

THE CONVOLVULUS SPECIES
OF THE
CANARY ISLES, THE MEDITERRANEAN REGION
AND THE NEAR AND MIDDLE EAST.

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AAN mijn ouders

AAN mijn echtgenoot

AAN mijn kinderen Hanan en Dalal

**The Convolvulus species of the Canary
Isles, the Mediterranean region
and the Near and Middle East
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Botanical Museum and Herbarium Utrecht**

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INTRODUCTION

This study was undertaken in 1963 at the suggestion of Prof. Dr. J. Lanjouw. As the genus *Convolvulus* is so large that a revision of all its species would have taken too much time, and as a revision of the African ones alone would not have been interesting because these species do not form a natural group, it was decided to choose a middle way, and to take into consideration also the species occurring in the adjoining countries. This was all the more indicated as the *Convolvulus* species of the area which includes besides the Mediterranean region also the area extending eastwards of the latter to the western border of Afghanistan, i. e. such countries as Iraq and Iran, show many signs of affinity. During our study of the species occurring in these parts, it was realized that it would be desirable to consider also those occurring in Afghanistan and Turkmeniskaya and further to the west in the Caucasus, Armenia and a part of the area surrounding the Black Sea. The Canary and Madeira Isles were also included, as they are close to the North African part of this region and as these islands moreover are interesting because they show a high degree of endemism and because some of the *Convolvulus* species occurring here were regarded by some authors as sufficiently distinct from those found elsewhere to be referred to a genus of their own, a genus for which the name *Rhodorrhiza* was proposed.

The genus *Convolvulus* was introduced by Linnaeus (1753). In 1789 it was revised by Desrousseau, who described 107 species under the heading "Liseron"; he divided the genus into two subdivisions, viz. 1^o "peduncles with solitary flowers" and 2^o "peduncles with numerous flowers"; in the delimitation of the genus he followed Linnaeus.

Some of the species which Linnaeus and Desrousseau had included in

Convolvulus were transferred by R. Brown (1810) to a new genus *Calystegia*. His delimitation of the genus *Convolvulus* was accepted by the present author.

Webb (1841) transferred some of the endemic species of the Canary Isles to a new genus *Rhodorhiza*. In the present work they are considered to be true representatives of the genus *Convolvulus*.

The next important revision was that of Choisy (1845), who described 117 species, returned *Rhodorhiza* to the genus *Convolvulus*, and followed Don (1838) in his division of the genus into two subsections, viz. *Orthocaulos* and *Strophocaulos*. A good delimitation of the genus was given in Bentham and Hooker's "Genera Plantarum" (vol. II 1876); the genus *Rhodorhiza* Webb was treated here as a section of *Convolvulus*, a view with which the present author does not agree. Hallier (1893) added to the diagnostic characters of the genera *Convolvulus* and *Calystegia* a difference in the structure of their pollen grains.

The subdivision of the genus *Convolvulus* has always been based on differences in habit, but Boissier (1875) in his revision of the species of the Orient rightly made the following remark "genus in sectiones naturales aegre dividendum; greges hic propositae saepissime artificiales nam limites inter species ramis tandem spinescentibus vel inermibus, caulibus scandentibus vel subscaudentibus, rhizomate plus minusve suffrutescenti donatas interdum incerti sunt".

Peter in Engler and Prantl (1897) used besides the habit of the plant the shape of the inflorescence; this gives a greater accuracy to the subdivision of the genus.

The author recognises in the area surveyed in this work 118 species of which 16 are new to science; two of the new species were described from the Nubian Desert in Egypt (U. A. R.), i. e. from a stretch of country which is now covered forever by the water of the Aswan Dam. The author had the opportunity to collect here with the co-author of the two new Egyptian species some other ones, viz. *C. hystrix* Vahl, *C. prostratus* Forsk. and *C. arvensis* L. In other parts of Egypt too they collected some species.

The species occurring in the above delimited area are in this work divided over three sections, twelve subsections and four series; among these are one new section, two new subsections and two new series.

Before coming to the Netherlands the present author had the opportunity to see some of the Egyptian *Convolvulus* species in their natural habitat,

viz. when she was engaged in a botanical survey of the plants growing behind the Aswan Dam, an area which will be covered forever by the water of the dam.

The seeds from which the plants were obtained which permitted the author to study besides the usual taxonomic characters the karyology, pollen morphology and some other less easily accessible features, were partly obtained from a number of botanical gardens and partly collected by the author and some of her compatriots in their natural habitats in Egypt. Not all the seeds germinated and gave mature plants in the garden, as the weather in the Netherlands is not favourable for their germination and growth. A considerable part of the seeds obtained from botanical gardens were not correctly named.

The karyological data were obtained from eight species representing two sections; in three of the species the chromosomes were counted for the first time, and in two of them basic numbers were found which proved to be new for the genus. The author intends to go on with these karyological studies when she is back in Egypt where the climatic conditions are more favourable for most of the species of this genus.

In other fields of taxonomic research too there is still much to be done before a better understanding of the relationships within this genus can be reached.

Concerning the infraspecific taxa the author spent a good deal of time in searching the literature. Those which the author found in the publications which came to her hand are all dealt with; since there is no special index for these categories, it is, of course, nearly impossible to obtain a complete survey of them.

Acknowledgement

This study was carried out at the "Instituut voor Systematische Plantkunde" of the State University, Utrecht, under the supervision of Prof. Dr. J. Lanjouw, the head of this Institute, to whom the author is deeply indebted for his guidance and stimulating criticism.

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A. GENERAL PART

1. DELIMITATION OF THE GENUS CONVULVULUS IN THE PAST AND PRESENT

The name *Convolvulus* has been known already for a long time; it is found e.g. in C. Bauhin's *Pinax* (1623). Tournefort (1694), the first botanist who consistently used generic names, gave a description of the genus, which in his delimitation comprised also a *Calystegia* species.

Linnaeus (1753) included in *Convolvulus* thirty-one species, but of these one was subsequently transferred to *Argyreia* Lour., three to *Evolvulus* L., three to *Calystegia* R.Br. and eleven to *Ipomoea* L. That all these heterogeneous elements could be referred to the same genus, was due to the fact that his concept of the latter was, as may be seen from the description given in his "*Genera Plantarum*" (ed. V, 1754), still rather vague.

Desrousseaux in Lamarck's *Encyclopédie* (1789) and Desfontaines (1798) accepted Linnaeus' delimitation of the genus, but De Jussieu's diagnosis (1789) is more in accordance with modern concepts. He called attention to the fact that each flower is subtended by two bracteoles. According to him the flowers might be terminal as well as axillary, but he apparently failed to notice that the terminal flowers are found only on lateral shoots.

R. Brown (1810) was the first to separate *Calystegia* from *Convolvulus*. In this respect he was followed by Choisy (1833), Boissier (1875) and Bentham and Hooker (1876), but according to Spach (1840) *Calystegia* would merely be a subgenus of *Convolvulus*. Hallier (1893) adduced a new argument for the separation of these two taxa, by drawing the attention to the fact that the *Calystegia* species possess oblong or rarely filiform stigmas, an incompletely uni-locular ovary and spherical pollen grains

with scattered pores; while in *Convolvulus* according to him, the stigmas are filiform or cylindrical, the ovary bilocular and the pollen grains ellipsoidal, with three longitudinal furrows. O'Donell (in *Lilloa* 29: 299-311, 1959) separated the genera on much the same grounds. Lewis and Oliver (in *Ann. Missouri Bot. Gard.* 52 (2) : 217-222, 1965) do not agree with the separation. They discuss the differences and the points of resemblance between the two taxa and give an accurate description of the stigmas illustrated by drawings. For species of *Calystegia* the paired stigmas are oblong, (2) -3- (4) times as long as broad, cylindrical, with blunt apices and a demarcation between the stigmatic areas and the style. For those of *Convolvulus* the paired stigmas are linear or linear-spathulate, applanate, with acutate apices and without a distinct separation between the stigmatic area and the style.

However, they could find no sharp difference between the bracts and bracteoles, at least not in *Calystegia* and the two *Convolvulus* species (*C. gharbensis* Batt. and *C. humilis* Jacq.) to which they paid special attention. The remaining differences between the two taxa are nevertheless in my opinion of sufficient importance to retain them as separate genera.

The most important work dealing with this genus was that of Choisy (1845), in which 117 species are described. A drawback is that he not rarely misidentified specimens.

Webb (in *Lindl. Bot. Regist, Misc. Not.* 69.n. 152, 1841) separated the genus *Rhodorhiza* from *Convolvulus* on account of the shortness of the style, the abortion of one of the locules of the capsule, the presence of but one seed, and the irregular basal dehiscence of the capsule. However, a renewed study of the genus *Convolvulus* proved that in nearly related species the dehiscence of the capsule may be basally irregular as well as loculicidal. The abortion of one of the locules and of one to three seeds in the capsule is, moreover, of more or less common occurrence in this genus, and a short style is regularly found in species with a conical ovary. The species mentioned under *Rhodorhiza* Webb, viz. *C. floridus* L.f., *C. scoparius* L.f. and *C. fruticulosus* Desr., all of them endemic in the Canary Islands are in every respect typical representatives of the genus *Convolvulus* and are therefore to be returned to the latter. This was done already by Choisy (1845) and by Peter (1897) in "Die natürlichen Pflanzenfamilien".

2. MORPHOLOGY

The subterranean parts

The species of the genus *Convolvulus* are mostly perennial or suffrutescent, rarely frutescent or annual. The annual species possess a slender perpendicularly descending root, a so-called taproot, with a large number of lateral roots which remain short and simple, where as the perennial species are provided with ligneous roots descending perpendicularly or spreading horizontally and reaching a diameter of 2 cm. Some of the perennial species possess a rhizome.

In cushion-shaped species the root is lignified and reaches a length of about 40 cm., which means that it is several times as long as the short shoots. In *C. dryadum* Maire the subterranean part is a rhizome which, according to Maire, is similar in structure to the aerial shoots though the xylem part is more fully developed and may show several annual rings, but it also differs from the aerial shoots in having a more interrupted ring of fibers in the pericycle. The presence of strands of laticiferous cells is recorded from the cortex, the phloem and the pith of this rhizome.

The roots of *C. scammonia* L. furnished the scammony, a purgative which is now according to Metafe and Chalk but seldom used; the starch grains are compound and consist of 2-4 elementary grains, each with a V-shaped hilum, the larger ones being 20-25 μ in diameter.

The roots of the species which are endemic in the Canary Islands and Madeira, *C. floridus* L.f., *C. canariensis* L., etc. furnish the fragrant powder known as "bois de rose".

The shoots

In the dry districts of the eastern Mediterranean region and Arabia the *Convolvulus* species appear either in the form of spiny shrubs with very small leaves, so e.g. *C. acanthocladus* Boiss., or assume a broom-like habit, so e.g. *C. pseudocantabricus* Schrenk. Under more favourable conditions trailing leafy shoots are developed, so e.g. in *C. althaeoides* L. These trailing shoots often show a tendency to climb, a feature which is characteristic for the majority of the species of this genus.

In the suffrutescent and frutescent species the shoots are mostly erect

and divaricately branched, angular or sometimes spiny, except e.g. in *C. canariensis* L. and *C. fruticosus* Desr. where the upper branches are dextrorsely twining. The largest forms attain a height of 180 cm., so e.g. *C. floridus* L.f.

In the perennial species the shoots are ascending, prostrate or twining, and mostly branched and in the basal part lignified, the main branches being either simple or once more branched. The shoots range from 1 to 4 mm in diameter; in the species with twining branches, e.g. in *C. arvensis* L., they are mostly hollow and cylindrical or quadrangular. Sinistrorsely as well as dextrorsely or in modern terminology antihelictically and helictically twining species are found in this genus, *C. arvensis* L., for instance, is sinistrorsely or antihelictically twining, *C. scammonia* L. dextrorsely or helictically twining. In annual species the main shoot is usually erect.

In the spiny species the internodes are short, while those of the other ones are elongated.

The pulvinate species are branched at the base and provided in this way with ascending, branched and lignified, flattened shoots, which are 3-17 cm. high; the part of the shoot resting on the ground produces adventitious roots. The shoots are green, grey or, rarely, covered by a reddish-brown bark, so e.g. in old shoots of *C. canariensis* L.

In the climbing species, e.g. *C. arvensis* L., the xylem vessels reach a diameter of 300 μ

The spines

In studying the spines of some of the species of the genus *Convolvulus* it was found that they are of different origin. In the subsect. *Acanthocladi* the spines are metamorphosed peduncles. On studying the arrangement of the leaves, the flowers and the spine as it appears on a young branch from the base to the top, it was found that the base carried sterile leaves, the middle part leaves with axillary flowers or groups of flowers, while the upper part carried spines, each of them subtended by a bract and ending in an early deciduous flower bud. The pedicel is in this case always weak and recurved. When on the older branches the flower buds have been shed, these branches therefore carry spines which represent axillary peduncles. Each spine shows at the top two scars left by the bracteoles.

In *C. fruticosus* Pallas the spines apparently represent the

secondary peduncles of a three-flowered cyme, as they occur always in a pair below a flower. Paulson (1912) considered the spines of this species to be branches of the first, second and third order. However, the spines by which in this species the flowers are flanked always represent branches of the third order. If some of the spines were branches of the first and second order, as Paulson suggested, it would morphologically be impossible that the spines were all of them found in pairs at the base of flowers.

Another kind of spines is found in the subsect. *Spinescentes*, here the spines are restricted to the tip of the branches. In these species the peduncles are wanting or, if present, never persistent. This situation is found e.g. in *C. hystrix* Vahl.

In the subsectio *Serospinescentes* the spines are in so far different that they are found only at the tips of the older branches, while the tips of the young branches, though rigid, are not spiny. This is found e.g. in *C. lanatus* Vahl.

The leaves

The leaves are alternate, simple and exstipulate, and may be sessile or petiolate. The petiole may be as long as or, rarely, longer than the blade, but sometimes it is very short or absent. The blade is 8-80 mm. long and varies in shape from linear with various transitions to oblong, lanceolate, spatulate, ovate, elliptic, obovate and rarely, suborbicular; it is sometimes truncate, cordate, sagittate or hastate, at the base, and at the top obtuse to acute or, sometimes, acuminate; the margin is usually entire or crenate to dentate, rarely lobed or undulate.

The sessile leaves are usually lanceolate to oblanceolate, but sometimes oblong to linear; here too the apex is obtuse to acute or acuminate. The radical ones are in this case always oblanceolate and narrowed to the base. In species of the subsect. *Compacti* and *Lanuginosi* and in some of the species of the series *Oleifolii* the radical leaves are in the basal part dilated and membranous and in the lower most part amplexicaul, i. e. clasping the shoot.

The leaves vary in colour from green to grey and show sometimes a silky shine; rarely they show a patchwork of dark and light green. In general the leaves are herbaceous; in some cases they are thinly herbaceous or chartaceous, rarely subcoriaceous. The indumentum is often variable in density, but the leaves are but rarely entirely glabrous, so e.g. in *C. durandoi* Pomel.

The nervation is usually pinnate, with the tertiary nerves sometimes reticulate and then either prominulous or immersed, rarely the leaves are uninervate. The nervation is often, owing to the presence of a dense indumentum, difficult to see. Stomata are commonly present on both sides of the leaves.

According to Metcalfe (1950) the vascular bundles of the veins are bicollateral and either surrounded by a closed sheath or accompanied by arcs of sclerenchyma; the size, shape, frequency and distribution of the laticiferous cells vary, and they are either solitary or arranged in rows; the variation shown by these characters is said to be valuable for the identification of the species. Lack of time prevented the present author to verify Metcalfe's statement, but she intends after her return to Egypt to continue her work on these anatomical problems.

The seedling

The seedling is provided with two opposite glabrous petiolate cotyledons which are situated in a plane perpendicular to that in which the first ordinary leaf arises. In *C. althaeoides* L., *C. arvensis* L. and *C. siculus* L. the blade of the cotyledons is reniform with an emarginate apex, whereas in *C. fatmensis* Kunze it is broadly oblong with an emarginate apex. The lowermost ordinary leaves are always obtuse and short, with the base of the blade not deeply incised. In *C. althaeoides* and *C. fatmensis* their margin is more or less entire, although in *C. althaeoides* the upper leaves are lobed or more deeply divided.

The observations of the author were restricted to the seedlings of species with petiolate leaves; it would be interesting to study the seedling also in other species.

The inflorescence

The two basic forms of the inflorescence, the determinate or cymose one and the indeterminate or racemose one, are both represented in the genus *Convolvulus*. If the main inflorescences are of the racemose type, the branches produce either axillary partial inflorescences or axillary flowers. In its simplest form the branches end in a single flower; this is found in the *Ser. Ebracteati*, which is characterized by the absence of bracts as well as bracteoles. A similar situation is found in some species of the subsect.

Compacti; here too the branches usually end in a single flower, so e. g. in *C. assyricus* Griseb. and *C. boissieri* Steud.

On branches bearing inflorescences of the determinate or cymose type, the first flower to open is the terminal one, and the next one is the flower in the axil of the bract which is farthest away from the tip, after which the opening proceeds in the usual acropetal sequence. If the axillary flowers are replaced by dichasia, it is always the central flower which opens first. In branches without a terminal cyme or flower the flowers are always opening in the usual acropetal sequence. The arrangement of the flowers on the branches is a character which may be typical for a taxonomic group of subordinate rank, or one which may be used to distinguish a species from its nearest allies.

C. caelesyriacus Boiss., for instance, may be recognized by the presence of flowers along the whole length of the shoot. In other species the flower-bearing part begins either in the middle of the branch or even nearer to its top.

The axillary inflorescences are always of the dichasial type. This is easily seen in the species when the flowers are provided with well developed pedicels and when they are arranged in many-flowered and lax inflorescences. On the pedicel of the terminal flower we find in that case at the base two bracts, each with a lateral branch in its axil. These branches in their turn bear terminal flowers provided with bracts with or without well developed flowers. If the axillary flowers are entirely suppressed, we speak of bracteoles instead of bracts. The lateral branch or the lateral flower in the axil of one bract (B) is often more strongly developed than that in the axil of the other bract (Forderung aus B., Eichler). If one of the main branches of the dichasium remains undeveloped, the dichasium is replaced by a monochasium. If both the lateral branches of the dichasium remain undeveloped, we obtain a peduncle ending in a solitary flower. This means that there is a gradual development from the symmetrical dichasium through unequally dichasial and partly monochasial inflorescences to monochasia and solitary flowers, and that the different forms of monochasial inflorescences as well as the solitary flowers are to be regarded as derived from dichasia by the partial or complete suppression of the development of one or both of the axillary buds of the bracts at the base of the terminal flower.

