
FOREGOING REVISION ON PAGES 259-327, 331-352.

A star * denotes a name here published for the first time.

Fumaria, *Linn.*, 250-327.

- abyssinica*, *Hamm.*, 308.
- agraria*, *Lag.*, 259.
- var. *chilensis*, *Parl.*, 259.
- — *mauritanica*, *Haussk.*, 259.
- amarysia*, *Boiss. & Heldr.*, 267.
- apiculata*, *Lange*, 289.
- asepala*, *Boiss.*, 321.
- var. *aprica*, *Pugs.**, 321.
- — *compacta*, *Haussk.*, 321.
- atlantica*, *Coss. & Dur.*, 260.
- var. *platyptera*, *Pugs.**, 261.
- australis*, *Pugs.**, 309.
- Ballii*, *Pugs.**, 262.
- Bastardii*, *Bor.*, 278.
- var. *affinis*, *Pugs.**, 279.
- — *benedicta*, *Pugs.**, 280.
- — *Gussonei*, *Pugs.*, 279.
- — *hibernica*, *Pugs.*, 279.
- — *patens*, *Pugs.**, 278.
- — *vagans*, *Pugs.**, 279.
- berberica*, *Pugs.**, 273.
- bicolor*, *Somm.*, 276.
- Boissieri*, *Haussk.*, 306.
- bracteosa*, *Pomel*, 300.
- capreolata*, *Linn.*, 269.
- var. *albiflora*, *Hamm.*, 270.
- — *Babingtonii*, *Pugs.*, 270.
- — *condensata*, *Ball*, 270.
- — *devoniensis*, *Pugs.*, 270.
- — *Hochreutineri*, *Pugs.**, 270.
- — *speciosa*, *Hamm.*, 269.
- cilicica*, *Haussk.*, 305.
- coccinea*, *Lowe**, 274.
- dubia*, *Pugs.**, 272.
- flabellata*, *Gasp.*, 266.
- Gaillardotii*, *Boiss.*, 265.
- indica*, *Pugs.**, 313.

Fumaria

- indica* f. *montana*, *Pugs.**, 314.
- Jankæ*, *Haussk.*, 310.
- judaica*, *Boiss.*, 267.
- var. *insignis*, *Pugs.**, 267.
- Kralikii*, *Jord.*, 298.
- macrocarpa*, *Parl.*, 268.
- macrosepala*, *Boiss.*, 273.
- major*, *Bad.*, 263.
- var. *algerica*, *Pugs.**, 264.
- — *spectabilis*, *Rouy*, 263.
- Martinii*, *Clav.*, 282.
- micrantha*, *Lag.*, 299.
- var. *dubia*, *Pugs.**, 299.
- — *littoralis*, *Rouy & Fouc.*, 300.
- microcarpa*, *Boiss.*, 312.
- microstachys*, *Kralik*, 306.
- montana*, *J. A. Schmidt*, 297.
- Munbyi*, *Boiss. & Reut.*, 281.
- muralis*, *Sond.*, 285.
- subsp. *Boræi*, *Pugs.*, 287.
- — — var. *ambigua*, *Pugs.*, 288.
- — — *britannica*, *Pugs.*, 288.
- — — *gracilis*, *Pugs.*, 288.
- — — *hispanica*, *Pugs.**, 288.
- — — *longibracteata*, *Pugs.*, 288.
- — *neglecta*, *Pugs.*, 287.
- var. *decipiens*, *Pugs.*, 286.
- — *læta*, *Lowe*, 286.
- — *Lebellii*, *Rouy & Fouc.*, 286.
- — *Lowe*, *Pugs.*, 286.
- occidentalis*, *Pugs.*, 261.
- officinalis*, *Linn.*, 302.
- var. *densiflora*, *Parl.*, 304.
- — *elegans*, *Pugs.*, 304.
- — *minor*, *Koch*, 303.
- — *Wirtgenii*, *Haussk.*, 303.
- Painteri* ×, *Pugs.*, 289.

Fumaria

- parviflora*, *Lam.*, 322.
- *f. Vivianii*, *Pugs.**, 323.
- var. *acuminata*, *Clav.*, 325.
- — *glauca*, *Clav.*, 324.
- — *indicoides*, *Pugs.**, 325.
- — *latisecta*, *Haussk.*, 323.
- — *persica*, *Pugs.**, 324.
- — *sinaïtica*, *Haussk.*, 325.
- — *Symeï*, *Pugs.*, 323.
- Petteri*, *Reichb.*, 290.
- purpurea*, *Pugs.*, 272.
- var. *brevispala*, *Pugs.*, 272.
- Reuteri*, *Boiss.*, 295.
- rostellata*, *Knaf*, 301.
- rupestris*, *Boiss. & Reut.*, 261.
- Schleicheri*, *Soy.-Will.*, 310.
- var. *supina*, *Pugs.**, 310.
- Schrammii*, *Pugs.**, 319.
- var. *orientalis*, *Pugs.**, 319.
- sepium*, *Boiss.*, 284.
- var. *gaditana*, *Pugs.**, 284.
- Thuretii*, *Boiss.*, 292.
- var. *deflexa*, *Pugs.**, 293.
- — *Heldreichii*, *Boiss.*, 293.
- — *pikermiana*, *Pugs.**, 294.
- — *thasia*, *Pugs.**, 295.
- Vaillantii*, *Lois.*, 315.

Fumaria

- Vaillantii*, var. *Chavinii*, *Rouy & Fouc.*, 316.
- — *conferta*, *Haussk.*, 316.
- — *venetica*, *Pugs.**, 317.
- Rupicapnos*, *Pomel*, 328-352.
- *africana*, *Pugs.**, 343.
- *caput-plataleæ*, *Pomel*, 340.
- *cerefolia*, *Pomel*, 346.
- *Cossonii*, *Pugs.**, 338.
- *decipiens*, *Pugs.**, 345.
- var. *mauritanica*, *Pugs.**, 345.
- *delicatula*, *Pomel*, 332.
- *erosa*, *Pomel*, 341.
- var. *major*, *Pugs.**, 342.
- *longipes*, *Pomel*, 332.
- *muricaria*, *Pomel*, 331.
- *numidica*, *Pomel*, 337.
- *ochracea*, *Pomel*, 351.
- *oranensis*, *Pugs.**, 350.
- *platycentra*, *Pomel*, 346.
- *Pomeliana*, *Pugs.**, 348.
- *prætermissa*, *Pugs.**, 333.
- *Reboudiana*, *Pomel*, 336.
- *sarcocapnoides*, *Pomel*, 335.
- *speciosa*, *Pomel*, 347.
- *sublævis*, *Pugs.**, 334.
- *tenuifolia*, *Pomel*, 339.