Different types of axillary inflorescences occur sometimes in the same species, so e. g. in *C. betonicifolius* Mill. and in *C. scammonia* L., where we find symmetrically dichasial, unequally developed dichasial and

monochasial inflorescences and rarely also solitary flowers. In *C. austro-aegyptiacus* Abdlh et Sa'ad the inflorescences vary from the unequally developed dichasial type to the monochasial one.

In the case of the compact inflorescences situated at the top of branches the upper part of the latter is usually leafless. These inflorescences may be of two kinds, viz. determinate or indeterminate ones. In the subsection *Lanuginosi* the compact inflorescence consists of a terminal cyme accompanied by axillary ones. It can be derived from that found in the *Ser. Oleifolii* and in the subsect. *Compacti* in which the branches end in a flower, by assuming that the uppermost internodes have become very short, with the result that the upper flowers approach each other. In case of the cymose inflorescences it may happen that all the internodes of the flowering part of the shoots as well as the peduncles and pedicels become very short. Then too a congested inflorescence is formed.

In other cases the terminal inflorescence is a capitulum, i. e. an indeterminate inflorescence. A good example is found in *C. gharbensis* Batt., a species belonging to the subsect. *Diffusi*. Another species belonging to this subsection is *C. humilis* Jacq. where the sessile flowers are axillary and solitary. In *C. humilis* the internodes near the top become very short, so that the flowers become congested. In this case the capitulum therefore is clearly a congested raceme.

An example of a determinate inflorescence is that which characterises the subsect. *Floridi*, of which *C. floridus* L.f. is the only species. In some species with determinate inflorescences the lower branchlets of the flowering shoot are terminated by a single flower; towards the top of the shoot these branchlets become shorter and are provided with a smaller number of leaves, while the terminal flower is provided with its usual pedicel; this situation can be explained by assuming that on these branchlets the buds in the axils of the bracts do not develop into flowers with the result that these bracts are converted into ordinary leaves.

In *C. dorycnium* L. the axillary inflorescence is a strongly unequal dichasial to monochasial one, in which the pedicel of the central flower is fused with the strongest branchlet. This therefore is an example of concaulescence.

The compact axillary inflorescences are always of the determinate type, never of the indeterminate one. They are nevertheless of different kinds. A *cinnus* with four to several main branchlets is found in the subsect. *Pannosi*, viz. in *C. asyrensis* Kotschy, *C. spicatus* Peter ex Hallier f.

and *C. euphraticus* Bornm., where it sometimes reaches a length of 4 cm., and in *C. hystrix* Vahl belonging to the Ser. Spinescentes. A helicoid cyme (bostryx) occurs also in the subsect. *Pannosi* and in *C. buschiricus* Bornm., and *C. cephalopodus* Boiss. The helicoid cyme is sometimes a double one as the axillary buds of both the bracts on the peduncle of the terminal flower develop into branchlets.

The subsect. *Acanthocladi* and the subsect. *Convolvulus* represent in their habit the two extremes found in this genus, viz. the twining and the spiny one. However, in both taxa the inflorescences are indeterminate, the only exception being those of *C. acanthocladus* Boiss. which are of the determinate type. In the intermediate groups, i. e. in those groups in which the plants are neither spiny nor twining, usually determinate inflorescences are found.

The bracts are similar to the ordinary leaves, though usually narrower and smaller, more rarely they are scale-like. The author follows Troll (1964) in calling every leaflike part subtending an inflorescence or a flower a bract. In the determinate inflorescences the number of the flowers equals $n + 1$, in which n is the number of bracts. The terminal flower possesses a pedicel which is a continuation of the axis of the branch.

The peduncles are either longer than the bracts or shorter or wanting. When we speak of the relative length of the peduncle in relation to the bract we mean that of the peduncle of the lowermost flower on the branch. The pedicel is usually as long as the calyx, but sometimes it is several times as long as the latter, e. g. in *C. glaucorum* Braun-Blanquet et Maire and *C. pitardii* Battand. If the pedicel is wanting, the two bracteoles are inserted just at the base of the calyx.

The bracteoles are usually minute and filiform, linear or rarely, subulate; in lax inflorescences with a large number of flowers, the bracteoles are enlarged and always linear. Their length in relation to that of the pedicel is for each species or, occasionally, for infraspecific taxa constant and may therefore be used as a diagnostic character for the distinction of related species or of infraspecific taxa. They are as long, longer or shorter than the pedicel, and exceeding or not exceeding the calyx. In some species with compact inflorescences the bracteoles are leafy, ovate or lanceolate, and situated in front of the flower because there is no place for their normal development; these larger bracteoles are confined to the outer flowers; the inner flowers are usually provided with narrower and smaller bracteoles.

In some of the species of this genus, for example in *C. stachydifolius* Choisy, *C. reticulatus* Choisy and *C. fruticosus* Pallas, the bracts bear in their axil more than one axillary bud arranged in a descending row.

In *C. maireanus* Pampan. the style of the terminal flower is mostly provided with three stigmas, while in *C. eremophilus* Boiss. this aberration is also but only rarely, found. This deviation of the normal condition is rarely observed in this genus.

The calyx

The calyx consists of five, mostly unequal, free sepals with a dextrorsely (helictically) or sinistrorsely (antihelictically) quincuncial aestivation: these two forms of aestivation may occur on the same plant. (The two outer sepals are 1+2, the middle one 3, the inner ones 4+5). The two outer ones are slightly unequal with the second one nearer to the axis. The middle one is mostly asymmetric, i. e. the two halves are unequal, the exposed half resembling exactly the two halves of the outer ones, whereas the other half resembles the halves of the inner ones. In some of the species with compact inflorescences, e. g. in *C. lanatus* Vahl, the three inner sepals are identical and much smaller than the two outer ones. The hairs on the outer sepals are frequently different from those on the inner ones, those on the inner sepals being softer and less densely packed, so e. g. *C. lanatus* Vahl, where the outer sepals are tomentellous, while the inner ones are sericeous with usually a greater density of hairs in the middle.

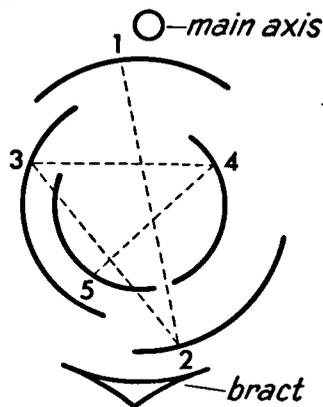


Fig.1 Aestivation of the calyx

In general the hairiness corresponds approximately with that of the shoots, but in other cases they are provided with a different kind of hairs. The outer sepals may be glabrous, and in this case the shoots too may be glabrous, but this is found but rarely, e.g. in *C. durandoi* Pomel; in most species with glabrous sepals, the stems are hairy. The margin is usually entire, rarely undulate; sometimes it is ciliate. Rarely the outer sepals possess a scarious rim. In the latter case the inner ones are convex and possess mostly a wider scarious rim than the outer ones. The sepals are either entirely colourless, and then sometimes scarious, or they are in the upper part green and in the lower part colourless. The outer sepals may be longer than, as long as, or shorter than the inner ones, sometimes they are very large and enclose the inner ones completely, e.g. in *C. hystrix* Vahl; in some species this may be regarded as a characteristic feature.

In some species the shape as well as the length of the sepals are very variable; in others these features are more or less constant.

In my study of herbarium material I observed that in species occurring in the eastern part of the Mediterranean region and in Greece the sepals are wider and shorter, so e.g. in *C. dorycnium* L. and in *C. compactus* Boiss.; this variability may be either of a genotypic or of a phenotypic nature, but this needs study in the field or in the experimental garden. The calyx persists round the fruit and increases sometimes slightly in size.

The corolla

The corolla is gamopetalous, in the bud with dextrorsely or antihelictically contorted aestivation, the strips along which the segments are united being folded inwards and backwards; after opening it often proves to be funnel-shaped with an entire or slightly lobed margin, rarely bell-shaped, e.g. in *C. fatmensis* Kunze; on the outside it shows five distinct stripes tapering from the base to the apex, which according to Rendle (1925) are the stronger central parts of the segments characterized by the presence of well-marked longitudinally extending vascular bundles; these stripes alternate with five obtriangular non-striated and weaker areas extending in the opposite direction. The five stripes are darker in colour and often pubescent, but the pubescence is almost always restricted to the upper part, whereas the tube usually remains glabrous. The corolla is generally longer than the calyx, varying in length from 5 to 40 mm.; rarely it is as long or only slightly longer than the latter, e.g. in *C.*

rhyniospermus Hochst. ex Choisy.

The corolla is generally pink and white, sometimes entirely pink, purple, pale violet or blue, e.g. in *C. siculus* L., or yellow, e.g. in *C. scammonia* L. and in *C. holosericeus* Marsch. Bieb. In *C. gharbensis* Battand. et Pit. the corolla is dark blue with a yellow base; in *C. tricolor* L. and *C. meonanthus* Hoffm. et Link the upper part of the corolla is blue, the middle part white and the lower part yellow.

The androecium

The five stamens are inserted at the base of the corolla tube; they are episepalous, which means that they alternate with the corolla segments, and they are always included. The filaments are usually of unequal length, slender in the upper part, but towards the base gradually dilated; the upper part is always glabrous, the dilated part is in some species glabrous, in others covered with multicellular glands; these glands are either sessile, e.g. in *C. scammonia* L., or provided with a more or less long stalk, e.g. in *C. canariensis* L. The anthers are equal, oblong to oblong-sagittate, rarely broadly oblong, at the apex usually retuse, but sometimes obtuse or acute; they are basifixed, 2-celled, introrse and longitudinally dehiscent; either entirely glabrous or, frequently, provided with sessile glands along the slit.

The pollen characters are in this family useful for the characterization of some of the genera. The *Convolvulus* pollen is prolate, i.e. ellipsoidal, and tricolpate, i.e. provided with three longitudinal furrows. An intrastaminal disc is always present; it is ring- or cup-shaped, glabrous or, rarely, on the inner side hairy, fleshy or membranous, entire or more often lobed; it rarely extends to the top of the ovary.

The pistil

The ovary is superior, ovoid, conical or globular, entire or slightly lobed, glabrous or densely covered with a velutinous pubescence, rarely puberulous. In species which at first view seem to possess a glabrous ovary it is frequently possible to detect a few hairs on the latter. The ovary consists of two carpels and is bilocular with an axile placenta; in each locule there are two sessile, erect and anatropous ovules, springing from the inner angle. The style is simple, usually slender and hairy or glabrous; in the presence or absence of

hairs it usually agrees with the ovary. If the ovary is conical, the style is short. There are as a rule two filiform, cylindrical or cylindrical-clavate stigmas; in the latter case the stigmas are very short, much shorter than the style; in the other case they may be as long as or longer or shorter than the style. The flowers are usually protogynous, which means that the stigmas mature before the anthers; the anthers however mature before the opening of the corolla. In exceptional cases the style of most of the terminal flowers is provided with three stigmas, so e.g. in *C. maireanus* Pamp. and in *C. eremophilus* Boiss.

Capsule and seeds

The capsules are subglobose, ovoid or, rarely, ellipsoidal, 2.5-13 mm. long, obtuse or, rarely, acute, and in conformity with the ovary glabrous or hairy. The dehiscence is loculicidal or irregular from the base. They are as long as or longer than the persistent calyx; the style too is frequently persistent. The pericarp is membranous or sclerotic. The capsule is either bilocular or by abortion unilocular. The seeds are 2-6 mm. long, they are trigonous when there are two seeds in a locule, two of the sides being plane and one convex; but when there is one seed in each of the locules, the seed is dorsiventral, one of the sides being plane and one convex. However, if the number of seeds per capsule is reduced to one, the latter is ellipsoidal; the shape of the seed depends therefore upon the number of seeds per capsule. If one of the locules contains two seeds and the other one a single seed, the dissepiment is shifted in the direction of the locule with the solitary seed.

The surface of the seed is either smooth or covered with large or small warts. Differences of this kind may be shown by varieties of the same species, e.g. in *C. rhinospermus* Hochst. ex Choisy var. *rhinospermus* and var. *laevis* Sa'ad. The seeds may also be densely puberulous or, rarely, hirsute. The endosperm is cartilaginous and surrounds the embryo; the latter has folded, bilobed cotyledons and the radicle is directed towards the base.

The indumentum

In the course of my taxonomic study of this genus I noticed a certain degree of variability in the kind of hairs occurring within the same species; this induced me to study the different types of indumentum to solve some taxonomic

problems.

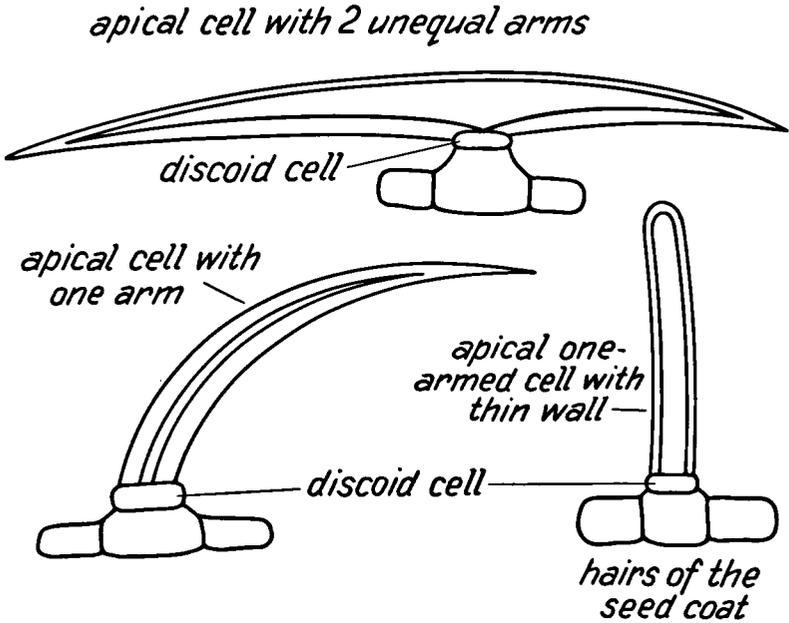


Fig.2 Different types of indumentum

The indumentum, i. e. the covering of hairs found on the various parts, is soft or at least not harsh to the touch. The hairs are tri-cellular, with an elongate apical cell and a discoid central one. The apical cell is provided with one or sometimes with two arms; in the first case it possesses, as a rule, a very thick wall which, according to Haberlandt (1918. 222), consists of cellulose. However, when it possesses two arms and sometimes also when it possesses but one arm, viz. in case the elongated apical cell is directed parallel to the surface, the wall is of unequal thickness, the upper side being thin, while the lower side, i. e. the side which faces the surface of the part from which the hair arises, is thick.

According to Uphof (158. 1962) who quotes Hallier (1893), Solereder (1899: 642) and Haberlandt (1918 : 222 and fig. 91 D) the discoid central cell is provided with a very thin outer wall, and as the latter, as Solereder has shown, is cutinized, this central cell cannot be held responsible for the absorption of water. The water can enter only through the thick wall of the apical cell, after which it has to pass the transverse walls which separate the three cells from

each other and which consist also of cellulose. The transverse wall which separates the apical cell from the central one is provided with elongated pits that are arranged parallel to each other. The central cell itself functions therefore merely as a water-pipe.

The differences between the various types of hairs found in this genus depend upon the shape and the length of the apical cell, the length varying from 0.2 - 5 mm., where as the apex of the hair is usually acroscopic, i. e. directed towards the top of the plant; occasionally, however, the hairs are retrorse, so e.g. in *C. stachydifolius* Choisy and *C. palestinus* Boiss.

The glands occurring in some species at the dilated base of the filaments are multicellular and in rows, and either sessile or stalked, their length depending upon that of the stalk. In some species of *Convolvulus* the anthers are provided on each side of the slits with a row of sessile glands.

The indumentum is but rarely missing in the genus *Convolvulus*, e.g. in *C. durandoi* Pomel, in which every part of the plant is completely glabrous. In other species the shoots and leaves are hairy, while the sepals are completely glabrous, so e.g. in *C. pseudocantabricus* Schrenk. The last mentioned species is easily distinguishable by this character from its nearest allies. In some species the indumentum appears to be almost evenly distributed over every part of the shoots and leaves; such an approximately uniform indumentum may be very dense, it may even be that all epidermis cells are grown out into trichomes, but it may also be less dense and even rather scanty. The various parts of the plant may either be covered by one type of indumentum or by two types, i. e. the apical cell of the hairs may be of one or of two kinds.

The names with which the various kinds of the indumentum are indicated do not enlighten us with regard to the exact shape of the apical cell of the hairs; in the sericeous indumentum, for instance, the apical cell may be provided with one or with two arms. In *C. fruticosus* Pall. it is provided with two arms and indumentum is here very dense, while in *C. linoides* Bornm. and in *C. leptocladus* Boiss., where the hairs possess also a two-armed apical cell, the hairs are scattered; the various parts of these plants are therefore described as shortly appressed pilose. In *C. boissieri* Steud. the shoots are covered with sericeous hairs which on the average are 1.1 mm. long; in these hairs the apical cell is provided with one arm. In *C. koeieanus* Bornm. the hairs are short and scattered and closely appressed to the surface; the various parts of this plant are therefore described as shortly appressed

pilose, but here too this description gives us no indication with regard to the structure of the hairs, i. e. to the fact that the apical cell is provided with one arm.

In some species, e.g. in *C. deserti* Hochst. et Steud., *C. prostratus* Forsk., *C. pilosellifolius* Desr., the stems may possess two different kinds of indumentum; they may be either appressed pubescent or appressed puberulous or more or less patently hairy; in these species we may distinguish therefore on account of these differences in the indumentum various infraspecific taxa.

In *C. lanatus* Vahl the basic type possesses a densely tomentellous indumentum consisting of short zigzag hairs which may be intermingled with longer patent hairs; in some of the forms the latter may increase in number till the whole shoot is covered by a woolly or tomentose indumentum.

From the above example it seems clear that a species may possess two kinds of hairs and that these two kinds may be present in various proportions, the two extremes being forms with but one type of hairs. It seems to me that this may be the result of segregation in crosses in which multiple genes are involved, but this hypothesis should be tested experimentally.

In some species the differences in the kind of hairs by which the shoots and the leaves are covered may be used for the distinction of infraspecific taxa. In *C. betonicifolius* Mill. var. *betonicifolius* the hairs are on the average 0.6 - 0.8 mm. long, while in the var. *tomentosus* Boiss. they are on the average 0.4 mm. long and more numerous. In *C. pitardii* Battand. var. *pitardii* the hairs on the lower side of the leaves are 0.5 mm. long and more or less spreading, whereas in the var. *leucochnous* (Benoist) Maire, they are 0.2 mm. long and appressed.

In *C. althaeoides* L. some authors consider the var. *b* of Linnaeus to be a distinct species, which they call *C. tenuissimus* Smith, but in the opinion of Linnaeus it differed from the type only in the indumentum and had to be regarded as a variety.

In some species the hairs on the outer sepals are often of the same kind as those on the shoots, so e.g. in *C. persicus* L.; but in others these hairs are different. The indumentum on the outer sepals, if present, is mostly different from that on the inner ones, which are mostly covered with softer appressed hairs. In *C. persicus* L. the outer sepals are tomentose, the inner one sericeous, whereas the middle sepal is on the exposed part tomentose and on the covered part sericeous.

The various kinds of trichomes found on the seed coat are often taxonomically important, but in *Convolvulus* differences of this kind cannot be used for the characterization of related species, as such species always have the same kind of indumentum. However, in some cases, where the seed coat may or may not be covered by tubercles, the presence or absence of the latter may be used for the distinction of infraspecific taxa. It seems to me that in those species in which the apical cell of the hairs may be one-armed and two-armed, the hairs on the seeds are of the same kind as those on the shoots, so e.g. in *C. fruticosus* Pall. The hairs are always of the tricellular type, but there may nevertheless be slight differences; for instance if the apical is one-armed, it may have an obtuse apex and a thin wall; if on the other hand, it is two-armed, it is always as described before. The hairs on the seeds are 0.05 - 0.3 mm. long and 0.01 - 0.03 mm. in diameter, i.e. 4-15 times as long as thick. In *C. dorycnium* L. the hairs are very short and thick, while in *C. erinaceus* Ledeb. they are long and relatively thin.

A useful help in the identification of the species is the presence or absence of hairs on the ovary. However, ovaries which at first sight look glabrous, may bear a few hairs. The hairs on the ovary are always provided with a one-armed, thick-walled apical cell.

The hairs are in the fresh state always white, but when the specimens are kept for a long time in the herbarium, the colour of the hairs may change to brown. This change in the colour of the hairs may be due either to chemical or to physiological factors, but this will have to be tested experimentally. The colour of the hairs, at any rate, cannot be used for the distinction of species or of units of infraspecific rank.

3. KARYOLOGY

Introduction

The family Convolvulaceae has received but little attention from the side of karyologists, despite the fact that its genera (ca. 50) are distributed throughout the greater part of the world, viz. from the temperate to the tropic zone. Moreover, most of the species are herbs, and seem to be easily accessible for karyological studies. The delimitation of the genera of the Convolvulaceae still presents difficulties, and karyological studies may very probably contribute

to a better understanding of the generic limits. The present author met with considerable difficulties in delimiting some widely distributed species, so as *C. betonicifolius* Mill, *C. althaeoides* L. and *C. prostratus* Forsk. It seems desirable to carry out karyological studies on specimens obtained from all parts of the area from which these species have been recorded. As the climatic conditions in the Netherlands are not favourable for the cultivation of several of these species on a larger scale, the author intends to continue her studies in the karyology of *C onvolvulus* after her return to Egypt.

Material and methods

The plants were grown from seeds which were either collected in the wild or obtained upon request from various Botanical Gardens. The determination of the chromosome number was carried out by the study of roottip mitoses. The roottips were fixed in Karpechenko's fixative, embedded in paraffin and stained according to Heidenhains haematoxylin method. Voucher specimens as well as microscopical preparations have been deposited in the Botanical Museum and Herbarium of the State University of Utrecht.

Results

The species which so far have been studied are listed in the Table. The species are arranged according to the subsections to which they belong. A survey of the findings of previous investigators has also been included.

Discussion

C. prostratus Forsk. (subsectio Diffusi) was studied by Tandon and Mzalik (1959). This species, which is widely distributed in the Saharo-Sindian region, shows differences in the size of the flowers. The haploid number of the small-flowered plants turned out to be 9, whereas in the large-flowering plants the haploid number was found to be 18. Singh (1951) reported for the small-flowering plants $n = 10$. These observations indicate that *C. prostratus* is represented by diploid and tetraploid forms. That in 50 per cent of the pollen mothercells 18 bivalents were found, suggests that it might be an allotetraploid. However, the fact that the remaining 50 per cent showed a multivalent association, seems to indicate that it is an autotetraploid or segmental polyploid. As true

A survey of the chromosome numbers of the investigated species, with references to the collection numbers of the present study and to the finding of other investigators.

Species, sections and subsections	collection number	2n	References
Sectio Inermes			
subsection Floridi			
<i>C. floridus</i> L.f.	.....	30	Larsen (1960)
subsectio Oleifolii			
ser. Oleifolii			
<i>C. cantabricus</i> L.	.....	30	Baksy (1958); 2n = 22 Dolcher & Pignotti (1960)
subsectio Diffusi			
<i>C. tricolor</i> L.	.....	20	Kano (1929)
<i>C. sabatius</i> Viv.	CV 19	22	.....
<i>C. humilis</i> Jacq.	.....	22	Heitz (1926)
<i>C. gharbensis</i> Batt.	CV 33, CV 51 A	22	.....
<i>C. supinus</i> Coss. et Kralik	.....	44-46	Reese (1957)
<i>C. meonanthus</i> Hoffmg. et Link	CV 71 A	26	.....
<i>C. prostratus</i> Forsk	.....	20, 18	Singh (1951) 2n = 20, 2n = 18 and 2n = 36 Tandon and Mzalik (1959); n = 20 Baquar et al(1965) 2n = 40
<i>C. siculus</i> L. var. <i>elongatus</i> (Willd.) Batt.	CV 15; CV 53 C; CV 54 A; CV 58 c, CV 66/19	22	Heitz (1926): 2n = 22
<i>C. siculus</i> L. var. <i>siculus</i>	CV 18, CV 56 A	44	Heitz (1926): 2n = 44
Sectio Convolvulus			
Subsectio Convolvulus			
<i>C. arvensis</i> L.	CV 3 A	50	Wolcott (1937) 2n = 50; Hagerup (1941a) 2n = 50
<i>C. farinosus</i> L.	CV 48 A	24	.....
<i>C. fatmensis</i> Kunze	CV 26	20	.....
<i>C. althaeoides</i> L.	.....	40	Reese (1957)
<i>C. scammonia</i> L.	.....	24	Heitz (1926)

allopolyploid forms usually do not show multivalent associations, the tetraploid form of *C. prostratus* is considered to be a segmental polyploid or an autopolyploid (Tandon and Mzalik, 1959). A large-flowering, densely hairy plant was regarded by Duthie (1911) and already at an earlier time by Hooker (1885) as a variety. These plants seem to be identical with the tetraploid form studied by Tandon and Mzalik.

According to Baquar et al. (1965) the haploid number is 20. This species, therefore, appears to display aneuploidy as more than one basic number (9 and 10) have been reported.

Heitz (1926) suggested that *C. siculus* L. var. *siculus* ($2n = 44$) may be a tetraploid form derived either from *C. elongatus* Willd. ($2n = 22$) or from *C. humilis* Jacq. (quoted as *C. undulatus* Cav., $2n = 22$). Battandier (1888) considered *C. elongatus* to be a variety of *C. siculus*. The present author agrees with Battandier that these two taxa are closely related; apart from the number of chromosomes the only differences between them seem to be the length of the pedicel and that of the bracteoles.

C. gharbensis Battand. and *C. humilis* Jacq. are closely similar to each other in their external features and have also the same number of chromosomes. *C. sabatius* Viv. has the same chromosome number as these two species, but differs considerably from them in its other characters. It shows some affinity to *C. siculus* of which the var. *elongatus* has the same number of chromosomes, and to *C. supinus* Coss. and Kralik in which, as in *C. siculus* var. *siculus* $2n = 44$. Therefore, the inclusion of these species in the subsection *Diffusi* is corroborated by the karyological evidence.

C. tricolor L. ($2n = 20$) and *C. meonanthus* Hoffmg. et Link ($2n = 26$) have also been placed in the subsection *Diffusi*. The latter species was treated by Choisy (1845) and others as a variety of the first, but these two taxa differ rather conspicuously in their external characters, and this opinion is not supported by the karyological evidence either.

In the subsection *Convolvulus* *C. fatmensis* Kunze and *C. farinosus* L. have long chromosomes. They are doubtless morphologically related, but have different chromosome numbers. The chromosome number of *C. scammonia* L. could not be determined by the present author. According to the literature it has the same number of chromosomes as *C. farinosus* L., to which it is closely related. *C. arvensis* L. and *C. althaeoides* L. have the highest chromosome numbers that so far have been

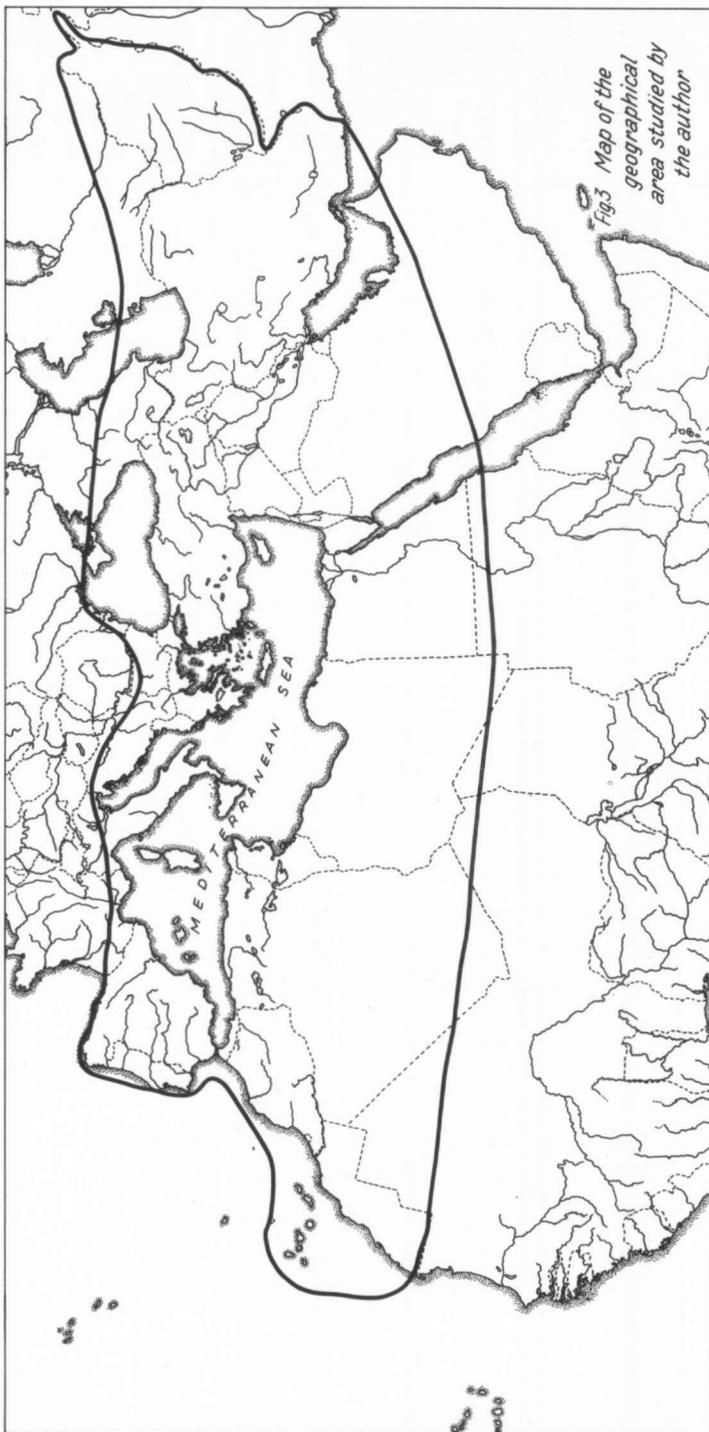
recorded in this subsection, but they can not be regarded as nearly related.

In *C. cantabricus* L., which belongs to the subsection *Oleifolii*, the diploid number is according to Baksay (1958) 30. In Baksay's opinion the basic number of *Convolvulus* would be either 10 or 11. The haploid number 15 is known from species belonging to other genera of the *Convolvulaceae*. Dalcher and Pignatti (1960), however, found in this species for the diploid number 22. A reinvestigation, therefore, is desirable. *C. floridus* L.f., which belongs to the subsection *Floridi*, is endemic in the Canary Islands. Larsen (1960) determined the chromosome number and found $2n = 30$. Therefore it seems highly probable that in the genus *Convolvulus*, besides species with the basic numbers 10, 11, 12 and 13, also species with the basic number 15 occur. The latter number is characteristic for most of the genera of the family *Convolvulaceae* (*Ipomoea*, *Merremia*, *Hewittia*). In *Calystegia*, the genus which is most closely related to *Convolvulus*, the basic numbers are 11 and 12, two numbers therefore which are also met with in *Convolvulus*.

4. POLLEN MORPHOLOGY

The *Convolvulus* pollen grains are 3-colpate, and usually more or less spheroidal. The colpi are long and broad. The exine is thick; the nexine (endexine) thinner than the sexine (ektexine). The columellae are distinct, long, branching in the upper part (digitate). The tectum covering the columellae is very thin and provided with small holes (tectum perforatum). According to Lewis and Oliver (1965) the *Calystegia* pollen grains are spheroidal and pantotreme, as was stated already by Hallier (1893), and are provided with 20 - 40 apertures. The apertures are more or less circular; the sexine varies locally in thickness. According to Erdtman (1952) the *Ipomoea* pollen grains too have many pores, but their exine is spiniferous.

From these data it seems probable that the pollen grains of the three genera *Convolvulus*, *Calystegia* and *Ipomoea* are completely different from each other.



5. GEOGRAPHY

The area occupied by the genus *Convolvulus* extends from latitude 60° N to 46° S, but most of the species occur between latitude 20° and 45° N. According to Rendle (1925) and to Lawrence (1955) the total number of *Convolvulus* species is 200, but according to the Index Kewensis the total number would be about 300, but in this number, of course, some synonyms may be included. The genus occurs mainly in the temperate and subtropic regions; it is more rare in the tropics, and according to the previously cited authors its principal development was reached in the Mediterranean region and in Western Asia, but it seems to me that the number of species in this part is about the same as that in N. and S. America. The study of the present author was confined to the species occurring in one of the principal areas of distribution of the genus, viz. to those found in the Mediterranean region and in the part of Western Asia outside the tropics, i. e. in the area consisting of S. Europe, N. Africa, the Canary Isles and Madeira and eastwards extending via Turkey and Iraq to Iran, Afghanistan, East Turkmeniya, the Caucasus, the Krym (Crimea) and the coast of the Black Sea.

The third area with a high concentration of species is found in S. and Tropical Africa, especially in the southern part of that continent. In Central Asia the largest number of species is found in India, while in the other parts but few species occur. The genus *Convolvulus* does not occur in Japan and is but poorly represented in N. Guinea, where but one species has been found, Australia and New Zealand and also in the West Indies. In Mexico and North America a large number of species are found, in Brazil and Chili a smaller number, while in the other parts of America but few species occur.

The species with the largest area of distribution is *C. arvensis*, which occurs over the whole world with the exception of Australia.

The Canary Isles and Madeira, situated at latitude 28° - 32° , possess very characteristic endemic species belonging to different subsections and series, e.g. *C. scoparius* L.f. belonging to the subsection *Inermes*, series *Inermes*, *C. floridus* L.f. belonging to the subsection *Floridi*, whereas the two other endemic species, *C. fruticosus* Desr. and *C. canariensis* L., belong to the subsection *Frutescentes*.

Of *C. boissieri* Steud. and *C. mazicum* Emberg., which belong to the subsection *Compacti*, the first is endemic in Spain, while the second is found in Morocco at a latitude of 35° - 40° . The other species of this sub-

section are found in Greece, Albania and Turkey. One of the species is endemic in Greece, viz. *C. radicosus* Heldr. et Sart., whereas *C. compactus* Boiss. is distributed over the two other countries too; the remaining species of the subsection are endemic in Turkey. So Turkey may be considered to be a variant centre of this subsection. *C. lanuginosus* Desr. is distributed in Spain, N. Morocco and S. France. The most nearly related species is *C. calvertii* Boiss., which is restricted to Turkey, the Caucasus and the Krym (Crimea). These two species may have originated from one ancestor, and may afterwards have been separated geographically.

The Mediterranean species with the largest area of distribution is *C. althaeoides* L., which inhabits the whole Mediterranean region, the Canary Isles and Madeira, between latitude 31° - 45° N, but the area of *C. lineatus* L., another species which is wide-spread in the Mediterranean region, extends outside this region to Iran, Afghanistan, Pamir-Alai and Tien-Shan, but this species does not occur in Madeira and the Canary Isles. *C. cantabricus* L. is another Mediterranean species; it occurs in countries situated above lat. 33° N. but is not found in the Mediterranean part of Egypt, i. e. below lat. 31° .

C. betonicifolius Mill. is an inhabitant of the Eastern part of the Mediterranean region; in Italy and South France it is found too, but here it seems to be naturalized. *C. farinosus* L. is a tropical species naturalized in Portugal.

Of the 118 species dealt with in this revision 63, i. e. slightly more than one half, were found in Iran, Iraq and Turkey. From Iran 42 species are recorded, of which 13 were not found elsewhere. From Turkey now 29 species are known, of which 12 seem to be confined to that country. It seems that in the area studied by the author this part may be considered the variant centre of the genus *Convolvulus*.

Other species with a limited distribution are found in North Africa. However, these species may prove to be more widely distributed, because a large part of this area is floristically not well known, and it is therefore not impossible that some of these species may have a wider distribution than we know at present. This, however, does not apply to the characteristic endemic species of the Canary Isles and Madeira.

C. hamarinensis Rech.f. was considered to be endemic in Iraq, but during the course of this study it was found to occur also in Arabia.

6. ECOLOGY

The species of *Convolvulus* are mainly desert and mountain plants. A great part of the area studied by the author belongs to the Sahara - Indian, Irano - Turanian and Mediterranean phytogeographic regions as delimited by Eig (1931). *C. prostratus* Forsk. is a typical Sahara - Sindian species; *C. dorycnium* L. is an example of an Irano - Turanian species, cf. Zohary & Feinbrun (1951). The *Convolvulus* species are but rarely found in forests. An exception is formed by some of the species which are endemic in the Canary Isles. These plants are climbing in high forest trees, so e.g. *C. canariensis* L. Most of the species inhabit regions of a middle or high elevation. They rarely invade the steppes or settle on the sandy soils of river banks. They prefer calcareous soils and clay and sandy soils on slopes and in vallies. *C. persicus* L. and *C. secundus* Desr. are noteworthy because they mainly inhabit sandy maritime dunes. *C. arvensis* L. is a weed in fields and waste places, but is never found in true deserts. *C. pyrrotrichus* Boiss. prefers conglomerate hills. The species of the subsection *Compacti* occur at high elevations and grow mainly on rocky mountains and in compact soil at alt. 1800 - 3000 m.

7. USES

The genus *Convolvulus* is economically of very slight importance. Although many species of this genus have relatively large and showy flowers, but few of them are grown as ornamental plants, so e.g. *C. tricolor* L.; *C. althaeoides* L., *C. arvensis* L., *C. lineatus* L., and *C. lanuginosus* Desr. are used for the adornment of hedges. Of some of these species horticultural varieties differing in the colour of their flowers are grown. Some of the species endemic in the Canary Isles are used in gardens as ornamental subshrubs, e.g. *C. floridus* L.f. and *C. scoparius* L.f., and the roots and wood of these species (Bailly, 1937) furnish the fragrant powder known as "bois de rose". According to Bonnier (1912) *C. althaeoides* L. possesses purgative properties; the ashes contain 26.2% lime, 28.3% potash, 16.8% phosphoric acid, 12.8% silicate, 7.7% magnesium, 4.6% sulfuric acid, 3.6% ferric oxide. The roots of *C. scammonia* L. give the scammony, a yellow-brown resin which was formerly used as a purgative, but which is

now no more employed. Grigoryev (1953) states that *C. cantabricus* L., *C. korolkowii* Regl. et Schmalh. and *C. divaricatus* Regl. et Schmalh. are important as pasture plants. They are grazed mainly in autumn and winter, rarely in summer. *C. arvensis* L. is a bad weed, which is difficult to keep under control. This species is a perennial which forms subterranean stolons. In this way it is able to effect a rapid vegetative propagation, and this explains that it often appears in large numbers in fields. At the same time it is a good fodder plant willingly eaten by cattle.

TAXONOMIC PART

MATERIALS

The author studied about 9500 herbarium specimens borrowed from different herbaria; some types were sent in loan, and several types of historical fame were studied by her during her visits to Paris, Geneva, Madrid and London; the abbreviations used in indicating those herbaria are those of the Index Herbariorum (The Herbaria of the world ed. 5, Utrecht, 1964).

Botanisches Museum, Berlin (B)

British Museum (Natural History), London (BM)

Botanical Museum and Herbarium, Copenhagen (C)

Department of Botany, Faculty of Science, Cairo University, Cairo (CAI)

The Herbarium Section, Ministry of Agriculture, Dokki, Cairo (CAIM)

Botanical institute of the University of Coimbra, Coimbra (COI)

Royal Botanic Garden, Edinburgh (E)

The East African Herbarium, Nairobi (EA)

Herbarium Universitatis Florentinae, Istituto Botanico, Firenze (FI)

Conservatoire et Jardin botaniques de Genève (G); (G-Boiss); (G-DC)

Systematisch-Geobotanisches Institut, Universität Göttingen (GOET)

Institut für Systematische Botanik und Pflanzengeographie der Martin-Luther Universität, Halle (HAL)

Staatsinstitut für allgemeine Botanik und Botanischer Garten, Hamburg (HBG)

Institut für spezielle Botanik und Herbarium Haussknecht, Jena (JE)

The Herbarium and Library of the Royal Botanic Gardens, Kew (K)

Rijksherbarium, Leiden (L)

Herbarium of the Komarow Botanical Institute of the Academy of Sciences of the U.S.S.R. , Leningrad (LE)

The Linnaean Society of London, London (LINN)

Estac̄ao Agronomica Nacional, Oeiras (Sacavem is the old name of the city) according to the recent address of the herbarium (LISE)

Instituto "Antonio Jos e Cavanilles", Jard n Bot nico, Madrid (MA)

Institut de Botanique, Universit  de Montpellier (MPU)

Museum National d'Histoire Naturelle, Laboratoire de Phan rogamie (P); (P-JU); (P-LA)

Institut scientifique ch rifien, Laboratoire de Phan rogamie et Laboratoire de Cryptogamie, Rabat (RAB)

Herbarium, Staatliches Museum in Stuttgart, Ludwigsburg (STU)

Botanical Museum and Herbarium, Utrecht (U)

Naturhistorisches Museum, Wien (W)

University of Khartoum Department of Botany (this herbarium is not mentioned in Ind. Herb.)

The author expresses her deep gratitude to the directors and curators of the above mentioned herbaria, and likes to thank the staff members of the Geneva, Paris, Madrid, Kew and the British Museum (Natural History) herbaria for their hospitality and for the facilities for studying the type specimens, and especially to Dr. W. Stearn for his help in solving some of the problems with regard to the types of Linn  and Miller.

Citation of the infraspecific taxa treated by the present author

The term variety is used for infraspecific taxa if the latter are growing together in the same area. In case the infraspecific taxa occupy fully separated, adjacent or but slightly overlapping areas the author calls them subspecies.

Localities

The author cites the modern names of the localities where the specimens were collected, while the old names indicated on the labels are put between brackets; in case it was not possible to find the localities, either on modern or on old maps, the author indicates in a note that the localities are copied from the labels.

The following atlases and literature were used:

Andrees Allgemeiner Handatlas, Ambrosius, E., 1921.

The Times atlas of the world, Mid. Century Edition, edited by J. Bartholomew. 1959.

Davis, P.H. "Old and New Place names used in studies on the Turkish flora" in Notes from the Royal Botanic Garden, Edinburgh, 22(6): 587-591. 1958.

Grigoryev, J.V.S., Flora USSR 19: 6-33. 1953.

Stearn, W., Botanical Latin 215-231. 1966.

Webster's Geographical Dictionary, 1965.

Diagnosis and subdivision of the Genus Convolvulus

Convolvulus Linn., Sp.Pl. 1: 153.1753 (31 specs. 1 subsequently transferred to *Argyria*, 3 to *Evolvulus*, 3 to *Calystegia*, 11 to *Ipomoea*); De Juss., Gen.Pl. 133.1789; Brown, Prodr. Fl. Nov. Holland et Ins. van-Diemen I: 382.1810; Don, Gen. Hist. Dichlamyd. Pl. IV: 252.1838; Choisy in DC., Prodr. IX: 399.1845; Ledebour, Fl. Ross. Enum. Plant. III: 87.1846-51; Boiss., Fl. Or. IV: 84.1875; Bentham et Hooker, Gen. Plant. 2 (2): 874.1876; Hallier in Bot. Jahrb. f. Syst., Pflanzengesch. u. Pflanzengeog. 16: 579.1893; Peter in Engl. et Prantl, Natürl. Pflanzenfam. IV (3a): 33.1897; Grigoryev, Fl. USSR XIX: 6.1953; Rechinger f., Fl. Low. Iraq 481.1964.

Stevogtia, Neck., Elem. II: 23.1790.

Merremia Dennst., Schluss. Hort. Malab. 34.1818.

Rhodorrhiza Webb. in Bot. Reg. Misc. 69.1841.

Pantočsekiia Griseb. in Oestr. Bot. Zeitschr. 267.1873.

Calyx consisting of five, mostly unequal, free sepals, of which the middle one, moreover, is mostly asymmetric, the two halves being unequal; sepals hairy or, rarely, glabrous; apex acute, acuminate or obtuse; margin mostly entire, rarely undulate. Corolla funnel-shaped with spreading limb or, rarely, bell-shaped, with five distinct stripes on the outside, tapering from the base to the apex, these stripes are mostly hairy, rarely glabrous, but the tube is always glabrous. Stamens five, included, inserted at the base of the corolla tube, epipetalous; filaments unequal, attached basally to the anthers, thin above, dilated at the base, the dilated part either glabrous or with sessile or

stalked glands; anthers equal, oblong to oblong-sagittate, and with an obtuse, retuse or acute apex. Ovary ovoid, rarely conical or globose, hairy or glabrous with a cup-shaped or annular disc at the base, bilocular, each locule with 2 erect, anatropous, sessile ovules. Style hairy or glabrous, filiform or cylindrical; stigmas two, glabrous, filiform, cylindrical or cylindrical-clavate. The capsule is either bilocular or by abortion unilocular; the dehiscence is loculicidal or irregular from the base. The shape of the seed depends upon the number of seeds per locule; the surface is covered by hairs or by small or large warts, rarely glabrous; the cotyledons are folded-bilobed. Either spiny shrubs or subshrubs or prostrate or erect herbs; the branches often twining or trailing. Leaves simple, alternate, sessile or petiolate. Flowers solitary or in different kinds of inflorescences, each flower subtended by two bracteoles, inserted at the base of the pedicel, or sometimes, if the latter is wanting, at the base of the calyx.

Type species: *C. arvensis* L.

Key to the Sections

- 1a. Plants spiny.....Sectio I. Acanthocladi
- b. Plants not spiny.....2
- 2a. Stems not twining, but either erect and rigid or prostrate. Sectio II. Inermes
- b. Plants twining or at least with twining branches.....Sectio III. Convolvulus

Key to the Subsections

- 1a. Shoots erect or prostrate, not twining.....2
- b. Shoots or at least the branches twining.....10
- 2a. The young branches rigid, the older ones spiny..Subsect. 3. Serospinescentes
- b. The young branches already spiny.....3
- 3a. Peduncles distinct and always persistent.....Subsect. 1. Acanthocladi
- b. Peduncles short or wanting; if long, then deciduous..Subsect. 2. Spinescentes
- 4a. Plant pulvinate.....Subsect. 8. Compacti
- b. Plant not so.....5
- 5a. Flowers numerous at the top of branches in a more or less distinct panicle
.....Subsect. 5. Floridi
- b. Flowers not so.....6

- 6a. Shoots softly herbaceous, prostrate or ascending, annual or perennial....
.....Subsect. 10. Diffusi
- b. Shoots rather stout or at least rigid, always perennial.....7
- 7a. Flowers terminal and axillary, more or less congested at the top.....
.....Subsect. 7. Oleifolii
- b. Flowers not so.....8
- 8a. Shoots intricately branched; branches divaricate or fastigate.....
.....Subsect. 4. Inermes
- b. Shoots not so.....9
- 9a. Shoots partly leafy. Flowers in terminal capitula. Subsect. 6. Lanuginosi
- b. Shoots entirely leafy. Flowers in axillary capitula or, rarely, solitary...
.....Subsect. 9. Pannosi
- 10a. Shrubs or subshrubs. Only the branches twining. Subsect. 12. Frutescentes
- b. Annual or perennial herbs..... Subsect. 11. Convolvulus

Sectio I. Acanthocladi Boiss., Fl. Or. IV: 84.1875, p.p.; Petrov in Bull. Soc. Nat. Mosc. n.s. 44: 132.1935; Grigoryev, Fl. USSR. XIX: 14.1953; Rechinger f., Fl. Iran (Conv.) 8.1953.

Syn.: these include all the synonyms cited under the subsections of this section.

Shrubby or subshrubby, the younger as well as the older branches either ending in spines or bearing spines which represent the upper sterile peduncles or the peduncles of the fallen flowers.

Type species: *C. acanthocladus* Boiss.

Subsectio 1. Acanthocladi

Syn.: *Orthocaulos* Don, Gen. Syst. Gard. Bot. IV: 283, 1838, p.p.; Choisy in DC., Prodr. IX: 399.1845, p.p.; §7 *Spinosi* Peter in Engler et Prantl, Natürl. Pflanzenfam. 4 (3a): 34.1897.

Sect. I. *Acanthoclada* § *Leiocalycini* and *Fruticosi* Petrov l. c.

Peduncles persistent, distinct; pedicels recurved deciduous; young and old branches bearing spines.

Type: the same as that of the Section.

Other species: *C. argyracanthus* Rech. f., *C. fruticosus* Pall., *C. leiocalycinus* Boiss.; *C. spinosus* Burm., *C. retrosepalus*

Sa'ad.

The species of this subsection grow in rocky steppes and on the slope of hills and mountains at an altitude of 160 to 200 m. In *C. fruticosus* the pedicels are provided with two spines arising from the axil of the two bracteoles and therefore representing the sterile branches of a cyme, but in other species the spines represent primary peduncles.

Subsectio 2. Spinescentes Boiss. l. c., p. p.

Syn.: *Orthocaulos* Don l. c., p. p.; Choisy l. c., p. p.,

Orthocaulos § 9. *Cephalophori* Peter l. c.

Sect. I. *Acanthoclada* ser. *Tragacanthoides* Petrov l. c.
p. 134.

Acanthocladi Boiss. l. c., p. p.; Rechinger f. l. c., p. p.;

Rechinger f. in Anz. Mat. Naturw. Kl. Oester. 1: 11. 1963.

Peduncles either short or even wanting or long, but in the latter case deciduous; flowers axillary or terminal; either congested in capitula or solitary or two or three together.

Type species: *C. hystrix* Vahl.

Other species: *C. caput-medusae* Lowe; *C. hamarinensis* Rech. f.;
C. oxyphyllus Boiss.; *C. spinifer* Pop.; *C. ulicinus* Boiss.;
C. urosepalus Pau.

In *C. hystrix* the flowers are usually born on very short spiny twigs, while in the other species of this subsection the flowers are born on ordinary branches.

Subsectio 3. Serospinescentes Sa'ad subsectio nov. a subsectionibus aliis ad sectionem *Acanthocladorum* pertinentibus ramis junioribus nondum spinescentibus, rigidis tamen distinguenda.

Syn.: *Orthocaulos* Don l. c., p. p.

Spinescentes Boiss. l. c., p. p.; Rechinger f., Fl. Iran p. 11.

Acanthocladi Boiss. in Rechinger f., op. c. p. 8, p. p.

The older branches with spiny tips; the young ones not spiny, but rigid. Flowers congested in terminal or axillary capitule.

Type species: *C. lanatus* Vahl.

Other species: *C. oxysepalus* Boiss.; *C. turrillianus* Parsa; *C. virgatus* Boiss.

C. lanatus Vahl is more widely spread than the three other species,

which are all three endemic in Iran.

C. oxyphyllus Boiss. continues in its two varieties the two characters of the subsections *Acanthocladi* and *Inermes*. In the var. *oxyphyllus* the branches are not spiny, but in the var. *oxycladus* Rech. f. they are spiny. This phenomenon may perhaps be taken as an indication that there is a degradation in the habit of the plants of this genus from stiff spiny shrublets to the delicate twining herbaceous ones, from which the name of the genus was derived. However the versus that the development may have proceeded in the opposite direction can also be defined.

Sectio II. *Inermes* Boiss. op. c. p. 85; Petrov op. c. p. 143; Rechinger f. Fl. Iran p. 13.

Syn. : these include all the synonyms cited under the subsections and series of this section.

Shrubs or subshrubs; shoots not twining, either erect and rigid or prostrate.
Type species: *C. chondrilloides* Boiss.

Subsectio 4. *Inermes*.

Syn. : including all the synonyms of the series of this subsection.
Shoots rigid, either intricately branched with the branches divaricate or fastigiately branched.
Type species: the same as that of the section.

Series a. *Inermes*, a serie alia ad subsectionem *Inermiam* pertinente inflorescentiis axillaribus e floribus 2-7 compositis et praesentia bractearum bracteolarumque distinguenda.

Syn. : *Orthocaulos* Don l.c., p.p.; *Choisy* l.c., p.p.

Acanthocladi Boiss. op. c. p. 84. p.p.; Rech. f., op. c. p. 8.

Spinescentes Boiss. l.c., p.p.; Rech. f., op. c. p. 11 &

Dorycnioides & *Virgati* Peter l.c.

Micranthi Petrov op. c. 135.

Divaricati Petrov op. c. p. 136.

Chondrilloides Petrov l.c.

Glabricalyces Petrov op. c. p. 139.

Rigidirami Petrov op. c. p. 135; Grigoryev op. c. p. 16; Rech. f. op. c. p. 12.

Rectangulares Rech. f., op. c. p. 17.

Inflorescence axillary and consisting of 2-7 flowers or reduced to a single flower. Bracts and bracteoles present.

Type species: the same as that of the section.

Other species: *C. divaricatus* Regl. et Schmalh.; *C. dorycnium* L.; *C. eremophilus* Boiss.; *C. erinaceus* Ledeb.; *C. koeieanus* Bornm. ex Koeie; *C. korolkowii* Regl. et Schmalh.; *C. leptocladus* Boiss.; *C. lindbergii* Sa'ad; *C. pseudocantabricus* Schrenk; *C. rectangularis* Rech. f.; *C. sarothrocladus* Boiss.; *C. scoparius* L.f.; *C. turcomanicus* (Ktze) V.Petr.

There is a disjunction in the geographic distribution of the species of this series as *C. scoparius* is endemic in the Canary Islands whereas the rest of the species are found in the eastern part of the Mediterranean region.

Series b. Ebracteati Sa'ad series nov. a serie alia ad subsectionem *Inermium* pertinente floribus omnibus terminalibus et absentia bractearum bracteolarumque distinguenda.

Syn.: *Orthocaulos* Don in Choisy l.c., p.p.; Peter l.c., p.p.

Acanthocladi Boiss., in Rech.f., Fl. Iran op c. p. 8, *Inermis* Boiss. op. c. p. 85, p.p.

Type species: *C. gracillimus* Rech. f.

Other species: *C. aucheri* Choisy; *C. linoides* Bornm. The geographical distribution of these three species is discontinuous. It seems that they are all three rare species which are known so far almost exclusively from their type specimens.

Subsectio 5. Floridi Sa'ad nov. subsectio a subsectionibus aliis ad sectionem *Inermium* pertinentibus floribus numerosis et ad apicem ramorum in paniculis dispositis distinguenda.

Syn.: *Orthocaulos* Don l. c., p.p.; Choisy l. c., p.p.; Peter l. c., p.p. *Doricnoidei* Peter l. c., p.p.

Shrubs with numerous flowers at the top of the branches in the form of a panicle.

Type species: *C. floridus* L. f.

This subsection consists but of one species which is endemic in the Canary Islands.

Subsectio 6. Lanuginosi Peter l. c., p.p.; Petrov op. c. p. 143.

Syn.: *Strophocaulos* Don op. c. p. 288, p.p.; *Orthocaulos* Don ex Choisy l. c., p.p.; Grigoryev op. c. p. 23; Rechinger f., Fl. Iran p. 13.

Flowers numerous, terminal in heads; base of the shoots ligneous; indumentum sericeous.

Type species: *C. lanuginosus* Desr.

Other species: *C. abdallahi* Sa'ad; *C. calvertii* Boiss., *C. commutatus* Boiss.; *C. schirazianus* Boiss.; *C. sericocephalus* Juz.

C. lanuginosus is the only species which invades the western part of the Mediterranean region, viz. Spain and S. France. The other species of this subsection occupy a continuous geographical area in the orient. Spain and S. France are considered to be a recent extension of the area of this section.

Subsectio 7. Oleifolii Peter l. c.

Syn.: these include all the synonyms cited in the two series of this subsection.

Shoots with axillary and terminal flowers congested at the top.

Type species: *C. oleifolius* Desr.

Series c. Oleifolii, sepalis non gibbosis a serie alia ad subsectionem *Oleifoliorum* pertinente distinguenda.

Syn.: *Orthocaulos* Don l. c., p.p.; Choisy l. c., p.p.; Peter l. c., p.p.; Sauvage et Vindt, Fl. Maroc II: 22.1954, p.p.

Inermes Boiss. l. c., p.p.; Ser. *Lineati* Petrov op. c. p. 145; Grigoryev op. c. p. 23; Rechinger f., Fl. Iran p. 13, p.p.

Solutoracemosa Petrov, Grigoryev op. c. p. 21.

Sepals not gibbous.

Type species: the same as that of the subsection.

Other species: *C. cantabricus* L.; *C. cneorum* L.; *C. lineatus* L.

C. lineatus and *C. cantabricus* are widespread in the Mediterranean region; their area extends to Iran, Afghanistan and S. USSR. *C. oleifolius* and *C. cneorum*, on the other hand, are restricted to the eastern part of the Mediterranean region.

Series d. Physocalycini Petrov l. c. p. 144.

Syn.: *Orthocaulos* Don l. c., p.p.; Choisy l. c., p.p.; §3 *Oleifolii* Peter l. c., p.p.

Inermes Boiss op. c. p. 85, p.p.; Grigoryev op. c. p. 23.

The inferior part of the outer sepals gibbous.

Type species: *C. holosericeus* M.B.

This series includes only one species which occurs in Turkey, Krym (Crimea) USSR., the Caucasus, Yugoslavia and Bulgaria.

This monotypic series differs from the series *Oleifolii* by its gibbous sepals.

Subsectio 8. Compacti Boiss. l. c. p. 85, emend Sa'ad.

Syn.: *Orthocaulos* Don, Choisy l. c., p.p.; *Pulvinati* Peter l. c.; Sauvage et Vindt l. c.

Inermes Boiss. l. c., p.p.

Pulvinate dwarf plants, varying in height between 3 and 17 cm. Old shoots ligneous, provided with adventitious roots; branches often wanting or short; root perpendicular, thick and ligneous.

Type species: *C. compactus* Boiss.

Other species: *C. aitchisonii* Clarke; *C. anatolicus* Sa'ad; *C. assyricus* Griseb.; *C. boissieri* Steud.; *C. cataonicus* Boiss.; *C. konyacus* Sa'ad; *C. libanoticus* Boiss.; *C. mazicum* Emb.; *C. orophilus* Sa'ad; *C. pulvinatus* Sa'ad; *C. radicosus* Held. et Sart.

None of these species can be called widespread; they are usually restricted to a comparatively small area. They can be divided into two groups, viz. plants with the upper side of the leaves glabrous: *C. assyricus*; *C. mazicum*; *C. libanoticus*; *C. cataonicus*, and plants with both sides of the leaves hairy: the remaining species of the subsection.

Of most of the species of this subsection but few specimens have been collected; some of them, like *C. nitidus* and *C. compactus*, however, are exceptions. This may be due to the circumstance that they are so very similar to each other.

Subsectio 9. Pannosi Boiss. op. c. p. 85; Bornm. in Beih. Bot. Centr. 22(2): 181. 1906; Petrov op. c. p. 145; Grigoryev op. c. p. 27; Rechinger f., Fl. Iran p. 15.

Syn.: *Orthocaulos* Don l. c., p.p.; Choisy l. c., p.p.; § *Prostrati* and § *Cephalophori* Peter l. c.; Ser. *Erugosi* Petrov op. c. p. 145.

Flowers in large numbers in axillary capitula, rarely solitary or but a few together; shoots rather stout; indumentum usually tomentose to woolly, rarely villous.

Type species: *C. reticulatus* Choisy

Other species: *C. asyrensis* Kotschy; *C. buschiricus* Bornm.; *C. cateniflorus* Sa'ad; *C. cephalophorus* Boiss.; *C. cephalopodus* Boiss.; *C. euphraticus* Bornm.; *C. gonocladus* Boiss.; *C. kotschyanus* Boiss.; *C. jordanensis* Sa'ad; *C. persicus* L.; *C. pyrrhotrichus* Boiss.; *C. schimperii* Boiss.; *C. secundus* Desr.; *C. spicatus* Peter ex Hallier; *C. stapfii* Rech. f.

The species of this subsection are restricted to the Orient. Some species are confined to a small area, e.g. *C. spicatus*, which is endemic in W. Sinai, *C. cephalophorus* and *C. stapfi*, which occur in Iran. Most of them are desert species; a few are confined to maritime sandy dunes, e.g. *C. persicus*, but *C. secundus* can be found in maritime dunes as well as in sandy mountain meadows.

Subsectio 10. Diffusi Boiss., op. c. p. 85; Rechinger f., Fl. Iran p. 17.

Syn.: *Orthocaulos* Don l. c., p.p.; Choisy l. c., p.p.; §
Prostrati and *Haplocarpici* Peter l. c.; Sauvage et Vindt l. c.
Strophocaulos Don, Choisy op. c. p. 406, p.p. *Integrifolii*
Peter l. c.

Siculi and *Undulati* Boiss. l. c.

Scandentes Boiss. l. c.; Rechinger f. Fl. Iran p. 19.

Solutoracemosa Petrov, Grigoryev l. c. p. 21.

Annual or perennial herbs; shoots herbaceous, prostrate or ascending, never twining.

Type species: *C. glomeratus* Choisy.

Other species: *C. ammocharis* Boiss.; *C. austro-egyptiacus* Abdlh. et Sa'ad; *C. caelesyriacus* Boiss.; *C. cancerianus* Abdlh. et Sa'ad; *C. deserti* Schimper; *C. georgicus* Sa'ad; *C. gharbensis* Batt. et Pitard; *C. humilis* Jacq.; *C. meonanthus* Hoffm. et Link; *C. pentapetaloides* L.; *C. pilosellifolius* Desr.; *C. prostratus* Forsk.; *C. rhyniospermus* Hochst. ex Choisy; *C. rottlerianus* Choisy; *C. sabatius* Viv.; *C. siculus* L.; *C. supinus* Coss. et Kralik; *C. tricolor* L.; *C. valentinus* Cav.

The most widespread species of this subsection are *C. siculus*, which

inhabits the Mediterranean region as well as the Canary Islands and Madeira, Arabia and tropical Africa, and *C. prostratus* Forsk., which is a Saharo-Sindian species; while some of its species are confined to a rather small area, e.g. *C. gharbensis* to Morocco and *C. ammocharis* to Iran. Other species of this subsection are restricted to the eastern or to the western part of the Mediterranean region.

Sectio III. Convolvulus

Syn.: these include all the synonyms cited under the two subsections of this section.

Shoots as well as branches or at least the branches twining; herbs or subshrubs.

Type species: *C. arvensis* L.

Subsectio 11. Convolvulus

Syn.: *Strophocaulos* Don op. c. p. 288, p.p.; Choisy op. c. p. 406, p.p.; Peter l. c., p.p.; Sauvage et Vindt op. c. p. 19, p.p. *Volubiles et Scandentes* Boiss. l. c., p.p.; Rechinger f., Fl. Iran l. c., p.p.

Siculi Boiss. l. c.

§ *Sagittati*, § *Crenati*, § *Lobulati*, § *Heterophylli* Peter l. c., p.p.

Hirsuticales, *Resinosi et Arvenses* Petrov op. c. p. 146, p.p.

Annual or perennial herbs.

Type species: the same as that of the section.

Other species: *C. aleppensis* Sa'ad; *C. althaeoides* L.; *C. betonicifolius* Mill.; *C. cassius* Samuelsson ex Rech. f.; *C. dryadum* Maire; *C. durandoi* Pomel; *C. farinosus* L.; *C. fatmensis* Kunze; *C. galaticus* Rost. et Choisy; *C. glaouorum* Br.-Bl. et Maire; *C. germanicae* Boiss. et Haussk.; *C. lanjouwii* Sa'ad; *C. longipedicellatus* Sa'ad; *C. maireanus* Pampan.; *C. mairei* Hal. C. *palestinus* Boiss.; *C. pitardii* Battand.; *C. scammonia* L.; *C. stachydifolius* Choisy; *C. variegatus* Sa'ad, *C. zargarianus* Parsa.

The species of this subsection are like those of the subsect. *Diffusi* partly wide-spread and partly confined to a small area.

Subsectio 12. Frutescentes Peter l. c.

Syn.: *Stophocaulos* Don l. c., p.p.; *Choisy* l. c., p.p.

Shrubby or subshrubby, branches twinning.

Type species: *C. canariensis* L.

Other species: *C. fruticosus* Desr.

These species are endemic in the Canary Islands and Madeira.

Key to the Convolvulus Species

- 1a. Shoots, and usually the branches too, spiny..... 2
b. Shoots and branches not spiny 19
- 2a. Flowers in terminal capitula at the end of the branches, numerous 3
b. Flowers axillary or in axillary capitula; if terminal at the end of the branches, then at most in groups of three 4
- 3a. Ovary hairy; shoot as well as the leaves shortly sericeous
.....16. *C. turrillianus* Parsa
b. Ovary glabrous; shoot as well as the leaves tomentellous.....
.....15. *C. oxyspalus* Boiss.
- 4a. Leaves petiolate..... 5
b. Leaves sessile..... 9
- 5a. Flowers solitary. Sepals scarious, glabrous..... 6
b. Flowers numerous, in capitula. Sepals herbaceous, hairy..... 7
- 6a. Pedicels hairy. Sepals lanceolate. Ovary hairy.....
..... 4. *C. leiocalycinus* Boiss.
b. Pedicels glabrous. Sepals oblong. Ovary glabrous.....
..... 5. *C. retrosepalus* Sa'ad
- 7a. Plant glabrous. Capitula on long peduncles.....
.....17. *C. virgatus* Boiss.
b. Plant hairy. Capitula sessile or almost so..... 8
- 8a. Leaves oblong to oblong-triangular, truncate or auriculate at the base.
Ovary glabrous 9. *C. hystrix* Vahl
b. Leaves suborbicular or obovate, cuneate at the base. Ovary hairy....
..... 8. *C. hamarinensis* Rech. f.
- 9a. Peduncles as long as the subtending bract or longer..... 10
b. Peduncles much shorter than the subtending bract or wanting..... 12
- 10a. Pedicel flanked by two spines. Sepals lax...3. *C. fruticosus* Pall.

- b. Pedicel not flanked by spines. Sepals compact..... 11
- 11a. Corolla 13-15 mm. long. Leaf blades mostly folded.....
..... 6. C. spinosus Burm.
- b. Corolla 20-22 mm. long. Leaf blades flat; margin undulate.....
..... 2. C. argyrcanthus Rech. f.
- 12a. Ovary glabrous or with a few hairs only..... 13
- b. Ovary densely hairy..... 14
- 13a. Flowers solitary. Sepals 3 mm. long..... 7. C. caput-medusae Lowe
- b. Flowers in capitula, numerous. Sepals 7 mm. long.....
.....14. C. lanatus Vahl
- 14a. Base of the radical leaves broad, scarious..... 15
- b. Base of the radical leaves narrow, green..... 16
- 15a. Sepals 14 mm. long, covered with long sericeous hairs.....
.....13. C. urosepalus Pau
- b. Sepals 8 mm. long, puberulous.....11. C. spinifer Pop.
- 16a. Bracteolus suborbicular, 5 mm. long and wide.....
.....12. C. ulicinus Boiss.
- b. Bracteoles linear, oblong or lanceolate..... 17
- 17a. Corolla 10-12 mm. long; spines restricted to the tip of the branches...
.....10. C. oxyphyllus Boiss.
..... ssp. oxycladus Rech. f.
- b. Corolla 18-25 mm. long; spines scattered along the branches..... 18
- 18a. Sepals 3 mm. long, appressed pilose..... 7. C. caput-medusae Lowe
- b. Sepals 8 mm. long, long sericeous..... 1. C. acanthocladus Boiss.
- 19a. Flowers congested in capitula. Plants never pulvinate..... 20
- b. Flowers either in lax inflorescences or solitary. Plants sometimes pul-
vinate..... 48
- 20a. Capitula terminal, very rarely accompanied by a few axillary ones... 21
- b. Capitula axillary..... 30
- 21a. Ovary and capsule glabrous..... 22
- b. Ovary and capsule hairy..... 24
- 22a. Stems herbaceous. Leaves glabrous or almost so.....
.....87. C. gharbensis Batt. et Pit.
- b. Stems ligneous at the base. Leaves densely hairy..... 23
- 23a. Indumentum tomentellous. Upper leaves petiolate. Bracts ovate, circ.
1.5 times as long as wide.....15. C. oxysepalus Boiss.
- b. Indumentum sericeous to woolly. Upper leaves sessile. Bracts lanceolate,

3-4 times as long as wide.....	39.	<u>C. lanuginosus</u>	Desr.
24a. Basal part of the radical leaves green.....	25		
b. Basal part of the radical leaves scarious.....	26		
25a. Leaves laxly scattered, usually petiolate; if sessile, then not with a stem-clasping base; elliptic.....	16.	<u>C. turrillianus</u>	Parsa
b. Leaves congested in the upper part of the shoots, sessile and with a stem-clasping base; lanceolate.....	43.	<u>C. cneorum</u>	L.
26a. Leaves on both sides hairy, flat.....	27		
b. Leaves on the upper side glabrous, mostly folded.....	36.	<u>C. abdallahi</u>	Sa'ad
27a. Leaves linear, 1-2 mm. wide.....	40.	<u>C. schirzianus</u>	Boiss.
b. Leaves lanceolate, 4-12 mm. wide.....	28		
28a. Stems herbaceous, sericeous but the appressed hairs mixed with some long spreading ones.....	37.	<u>C. calvertii</u>	Boiss.
b. Stems appressed pilose without spreading hairs.....	29		
29a. Leaves coriaceous; bracteoles not exceeding the capitula.....	38.	<u>C. commutatus</u>	Boiss.
b. Leaves herbaceous; bracteoles far exceeding the capitula.....	41.	<u>C. sericocephalus</u>	Juz.
30a. Lower peduncles as long as or longer than the bracts.....	31		
b. Lower peduncles shorter than the bracts or wanting.....	39		
31a. Stem leaves petiolate; blade auriculate or truncate at the base.....	32		
b. Stem leaves usually sessile; if petiolate, than the blade cuneate at the base.....	33		
32a. Ovary glabrous.....	82.	<u>C. glomeratus</u>	Choisy
b. Ovary hairy.....	116.	<u>C. zargarianus</u>	Parsa
33a. Lower bracts 30-50 mm. long.....	34		
b. Lower bracts 12-25 mm. long.....	35		
34a. Leaves reticulately rugose; bracts subcordate.....	70.	<u>C. reticulatus</u>	Choisy
b. Leaves flat; bracts cuneate at the base... ..	64.	<u>C. euphraticus</u>	Bornm.
35a. Inflorescence 2.5-4 cm. long.....	73.	<u>C. spicatus</u>	Peter ex Hallier f.
b. Inflorescence ca. 1.5 cm. long.....	36		
36a. Ovary and style glabrous.....	37		
b. Ovary and style hairy.....	38		
37a. Leaf margin undulate-plicate. Bracteoles oblong to oblanceolate.....	71.	<u>C. schimperi</u>	Boiss.

- b. Leaf margin entire. Bracteoles ovate.... 66. C. jordanensis Sa'ad
- 38a. Leaves 30-40 mm. long..... 71. C. buschiricus Bornm.
- b. Leaves 10-20 mm. long..... 63. C. cephalopodus Boiss.
- 39a. Plant slightly appressed-puberulous. Corolla 5 mm. long.....
..... 88. C. rhyniospermus Hochst. ex Choisy
- b. Plant densely hairy. Corolla 12-28 mm. long..... 40
- 40a. Bracteoles ovate..... 41
- b. Bracteoles either acicular, linear, oblanceolate or elliptic..... 42
- 41a. Leaves with immersed veins, woolly. Shoots stout, 3-4 mm. in diameter..
.....72. C. secundus Desr.
- b. Leaves smooth, tomentellous. Shoots as a rule not more than 2 mm. in
diameter.....14. C. lanatus Vahl
- 42a. Bracts 15-17 mm. wide..... 43
- b. Bracts 5-8 mm. wide..... 45
- 43a. Shoots long villous-tomentose, the hairs as long as the diameter of the
shoot..... 69. C. pyrrhotrichus Boiss.
- b. Shoots tomentellous to tomentose, the hairs shorter than the diameter of
the shoot..... 44
- 44a. Leaves thin, with a rough mealy appearance, tomentellous; nerves not
visible on the upper side..... 62. C. cephalophorus Boiss.
- b. Leaves thick, with a soft silky appearance, tomentose; nerves visible on
the upper side, but immersed in the indumentum.....
.....74. C. stapfii Rech. f.
- 45a. Leaves coriaceous; tip spinescent..... 61. C. cateniflorus(Rech.f.) Sa'ad
- b. Leaves herbaceous; tip soft..... 46
- 46a. Radical leaves 45-80 mm. long.....65. C. gonocladus Boiss.
- b. Radical leaves 20-30 mm. long..... 47
- 47a. Bracteoles elliptic, acute, 6-8 mm. long and 2-3 mm. wide, i.e. 2-3
times as long as wide..... 59. C. asyrensis Kotschy
- b. Bracteoles acicular, circ. 7 mm. long and 3/4 mm. wide, i.e. 9 times
as long as wide..... 67. C. kotschyanus Boiss.
- 48a. Plant pulvinate; older stems producing adventitious roots..... 49
- b. Plant not pulvinate; older stems never producing adventitious roots.... 60
- 49a. Leaves on the upper side glabrous..... 50
- b. Leaves on both sides hairy..... 54
- 50a. Sepals short, 3 mm. long.....49. C. assyricus Griseb.
- b. Sepals 6-12 mm. long..... 51

- 51a. Pedicel as long as the calyx.....55. C. mazicum Emberger et Maire
 b. Pedicel wanting..... 52
- 52a. Sepals puberulous.....54. C. libanoticus Boiss.
 b. Sepals covered with long spreading hairs..... 53
- 53a. Plant 3-6 cm. high; sepals 6 mm., oblong, acute.....
58. C. radicosus Heldr. et Sart
 b. Plant 11-17 cm. high; sepals 9-10 mm. long, oblong to elliptical, long
 acuminate.....51. C. cataonicus Boiss. et Hausk.
- 54a. Lamina rhomboid, mostly as long as wide.....
52. C. compactus Boiss.
 b. Lamina linear to obovate-oblong, 2 to several times as long as wide... 55
- 55a. Sepals glabrous, except for a few hairs on the upper part, membranous.56
 b. Sepals densely hairy, herbaceous..... 57
- 56a. Corolla 1.5 times as long as the calyx; sepals 12 mm. long.....
48. C. anatolicus Sa'ad
 b. Corolla 3 times as long as the calyx; sepals 6 mm. long.....
56. C. orophilus Sa'ad
- 57a. Ovary glabrous.....47. C. aitchisonii Clarke
 b. Ovary hairy..... 58
- 58a. Leaves circ. 1.5 mm. wide, linear-ob lanceolate.....
53. C. konyacus Sa'ad
 b. Leaves 3-4 mm. wide, oblanceolate..... 59
- 59a. Nerves numerous; surface of the leaf plicate; leaves thick.....
50. C. boissieri Steud.
 b. Leaves uninervate, thin..... 57. C. pulvinatus Sa'ad
- 60a. Leaves petiolate..... 61
 b. Leaves sessile..... 92
- 61a. Lower peduncles shorter than the bracts or wanting..... 62
 b. Lower peduncles as long as or longer than the bracts..... 77
- 62a. Leaf margin not entire..... 63
 b. Leaf margin entire..... 69
- 63a. Pedicel several times as long as the calyx..... 64
 b. Pedicel as long as the calyx..... 65
- 64a. Upper bracts lobed..... 106. C. glauorum Br.-Bl. et Maire
 b. Upper bracts crenate or dentate, never lobed.....
112. C. pitardii Battand.
- 65a. Leaf on the upper side with light green spots, on the lower side reticulate..

.....	116. <u>C. variegatus</u> Sa'ad	
b. Leaf neither with light green spots nor reticulate.....		66
66a. Corolla 25-30 mm. long.....		67
b. Corolla 8-10 mm. long.....		68
67a. Plant densely tomentose; upper bracts with five short obtuse lobes....		
.....	104. <u>C. galaticus</u> Rostan ex Choisy	
b. Plant puberulous; upper bracts with three lobes, the lateral ones shortly auriculate, the middle one elongated, entire.....		
.....	111. <u>C. palestinus</u> Boiss.	
68a. Sepals elliptical, acute. Bracts finely crenate.....		
.....	102. <u>C. farinosus</u> L.	
b. Sepals obovate, retuse and mucronulate. Bracts irregularly lobed.....		
.....	103. <u>C. fatmensis</u> Kunze	
69a. Pedicel 4-6 times as long as the calyx.....		70
b. Pedicel shorter than the calyx.....		72
70a. The upper part of the sepals plicate.....	101. <u>C. durandoi</u> Pomel	
b. The upper part of the sepals smooth, retuse and mucronulate.....		71
71a. Plant densely puberulous. Pedicel as long as the peduncle.....		
.....	108. <u>C. longipedicellatus</u> Sa'ad	
b. Plant glabrous or, rarely, appressed-hairy. Pedicel shorter than the peduncle.....	97. <u>C. arvensis</u> L.	
72a. Corolla 8-9 mm. long.....	91. <u>C. siculus</u> L.	
b. Corolla 15-45 mm. long.....		73
73a. Sepals densely woolly.....	68. <u>C. persicus</u> L.	
b. Sepals glabrous or pubescent, never woolly.....		74
74a. Bracteoles much longer than the pedicel..	51. <u>C. supinus</u> Coss. et Kralik	
b. Bracteoles much shorter than the pedicel.....		75
75a. Leaf blade 50-100 mm. long.....	117. <u>C. canariensis</u> L.	
b. Leaf blade 20-30 mm. long.....		76
76a. Ovary glabrous. Peduncle stout and persistent.....		
.....	28. <u>C. rectangularis</u> Rech. f.	
b. Ovary hairy. Peduncle slender.....	118. <u>C. fruticosus</u> Desr.	
77a. Leaf base cuneate or truncate.....		78
b. Leaf base not cuneate or truncate, usually cordate, sagitate, hastate or auriculate.....		82
78a. Pedicel twice as long as the calyx. Style 6 times as long as the stigmas..		
.....	100. <u>C. dryadum</u> Maire	

- b. Pedicel as long as or shorter than the calyx. Style as long as or but slightly longer than the stigmas..... 79
- 79a. Corolla 15 mm. long. The leaves on both sides distinctly hairy..... 80. C. georgicus Sa'ad
- b. Corolla 20-27 mm. long. The leaves on the upper side glabrous or but slightly hairy..... 80
- 80a. Leaves narrow, 4-10 times as long as wide, 2-8 mm. wide..... 94. C. valentinus Cav.
- b. Leaves broad, as long as wide to twice as long as wide, 7-22 mm. wide.. 81
- 81a. Pedicel as long as the calyx. Leaves 12-22 mm. wide; nerves on the lower side conspicuous..... 90. C. sabatius Viv.
- b. Pedicel half as long as the calyx. Leaves 7-8 mm. wide; nerves not conspicuous..... 92. C. supinus Cosson et Kralik
- 82a. Upper bracts lobed..... 96. C. althaeoides L.
- b. Upper Bracts never lobed..... 83
- 83a. Leaves reniform. Sepals caudate..... 77. C. caelesyriacus Boiss.
- b. Leaves not so. Sepals obtuse, retuse or acuminate..... 84
- 84a. Sepals acute or acuminate..... 85
- b. Sepals obtuse or retuse..... 88
- 85a. Leaf blades 20-30 mm. long. Corolla 20-24 mm. long..... 86
- b. Leaf blades 40-70 mm. long. Corolla 30-40 mm. long..... 87
- 86a. Leaves hairy, orbicular with cordate base..... 105. C. germaniciae Boiss. et Haussk.
- b. Leaves glabrous, sagittate-hastate..... 95. C. alepensis Sa'ad
- 87a. Shoots glabrous; bracteoles longer than or as long as the pedicel..... 99. C. cassius Samuel. ex Rech. f.
- b. Shoots hairy; bracteoles shorter than the pedicel..... 98. C. betonicifolius Mill.
- 88a. Leaf margin crenate-dentate to irregularly lobed..... 89
- b. Leaf margin entire..... 90
- 89a. Hairs retrorse; flowers axillary and solitary or in an axillary, more or less large monochasium or dichasium...114. C. stachydfolius Choisy
- b. Hairs very short and appressed; flowers congested at the top of an axillary peduncle..... 109. C. maireanus Pampan.
- 90a. Sepals 7-10 mm. long..... 91
- b. Sepals 2.5-4 mm. long..... 92
- 91a. Plant puberulous; base of the leaf blade truncate. Sepals with an entire

- margin.....107. C. lanjouwii Sa'ad
- b. Plant glabrous; base of the leaf blade sagittate to hastate. Sepals with an undulate margin..... 113. C. scammonia L.
- 92a. Corolla 8 mm. long; ovary hairy..... 110. C. mairei Halacsy
- b. Corolla 15-25 mm. long; ovary glabrous.....
.....97. C. arvensis L.
- 93a. Sepals glabrous or with few hairs at the top..... 94
- b. Sepals densely hairy..... 101
- 94a. Shoots soft, branched from the base, simple..... 95
- b. Shoots rigid, divaricately branched or fastigiata..... 98
- 95a. Peduncle wanting. Flowers hidden by the bracts.....
.....83. C. humilis Jacq.
- b. Peduncle as long as the bract or longer. Flowers not hidden by the bracts.. 96
- 96a. Corolla 9 mm. long. Sepals obtuse, mucronulate.....
.....85. C. pentapetaloides L.
- b. Corolla 14-22 mm. long. Sepals acute..... 97
- 97a. Sepals membranous, lanceolate. Corolla 18-22 mm. long and 3.5-4.5 times as long as the calyx..... 84. C. meonanthus Hoffm. et Link
- b. Sepals oblanceolate, with the upper part green, the lower colourless. Corolla circ. 14 mm. long and 2-2.5 times as long as the calyx.....
.....86. C. pilosellifolius Desr. var. leocalycinus Sa'ad
- 98a. Cauline leaves filiform, $\frac{1}{2}$ mm. wide, recurved, plicate.....
..... 23. C. koeieanus Bornm. ex Koeie
- b. Cauline leaves linear or linear oblong, 2-4 mm. wide, flat.....99
- 99a. Bracts narrowly ovate, with spinescent tip. Leaf margin undulate.....
.....31. C. turcomanicus V. Petr.
- b. Bracts linear or filiform; tip soft. Leaf margin entire..... 100
- 100a. Leaf on the upper side glabrous or slightly hairy. Radical leaves 3 mm. wide.....27. C. pseudocantabricus Schrenk
- b. Leaves on both sides densely hairy. Radical leaves 7-28 mm. wide...
.....29. C. sarothrocladus Boiss.
- 101a. Outer sepals gibbous..... 46. C. holosericeus Bieb.
- b. Outer sepals not so..... 102
- 102a. Stems and leaves densely sericeous..... 103
- b. Stems and leaves with another type of indumentum..... 105
- 103a. Base of the radical leaves with a broad scarious margin. Shoots herbaceous, compressed..... 44. C. lineatus L.

- b. Base of the radical leaves without scarious margin. Shoots rigid or herbaceous; if herbaceous, then not compressed..... 104
- 104a. Sepals 7-9 mm. long. Bracteoles 8-10 mm. long and much longer than the pedicel. Leaves herbaceous..... 45. C. oleifolius Desr.
- b. Sepals 3 mm. long. Bracteoles minute, much shorter than the pedicel. Leaves chartaceous with a rigid tip..... 26. C. lindbergii Sa'ad
- 105a. Upper leaves broadly ovate or suborbicular.....
.....19. C. divaricatus Regl. et Schmalh.
- b. Upper leaves of a different form..... 106
- 106a. Flowers numerous and forming panicles at the top of the branches; a shrub (Canary Islands).....35. C. floridus L. f.
- b. Flowers not so..... 107
- 107a. Branches with a single flower at the top. Bracts and bracteoles wanting
..... 108
- b. Branches with axillary as well as terminal flowers. Bracts and bracteoles present..... 110
- 108a. Upper cauline leaves lanceolate, 5-10 mm. wide. Sepals 7 mm. long..
.....32. C. aucheri Choisy
- b. Upper cauline leaves linear, filiform or scale-like. Sepals at the most 3 mm. long..... 109
- 109a. Sepals orbicular, obtuse, entirely colourless, 2 mm. long.....
.....33. C. gracillimus Rech. f.
- b. Sepals narrowly obovate, acute, consisting of an upper green part and a lower colourless one, 3 mm. long..... 34. C. linooides Bornm.
- 110a. Shoots striated, glabrous or more or less hairy..... 111
- b. Shoots not striated, distinctly hairy..... 112
- 111a. Bract as long as or longer than the peduncle. Leaves filiform, uninervate, hardly one mm. wide, deciduous..... 30. C. scoparius L. f.
- b. Bract much shorter than the peduncle. Radical leaves spathulate to oblanceolate, 5-10 mm. wide..... 18. C. chondrilloides Boiss.
- 112a. Indumentum densely tomentellous, rarely with spreading hairs. Leaves with spinescent tips.....10. C. oxyphyllus Boiss. ssp. oxyphyllus
- b. Indumentum not so..... 113
- 113a. Shoots ligneous, branches divaricate or fastigiate..... 114
- b. Shoots herbaceous..... 119
- 114a. Plant appressed hairy..... 115
- b. Plants puberulous..... 117

- 115a. Radical leaves spatulate to oblong 7-14 (-20) mm. wide.....
.....20. C. dorycnium L.
b. Radical leaves linear, 2 mm. wide..... 116
- 116a. Shoots intricately branched. Ovary hairy
.....22. C. erinaceus Ledeb.
b. Shoots fastigiate, not branched. Ovary glabrous.....
.....25. C. leptocladus Boiss.
- 117a. Ovary glabrous. Leaves of the branchlets suborbicular, 3 mm. long
and 2.5 mm. wide..... 21. C. eremophilus Boiss.
b. Ovary hairy. Leaves of the branchlets linear..... 118
- 118a. Leaf margin entire. Branches fastigiate.....
18. C. chondrilloides Boiss. var. *villosus* Bornm.
b. Leaf margin undulate, branches divaricate.....
.....24. C. korolkowii Regl. & Schmalh.
- 119a. Flowers 20-30 mm. long..... 120
b. Flowers 8-15 mm. long..... 121
- 120a. Inflorescences all axillary. Pedicel longer than the calyx. Bracts usu-
ally with a half-clasping base..... 93. C. tricolor L.
b. Branches with terminal as well as axillary inflorescences. Pedicel shor-
ter than the calyx. Bracts never with a half-clasping base.....
.....42. C. cantabricus L.
- 121a. Flowers I-II together.....122
b. Flowers solitary or in a lax inflorescence.....123
- 122a. Peduncle very short; flowers 1-3 together. Shoots thin, 1 mm. in dia-
meter.....87. C. prostratus Forsk.
b. Peduncle long; flowers 3-11 together. Shoots stout, 2.5 mm. in diameter.
.....78. C. cancerianus Abdlh et Sa'ad
- 123a. Indumentum puberulous but mixed with spreading hairs.....
.....76. C. austro-aegyptiacus Abdlh et Sa'ad
b. Indumentum appressed or more or less so..... 124
- 124a. Bracts lanceolate to linear-lanceolate, acute or acuminate..... 125
b. Bracts oblanceolate to linear-oblanceolate or rarely oblong..... 126
- 125a. Sepals 5 mm. long. Hairs appressed. Stigmas twice as long as the
style..... 75. C. ammocharis Boiss.
b. Sepals 7-8 mm. long. Hairs appressed but mixed with spreading ones.
Stigmas as long as the style.....86. C. pilosellifolius Desr.
- 126a. Corolla 8 mm. long. Sepals 5 mm. long. Stigmas twice as long as the

- style.....89. C. rottlerianus Choisy
- b. Corolla 14 mm. long. Sepals 8 mm. long. Stigmas as long as the style..
-79. C. deserti Hochst.

Sectio I Acanthocladi Boiss.

Shrubby or subshrubby, the younger as well as the older branches either ending in spines or bearing spines which represent the upper sterile peduncles or the peduncles of the fallen flowers.

Subsectio I. Acanthocladi

Peduncles persistent, distinct; pedicels recurved, deciduous.

1. C. acanthocladus Boiss., Diagn. I (7): 27. 1846; Boiss., Fl. Or. IV: 86. 1875; Rechinger f., Fl. Iran (Conv.): 8. 1963.

Type: Kotschy 352, near Shīraz, Iran, lectotype (G. Boiss.), seen.

Isotypes (C, E, FI, GOET, HAL, JE, K, W).

Icon.: Jaubert and Spach, Illustr. Pl. Or. IV: t. 367. 1850-53; inflorescence not correctly drawn.

Plate I. fig. 1-8.

A densely sericeous suffrutescent plant. Underground parts unknown. Shoots strongly branched. Leaves somewhat fleshy, the cauline ones sessile, oblong-oblancheolate, 5-15 mm. long, 2-4 mm. wide, 2-3 times as long as wide, apex subacute, gradually attenuate towards the base, margin entire, uninerved, the costa conspicuous on the lower surface. Flowers either axillary and solitary or in terminal and axillary dichasia; the latter consisting of 2 or 3 flowers on a peduncle as long as, or shorter or longer than the bract. Bracts sessile, linear-oblong, ca. 5 mm. long, one mm. wide. Bracteoles small, very narrow. Pedicels recurved, shorter than the calyx. Sepals 8-10 mm. long, covered with long soft sericeous spreading hairs; the outer ones lanceolate, long-acuminate, 4 mm. wide; the middle one with the right and the left half unequal, one half membranous and puberulous; the inner ones broadly oblong, aristate, both halves membranous and puberulous. Corolla 22-25 mm. long, 2.5 times as long as the calyx and with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the longest one half as long as the corolla, with glabrous filaments and oblong anthers. Ovary ovoid, hairy, with a glabrous disc at the base; style hairy, filiform; stigmas glabrous, filiform, half as long as the style. Capsule ovoid, 6 mm. long, 4 mm. wide, hairy above, unilocular, one-seeded; seeds brown, densely puberulous, 3 mm. long, 2 mm. wide. Fl. March-June, Fr. June.

In stony steppes and on stony slopes of hills and mountains, at an alt. of ca. 1000 m.-2100 m., rarely at 100 m.

Distribution: Iran, Pakistan.*

Specimens seen:

Iran: Aucher-Eloy 4934, paratype (G-Boiss., FI, W); Kotschy 208, Dālākī, paratype (G-Boiss., W); Stapf 361, Shīraz (W); Stapf 360 Kāzerūn (W); Rechinger 3226, between Čah Čaghuk and Tārom (E, W); Stutz 956 Ganāveh (W).

2. C. argyracanthus Rechinger f., Aellen et Esfandiari, Anz. Math.-naturw. Kl. Österr. Akad. Wiss. 11: 303, 1950; Rechinger, Fl. Iran (Conv.): 9, 1963.

Type: K.H. et F. Rechinger, Aellen et Esfandiari 3228, between Čah Čoghuk (Čaput) and Tārom, Iran, holotype (W) seen.

Isotype (G).

Plate I. fig. 9-16.

A fruticose, densely but shortly appressed-pilose plant. Subterranean parts unknown. Shoots strongly branched, erinaceous. Leaves sessile, linear-oblongate, 10-17 mm. long, 4-6 mm. wide, i. e. ca. 4 times as long as wide, acute or subacute, decurrent at the base, margin undulate-plicate, coriaceous, densely but shortly appressed-pilose, nervation pinnate, midrib prominent on the lower surface, the lateral nerves immersed in the indumentum. Flowers solitary and axillary or 2 or 3 in an axillary dichasium; peduncles stout, as long as the subtending bract. Bract ca. 6 mm. long, ca. 3.5 mm. wide. Bracteoles minute. Pedicels shorter than the calyx, quadrangular because of the decurrent bases of the outer sepals; pedicels of the solitary flowers curved. Sepals usually equal in length, convex, short, densely appressed-pilose; the outer ones oblong-obovate or oblong, acute, ca. 4 mm. long and 2 mm. wide; the middle one with the right and the left half unequal, one half membranous, ciliate, 3 mm. wide; inner ones strongly convex, broadly-obovate, retuse, mucronulate, both sides membranous, ciliate. Corolla white, 2-2.2 cm. long, 5 times as long as the calyx, with hairy bands outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the longest one 1 cm. long, with glabrous filaments; anthers oblong, with retuse top. Ovary hairy, ovoid, surrounded at the base with a glabrous disc; style filiform, hairy, 1.5 times as long as the filiform stigmas. Fruit not seen. Fl. April.

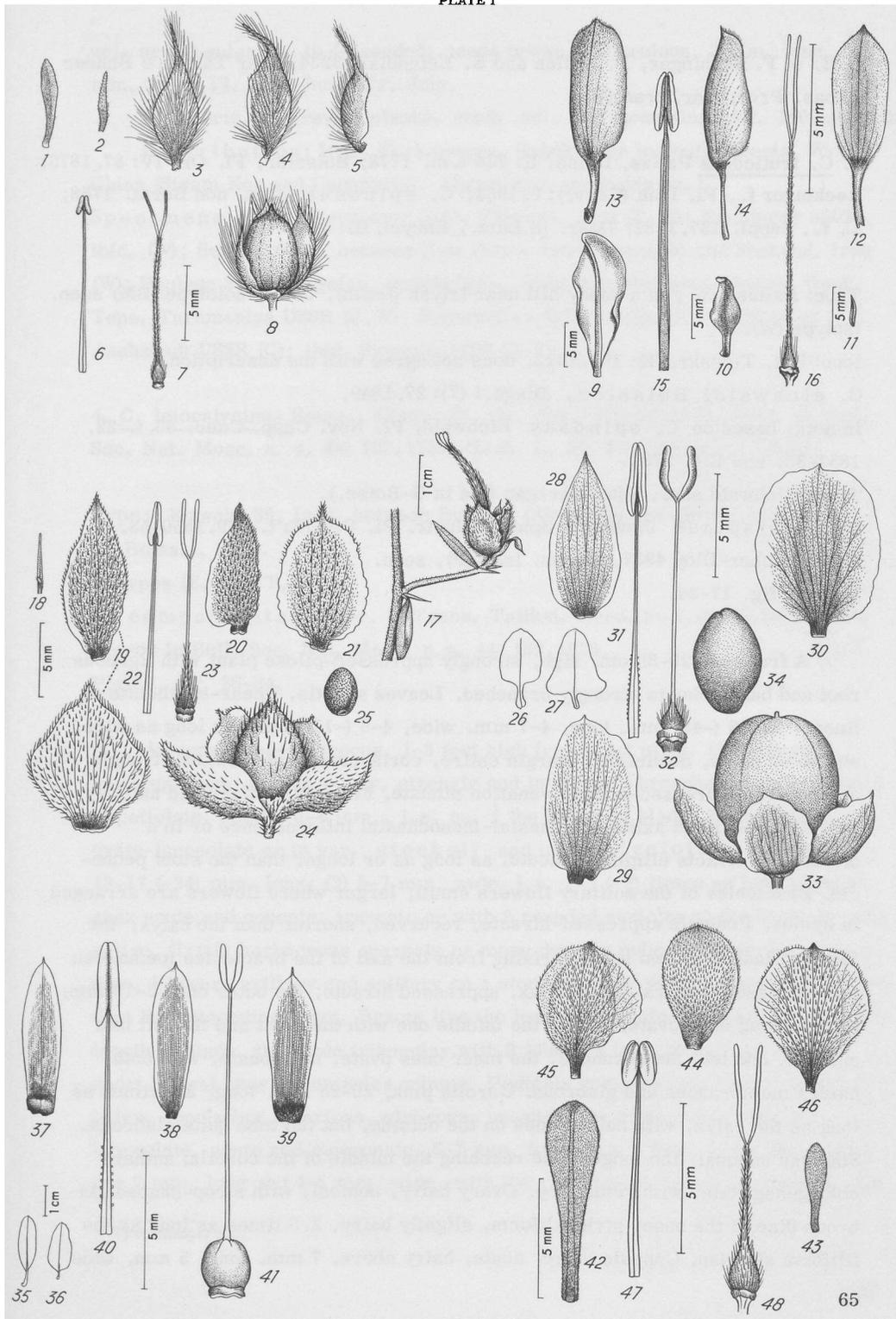
Alt. 760-1900 m.

Distribution: known from Iran only.

Specimens seen:

* 1) Rechinger l.c.

Plate I. fig. 1-8: *C. acanthocladus*; 1: leaf; 2: bracteole; 3: outer sepal; 4: middle sepal; 5: inner sepal; 6: stamen; 7: pistil; 8: capsule [1-7: stapf 362 (W); 8: Stapf 361 (W)]; fig. 9-16; *C. argyranthus*; 9,10: leaves; 11: bracteole; 12: outer sepal; 13: middle sepal; 14: inner sepal; 15: stamen; 16: pistil [9-11: Rechinger, Allen et Esphandiari 3228 typus (W); 12-16: id. 3234 (W)]; fig. 17-24 *C. fruticosus*; 17: a part of a branch showing the axillary buds; 18: bracteole; 19: different forms of outer sepals; 20: middle sepal; 21: inner sepal; 22: stamen; 23: pistil; 24: capsule; 25: seed [17: Borissova 3768a (C); 18-23: Ove Paulson 303 (C); 24,25: K.H. et F. Rechinger 5502 (W)]; fig. 26-34 *C. leiocalycinus* var. *leiocalycinus*; 26,27: leaves; 28: outer sepal; 29: middle sepal; 20: inner sepal; 31: stamen; 32: pistil; 33: capsule; 34: seed [26,27: Kotschy 39 (W); 28-32: Strauss s.n. (W); 33,34: Bommüller 3884 (B)]; fig. 35-41 *C. retrosepalus*; 35,36: leaves; 37: outer sepal; 38: middle sepal; 39: inner sepal; 40: stamen; 41: pistil [35-41 Lindberg 317 typus (W)]; fig. 42-48 *C. spinosus*; 42,43: leaves; 44: outer sepals; 45: middle sepal; 46: inner sepal; 47: stamen; 48: pistil [Griffith 5857 (GOET)].



K.H. et F. Rechinger, P. Aellen and E. Esfandiari 3234, near Tārom & Bander Abbas, Prov. Lar, Iran (W).

3. *C. fruticosus* Pallas, Reise, II: 734 t. m. 1773; Boissier, Fl. Or. IV: 87.1875; Rechinger f., Fl. Iran (Conv.): 9.1963; *C. spinosus* auct. non Burm. 1768; L. f., Suppl. 137.1781; Desr. in Lam., Encycl. III: 548.1789.

Type: Pallas s.n., in a sandy hill near Irtysh (Irtim), USSR, holotype (BM) seen. Isotype (W).

Icon: Bot. Tidsskr. 32: 196.1912, does not agree with the description.

C. eichwaldi Boissier, Diagn. I (7): 27.1849.

in nota: based on *C. spinosus* Eichwald, Pl. Nov. Casp. Cauc. 33.t. 22. 1831-33, non L.f. 1781.

Type: Eichwald s.n., Tjuk-Karagan (not in G-Boiss.).

C. brevispinus Jaubert & Spach, Illustr. Pl. Or. IV: t. 369.1850-53.

Type: Aucher-Eloy 4937, Shīraz, Iran (P), seen.

Plate I. fig. 17-24.

A fruticose 20-35 cm. high, strongly appressed-pilose plant with ligneous root and base. Shoots strongly branched. Leaves sessile, linear-spathulate or linear, 22-35 (-45) mm. long, 4-7 mm. wide, 4-6 (-11) times as long as wide, obtuse or acute, decurrent, margin entire, coriaceous, indumentum strongly and densely appressed-pilose, venation pinnate. Flowers solitary and axillary or 2 or 3 (-4) in an axillary dichasial-monochasial inflorescence or in a dichasium. Bracts elliptical, acute, as long as or longer than the stout peduncle. Bracteoles of the solitary flowers small, larger where flowers are arranged in cymes. Pedicels appressed-hirsute, recurved, shorter than the calyx; the flowers flanked by two spines arising from the axil of the bracteoles (peduncles of suppressed flowers). Sepals lax, appressed hirsute; the outer ones 8-10 mm. long, oblong or obovate, acute; the middle one with the right and the left half unequal, one half membranous; the inner ones ovate, mucronate, with both halves membranous and glabrous. Corolla pink, 20-25 mm. long, 2.5 times as long as the calyx, with hairy bands on the outside, but the tube quite glabrous. Stamens unequal, the longest one reaching the middle of the corolla; anthers oblong-sagittate, with retuse top. Ovary hairy, conical, with a cup-shaped glabrous disc at the base; style filiform, slightly hairy, 2.5 times as long as the filiform stigmas. Capsule ovoid, acute, hairy above, 7 mm. long, 5 mm. wide,

uni- or bilocular, 1- to 4- seeded; seeds brown, puberulous, 3 mm. long, 2 mm. wide. Fl. May-June. Fr. July.

In deserts, on gravely planes, sandy soils and mountains. Alt. 1400-2000 m.

Distribution: Iran, Turkmeniya, Uzbekskaya to South Siberia, W. China (Siram Nor and Dzungoria), Afghanistan and Pakistan. *

Specimens seen: Rechinger 5395, Shahrud, Iran (E, W); Rechinger 5502 ibid. (W); Schmid 6150, between Now Deh-e Arbāb (Naudeh) and Shahrud, Iran (W); Paulsen 303, Margelan, Uzbekshaya, USSR (C); Borissava 3768a, Geok-Tepe, Turkmeniya USSR (C, W); Bornmüller 927, Ashkhabad (Askabad or Aschabad) USSR (C); ibid. Sintenis 1100 (B, W).

4. *C. leiocalycinus* Boiss., *Diagn. Pl. Or. Nov. I* (7): 28. 1846; Petr. in *Bull. Soc. Nat. Mosc. n. s.* 44: 132. 1935; Rech. f., *Fl. Iran (Conv.)*: 8. 1963.

Type: Kotschy 39, Iran, between Bushire (Abuschir) and Shīrāz, lectotype (G-Boiss.), seen.

Isotypes (E, GOET, W).

C. campanulatus Zapr. in *Trans. Tajikst. Acad. Sc. I* (1): 73. 1933, teste Petrov in *Bull. Soc. Nat. Mosc. n. s.* 44: 132. 1935.

Plate I. fig. 26-34.

An appressed-sericeous, 1-3 feet high frutescent plant. Underground parts unknown. Shoots woody, strongly and intricately branched. Leaves shortly petiolate; petiole 3-4 mm., i. e. ca. $\frac{1}{4}$ the length of blade; blade ovate, ovate-lanceolate or in var. *stocksii* and in var. *lycioides* linear, 12-17 (-24) mm. long, (3) 5-7 mm. wide, i. e. 2-3 (-8) times as long as wide, apex acute and cuneate, truncate or with 2 rounded auricles at the base, margin entire, firmly herbaceous sparsely or more densely pubescent, nervation pinnate. Flowers axillary and solitary on a stout peduncle which is usually shorter than the subtending bract. Bracts like the leaves petiolate, the petiole ca. $\frac{1}{2}$ the length of blade, the blade triangular with 3 lobes, a long middle one and two short lateral ones. Bracteoles minute. Pedicels compressed, longer than the calyx. Sepals lax, scarious, glabrous, unequal; the outer ones ovate or lanceolate, acute and mucronate, 6-7 mm. long, 2.5-4 mm. wide; the middle one 7 mm. long and 4-5 mm. wide, with the right and the left half unequal, one

* 1) Rechinger l. c.

half membranous; the inner ones convex, suborbicular and mucronate, 8 mm.⁵⁵ long, 5-6 mm. wide, with both halves membranous. Corolla white or white with dilute pink-purple, 26 mm. long, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal; filaments with glands on the dilated lower part; anthers oblong, retuse at the top, 3 mm. long, 1 mm. wide. Ovary hairy, subglobose, with a glabrous disc at the base; style glabrous, filiform, 3 times as long as the broadly cylindrical stigmas. Capsule glabrous, subglobose, 6 mm. long, 5 mm. wide; seeds glabrous, 4.5 mm. long, 3.5 mm. wide. Fl. March-July; Fr. June-July.

On open stony ground, on slopes of mountains and hills, 2000-3000 m.,

Distribution: Iran, Afghanistan, * Pakistan. *

a. var. lelocalycinus.

Leaves ovate or ovate-lanceolate with 2 rounded auricles at the base, 5-8 mm. wide, 2-3 times as long as wide. Sepals usually wider, 4 mm. wide.

Specimens seen:

Iran: Stapf 367, Kāzerūn (W); Koelz 4597, Fars, Jahrom (W); Rechinger 3875, (Montes) Kūh-e Jebal Bārez betw. Bam & Dyītroft (W); Schmid 5285, between Ābādēh & Dowlātābād (W); Bornmüller 3885, Kermān (B); Davis 770k, Ardakān (E); Aucher 4954, S. Iran, paratype (G.Boiss.).

b. var. stocksii Boiss., Diagn. Pl. Or. Nov. 2 (3):123.1856.

Type: Aucher-Eloy 4935, S. Iran, round Shīrāz, lectotype (G-Boiss.) seen.

C. lasiophlaeus Jaub. & Spach, Illustr. Plant. Or. IV: 368.1850-53.

Type: Aucher-Eloy 4935, around Shīrāz, holotype (P), seen.

Leaves linear, base usually cuneate. Sepals narrower, 2.5 mm. wide.

Specimens seen: Stocks s.n., Baluchistan, Iran-Pakistan, paratype (G-Boiss.).

c. var. lycioides (Boiss.) Boiss., Fl. Or. IV: 86.1875.

basionym: *C. lycioides* Boiss., Diagn. Pl. Or. Nov. I (7): 29.1846.

Type: Kotschy 39, S. Iran near Shīrāz, holotype (G-Boiss.), seen.

Leaves nearly glabrous, green; upper leaves linear, 4-6 times as long as wide. Sepals oblong subacute.

* 1) Rechinger l.c.

5. *C. retrosepalus* Sa'ad nov. spec.

Plate I. fig. 35-41.

Frutex spinosus. Caulium parte basali et plantae parte subterranea ignotis. Caules veteriores et eorum rami glabri, cortice brunneo vestiti, spina terminali et spinis lateralibus quae pedunculos florum rejectorum et florum rudimentariorum repraesentant instructi; caules juniores dense sericei cum argenti aura nitentes, in parte superiore spinis pedunculos florum non evolutorum repraesentantibus muniti, in parte mediana flores normaliter evolutos ferentes. Folia radicalia non visa; folia caulina petiolo circ. 7 mm. longo instructa; lamina oblonga, circ. 18 mm. longa et 5 mm. lata, apice obtusa et vix conspicue mucronulata, basi cuneata, supra glabra, subtus in costa prominente sparse puberula. Flores axillares, pedunculo rigido, bracteae suffulciente brevior instructi. Bracteae nunc ut folia caulina nunc lanceolatae, apice obtusae, basi truncatae. Bracteolae minutae, post anthesin elongatae et tum filiformes. Pedicellus gracilis, pedunculo aequilongus, recurvatus, glaber. Sepala inaequalia, omnia tamen oblonga, 7 mm. longa, mucronulata, membranacea, basi convexa quae carnosae est excepta, nervata, glabra, post anthesin recurvata; sepala exteriora apice acuta; medianum cum dimidio dextro a dimidio sinistro diverso; interiora apice obtusa, tota pellucida. Corolla colore ignoto, 22 mm. longa, segmentorum quinque unoquoque virga mediana in parte superiore extus pilosa instructo. Stamina inaequilongae, longissimo 10 mm. longo; filamenta in parte dilata glandulis sessilibus vestita; antherae oblongae, apice obtusae, basi sagittatae, loculis utroque latere scissurae serie papillarum instructis. Ovarium globosum, basi disco circumdatum, glabrum; stylus filiformis, glaber, quam stigmata cylindrica sexies longior. Capsula nondum visa. Florens mensi Martio.

Typus: Lindberg 317, ad Tschongoulak* in terra Afghanorum (W, sub nomine *C. leiocalycinus* Boiss.).

Known from the type locality only.

This species resembles *C. leiocalycinus* Boiss. in the shape of its leaves, but it differs from the latter in the brown bark by which the older shoots and branches are covered, the greater length of the peduncles and pedicels, the glabrousness and the slender shape of the pedicels, the veined sepals which on the fruit are recurved and which possess a fleshy convex basal

* 1) Locality given on the label

part, the outer ones, moreover, being oblong and at the top acute and mucronulate, whereas the inner ones are oblong and at the top obtuse and mucronulate, and the glabrous ovary.

6. *C. spinosus* Burm., Fl. Ind. 47.t.19.f.4.1768; Boiss., Fl. Or. IV: 87.1875; Rech. f., Fl. Iran (Conv.) 8.1963.

Type: Garzin (herb.) s.n. Persia, holotype (G), seen.

C. genistoides Jaub. & Spach, Illustr. Pl. Or. IV: 370.1850-53.

Type: Aucher-Eloy 4933, S. Iran, holotype (P), seen.

Isotype (W).

C. affghanus Vatke in Oestr. Bot. Zeitschr. 5 (25):168.1875.

Type: Griffith 5857, Afghanistan, holotype (W).

Isotypes (C, GOET).

Icon: Burm. loc. cit. 1768.

Plate I. fig. 42-48.

A densely appressed-pubescent suffrutescent plant. Underground parts unknown. Shoots intricately branched. Leaves sessile, spatulate or obovate, mostly folded, 5-10 mm. long, 3-4 mm. wide, i.e. 1.6-2.5 times as long as wide, apex obtuse or retuse, base decurrent, margin entire, fleshy, indumentum densely appressed-pubescent, nervation pinnate. Flowers solitary or up to 3 in a dichasium; peduncle stout, as long as or longer than the subtending bract. Bracts oblong, attenuate towards the base, 3-7 mm. long, ca. 1 mm. wide. Bracteoles minute; pedicels short, quadrangular, because of the two decurrent outer sepals. Sepals unequal, densely appressed pilose; the outer ones oblong and acute or obovate and obtuse, 3 mm. long, 2 mm. wide; the middle one with the right and the left half unequal, one half hairy and membranous; the inner ones convex, broadly obovate, obtuse or retuse and mucronulate, 4.5 mm. long, with both halves hairy and membranous. Corolla 13-15 mm. long, with hairy bands on the outside, but the tube quite glabrous. Stamens unequal; filaments glabrous; anthers sagittate with retuse top. Ovary ovoid, hairy; style hairy, stout, as long as the filiform stigmas. Capsule not seen. Fl. April. Fr. time not known.

Distribution: Iran, Afghanistan, Pakistan. *

Specimens seen:

* 1) Reehinger l.c.

Iran: Sakohouri 825 E, Saravan, Balaučestan (W); Gabriel s. n., Lar (W).

Subsectio 2. Spinescentes Boiss.

Peduncles either short or wanting or long, but in the latter case deciduous; flowers axillary or terminal, either congested in capitula or solitary or two to three together.

7. C. caput-medusae Lowe in Ann. & Mag. Nat. Hist. 3 (4): 155. 1860.

Type: Lowe 220.292, Fuerteventura, Canary Islands, holotype (BM), seen. Isotype (K).

C. trabutianus Schweinf. & Muschler in Fedde, Rep. 9: 566. 1911; Sauvage & Vindt, Fl. Maroc. II: 34. 1954; Ozenda, Fl. Sahara, Sept. Centr. 376. 1958.

Type: Diels s. n., Colomb Bēchar, S. Oran, Algeria (B ± ?), not seen.

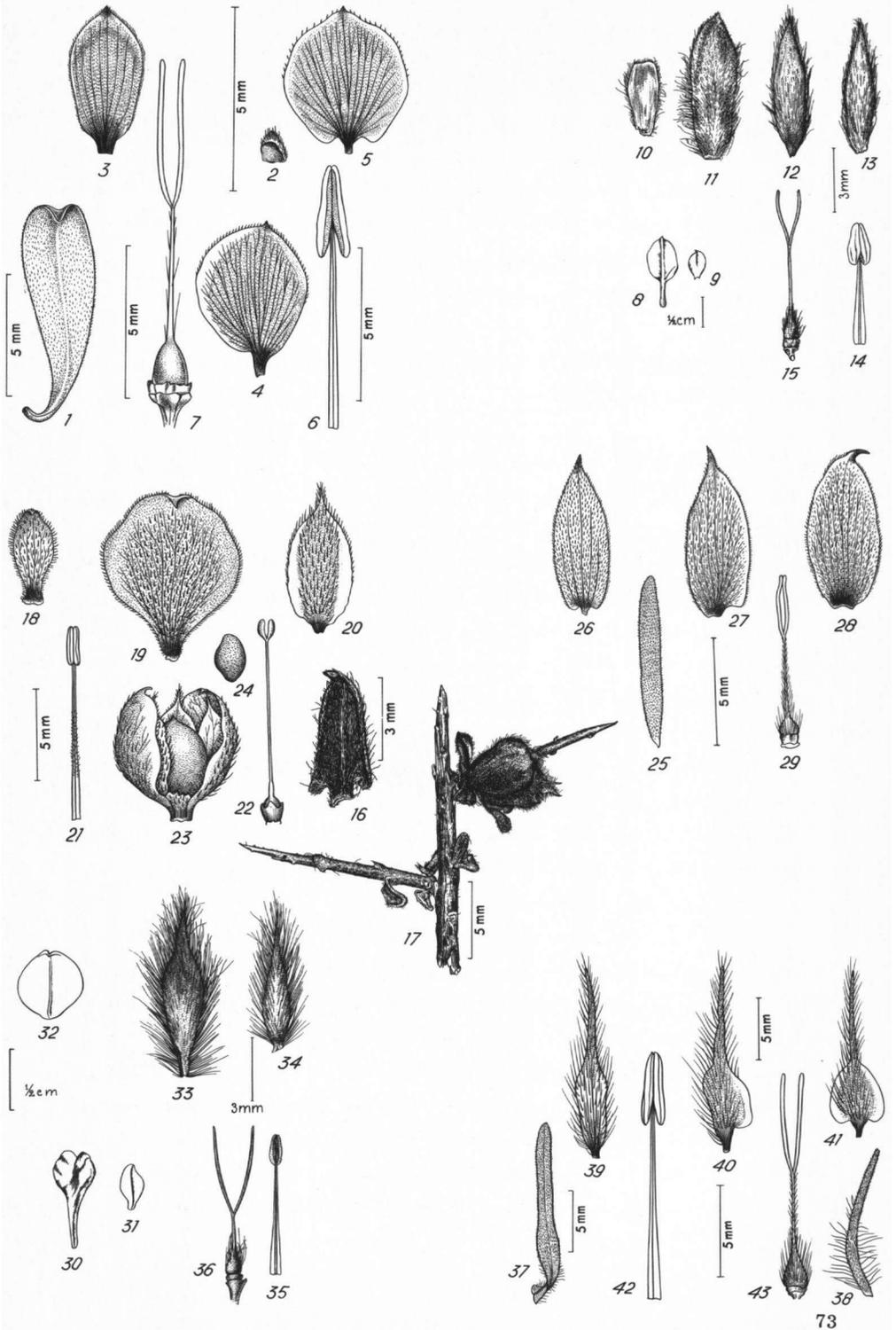
C. ifniensis Caballero in Trab. Mus. Cienc. Nat., Madrid, Ser. Bot. 30. 7. 1935.

Type: Caballero s. n., Bu-Sedra, Ifni, N.W. Africa, lectotype (MA).

Plate II. fig. 1-7.

A shortly appressed-pilose frutescent plant. Underground parts unknown. Shoots and branches ligneous; shoots intricately branched. Leaves firmly herbaceous, the lower ones not seen, cauline ones sessile, spatulate or linear-ob lanceolate to linear, 12-17 mm. long, 2-4 mm. wide, 3-7 times as long as wide, apex retuse or subacute, base decurrent, margin entire, indumentum shortly appressed-pilose, nervation pinnate, the midrib prominent at the lower surface. Flowers axillary, solitary; peduncle wanting. Bracts like the leaves. Bracteoles minute, fleshy, shorter than the pedicel. Pedicel as long as the outer sepals. Sepals unequal, shortly appressed-pilose; the outer ones attenuate towards the base, obovate, subacute, mucronulate, 3 mm. long, 2.5 mm. wide; the middle one 4 mm. long, with the right and the left half unequal, one half glabrous and membranous; the inner ones as long as the middle one, broadly obovate, convex, obtuse, mucronulate, auriculate at the base, with both halves glabrous and membranous. Corolla white, pink on the outside, 18 mm. long, 6 times as long as the outer sepals, with hairy bands on the outside, but the tube quite glabrous. Stamens unequal, the longest one 16 mm.; filaments glabrous; anthers oblong-sagitate, retuse at the apex. Ovary glabrous or rarely with few hairs; style stout, as long as the cylindrical stigmas. Capsule sub-

Plate II. fig. 1-7: *C. caput-medusea*; 1: leaf; 2: bracteole; 3: outer sepal; 4: middle sepal; 5: inner sepal; 6: stamen; 7: pistil [1-7: (Reymond 32 (RAB))]; fig. 8-15 *C. hamarinensis*; 8,9: leaves; 10: bracteole; 11: outer sepal; 12: middle sepal; 13: inner sepal; 14: stamen; 15: pistil [8-15: Rechinger 8083 typus (W)]; fig. 16-24 *C. hystrix*; 16: a leaf; 17: a part of a branch; 18: bracteole; 19: outer sepal; 20: inner sepal; 21: stamen; 22: pistil; 23: capsule; 24: seed [16-24: Sa'ad 1444 (CAIM)]; fig. 25-29 *C. spinifer*; 25: bract; 26: outer sepal; 27: middle sepal; 28: inner sepal; 29: pistil [25-29: Regel s.n. (W) Herb. Keck]; fig. 30-36 *C. ulcinus*; 30,31: leaves; 32: bracteole; 33: outer sepal; 34: inner sepal; 35: stamen; 36: pistil [30-36: Aucher-Eloy 3936 (W)]; fig. 37-43 *C. urosepalus*; 37: leaf; 38: bract; 39: outer sepal; 40 middle sepal; 41: inner sepal; 42: stamen; 43: pistil [37-43: Koelz 18056 (W)].



globose, 4 mm. long and wide, glabrous or with a few hairs; seeds not seen.
Fl. Feb-May, Fr. May.

In arid deserts, on rocks, alt. 500-1800 m.

Distribution: Morocco, Canary Islands, Algeria.

Specimens seen: Morocco: Sauvage 2420, Zemmous Or.* (RAB); Sauvage & Essaïef 3930, Jekna * (L); Maire s. n., Anti-Atlas, Adar-ou-Aman * (RAB); Gattefossé s. n., Tafraout (RAB).

Canary Islands: Gran Canaria: Larsen s. n., Telda (C).

8. C. hamarinensis Rechinger f. in Anz. Math. -naturw. kl. Oesterr. Akad. Wiss. I: 11. 1961; Rechinger f., Fl. Lowl. Iraq, 482. 1964.

Type: Rechinger 8083, J. Hamrin, Iraq, holotype (W) seen.

Plate II. fig. 8-15.

A 10-20 cm. high suffrutescent plant. Underground parts unknown. Shoots rigid, tomentellous with spreading hairs, divaricately branched. Leaves coriaceous; the basal ones petiolate with a petiole as long as the blade and the blade suborbicular or obovate, ca. 5 mm. long, ca. 4 mm. wide, i. e. 1.25 times as long as wide, apex subacute, base cuneate, margin entire, indumentum tomentellous with short spreading hairs, nervation pinnate, with the lateral nerves immersed in the indumentum, midrib prominent; the upper leaves subsessile with the blade obovate or elliptic, 4-6 mm. long, ca. 3 mm. wide, i. e. 1.25-2 times as long as wide; those on the branchlets smaller, sessile and suborbicular. Flowers sessile, solitary or rarely in pairs in the axil of the bracts. Bracts small, suborbicular to elliptic, ca. 3 mm. long, ca. 2 mm. wide. Peduncle wanting. Bracteoles small, oblanceolate, obtuse, recurved, shorter than the sepals. Pedicels wanting. Sepals unequal, tomentellous with spreading hairs; the outer ones oblong, 7 mm. long, acute, with the upper part green and the lower part colourless; the three inner ones lanceolate, 6 mm. long, acuminate; the middle one with the right and left halves slightly unequal; the inner ones with both halves narrow, membranous. Corolla white or pale pink, 10 mm. long, 1.5 times as long as the calyx; each segment with a hairy band on the outside, but the tube quite glabrous. Stamens unequal, the longest one 5 mm.; filaments thin, glabrous; anthers sagitate with retuse top. Ovary ovoid,

* 1) Localities from the labels

hairy, at the base surrounded by a glabrous cupshaped disc; style glabrous, filiform, as long as the filiform stigmas. Capsule not seen. Fl. March-October.

In a sandy-gypsum soil.

Distribution: Iraq, Arabia.

Specimens seen: Arabia; Khodeir 110, Rīyadh (CAI); Kadry & Khodeir s.n. Spring 1962, Alkharj (CAI)

9. *C. hystrix* Vahl, Symb. Bot. I: 16.1790; Choisy in DC., Prodr. IX: 400-1845; Boiss., Fl. Or. IV: 88.1875; Baker et Rendle in Thiselton Dyer, Fl. Trop. Afr. IV (2): 90.1905; Post, Fl. Syr. Pal. & Sin. ed. 2, II: 203.1933; Andr., Fl. Sud. III: 106.1956; Täckh., Stud. Fl. Egypt.: 170.1956.

Type: Forskål s.n., Arabia, Biet el Fakih (not Dahhi), holotype, herb. Forsk. no. 454 (C), seen.

Homonym: *C. spinosus* Forsk. Fl. Aegyp. Arab. CVI. 1775, non Burm. 1768.

Heterotypic synonym: *C. armatus* Delile, Descrip. Egypt. II: 189.1812; Fl. Egypt. illust. Pl. 18. f. 2.1813.

Type: Delile s.n., Egypt, near the Red Sea, 27 décembre 1800 (MPU), not seen. Isotype (P).

Plate II. fig. 16-24.

A 60-100 cm. high, sericeous to densely villous frutescent plant. Shoots and branchlets strongly entangled. Leaves firmly herbaceous, very shortly petiolate, oblong to ovate-triangular, 4-10 (-15) mm. long, 2-3 (-5) mm. wide, 1.5-3 times as long as wide, apex acute, base of the blade truncate to auriculate, margin entire, ciliate, indumentum shortly appressed sericeous, nervation pinnate. Flowers sessile, up to 6 in a compact axillary cincinnus, inserted at the base of the spiny branchlet. Bract triangular, auriculate, 6 mm. long, 4 mm. wide. Bracteoles leafy, obovate, with recurved tip, 6-7 mm. long, 3-5 mm. wide. Sepals shortly villous, convex; the outer ones broadly obovate, 9 mm. long, 6-8 mm. wide, acute, enveloping the inner ones; the three inner ones identical, broadly oblong, long mucronate, hairy and membranous. Corolla pale violet, 12 mm. long, 1.5 times as long as the calyx, with hairy bands on the outside. Stamens unequal; filaments with stalked glands on the dilated part; anthers sagittate with retuse apex. Ovary conical, with a membranous, 5-toothed, cupshaped disc at the base; style filiform, 6 times as long as the

cylindrical-clavate, cylindrical or, rarely, filiform stigmas. Capsule glabrous, obovoid, 3 mm. long, 2.5 mm. wide, unilocular, one-seeded; seed glabrous, ovoid, greyish-brown. Fl. the whole year, Fr. March.

On small sand dunes.

Distribution: Egypt, Arabia, Sudan, Eritrea. *

Specimens seen:

Egypt: Letourneux 101, near Suez (W); Khattab 6424 G. Elba (CAIM); Drar 893 D, Aswan (CAIM); Sa'ad 1286, W. 'Allāqi, Meitkuān (CAIM, U, WAG);

Sudan: Sa'ad 1444, 20 km., E. Darahîb Mine (N.Sudan) (CAIM);

Arabia: Schimper 906, Jiddah (Dschedda) (GOET, HAL, HBG, L, W); Hildebrandt 133 ibid. (L, W); Khattab 168, J. Arafat, Mecca (CAIM).

Its occurrence in the Canary Isles is uncertain, as some of the botanists working on the flora of the Canary Isles may have confused this species on account of its spiny appearance with *C. caput-medusae*. One specimen was collected by Lowe on M. Sabor 1863-4, S. Syria, but as this locality cannot be found on the maps, the occurrence of this species in what nowadays is called Syria remains uncertain.

10. *C. oxyphyllus* Boiss., Diagn. 1 (7): 26.1846; Boiss., Fl. Or. IV: 88.1875; Rech. f., Fl. Iran (Conv.) 10.1963; Rech. f., Fl. Lowl. Iraq 483-1964.

Type: Aucher-Eloy 4950, S. Iran, holotype (G-Boiss.), seen.

A 25-50 cm. high, suffrutescent plant; indumentum tomentellous with an admixture of spreading hairs. Root and base ligneous. Shoots branching; branches[±] flexuous or stiff and ending in a spine. Leaves coriaceous, sessile; the radical ones linear-oblong, 20-30 mm. long, ca. 5 mm. wide, 4-6 times as long as wide, apex acute, gradually attenuate towards the base, margin entire, with appressed or tomentellous hairs, nervation pinnate; the cauline ones lanceolate or linear-lanceolate, 10-20 mm. long, 3-6 mm. wide, 3-6 times as long as wide, apex acute with a spinescent tip, base cuneate; the margin the indumentum and nervation like those of the radical ones. Flowers 1-3 or, rarely, several in axillary inflorescences in the latter case usually on a short peduncle, but sometimes on a peduncle which is longer than the subtending bract. Bracts like the cauline leaves but smaller, 3-6 (12) mm. long. Bracteoles small, rarely leafy. Pedicels wanting. Sepals unequal, tomentellous with an

* 1) Ex Baker & Rendle, l.c.

admixture of long spreading hairs, 7-8 mm. long; the outer ones oblong, acute or acuminate; the middle one with the right and the left half unequal, one half narrowly membranous; the inner ones narrowly ovate, acuminate, shorter than the outer ones, with both halves narrowly membranous. Corolla of unknown colour, 1.5 times as long as the calyx, with hairy bands on the outside, but the tube quite glabrous. Stamens unequal, the longest one 7 mm. ; filaments glabrous; anthers oblong, with retuse top. Ovary ovoid, hairy, with a glabrous, cupshaped disc at the base; style hairy, filiform, as long as the filiform stigmas. Capsule not seen. Fl. the whole year.

Sandy or stony ground, sandy dunes and calcareous mountains, alt. 400-750 m.

Distribution: known from Iraq and Iran.

a. *ssp. oxyphyllus*

Branches flexuous; densely or rarely sparsely villous; peduncles usually wanting.

Distribution: NE Iraq; SW Iran.

Specimens seen:

Iraq: Rechinger 8072, between Al Miqdadiyah (Sharban) & Jalūlā (W); Rechinger 9658, Mandalī (W).

Iran: Behboudi 820 E, Mīnāb (W).

b. *ssp. oxycladus* Rech. f. in Anz. Math.-Naturw. Kl. Oesterr. Akad. Wiss: 11. 1961.

Type: Rechinger 9886, between Ar Ramādī (Ramadi) & Rutbah, Iraq, holotype (W).

Branches intricately divaricate, stiff, ending in a spiny tip; usually with but few spreading hairs.

Distribution: W. Iraq.

Specimens seen:

Iraq: Rechinger 9571, between Tigris & Jabal Hamrīn (W); Rechinger 8320, Karbalā (W); Rechinger 8190, between Ur & Al Buḡayyah (W).

11. *C. spinifer* Popov in Trav. Turkest. Univ. Tashkent, 4: 56. 1922; Petrov in Bull. Soc. Nat. Mosc. n. s. 44: 134. 1935 (not seen).

Type: unknown to me.

Plate II. fig. 25-29.

A low (8 cm. high), strongly appressed sericeous, intricately branched suffruticose plant. Root ligneous, 6-8 mm. in diameter. Base ligneous. Leaves chartaceous, sessile; radical ones oblanceolate, ca. 13 mm. long, ca. 3 mm. wide, 4 times as long as wide, apex acute, decurrent with a broad base, margin entire, indumentum sericeous, nervation pinnate, cauline leaves like the radical ones, but base narrower. Flowers axillary, solitary on a very short peduncle; the latter much shorter than the subtending bract. Bracts linear, subacute, ca. 10 mm. long, one mm. wide. Bracteoles small, longer than the very short and thick pedicel. Sepals lax, shortly sericeous, convex, slightly unequal, 8 mm. long; the outer ones lanceolate-oblong, mucronate; the middle one with the right and left half unequal, one half hairy and membranous; the inner ones like the outer ones, but broader and with both halves hairy and membranous. Corolla immature, colour not known, with hairy bands outside, but the tube quite glabrous. Stamens unequal; anthers oblong, retuse above. Ovary ovoid, with long velutinous hairs and a glabrous cupshaped disc at the base; style hairy; stigmas filiform. Capsule subglobose, hairy, 6 mm. long and wide. Fl. and Fr. June.

In hills, on calcareous soils.

Distribution: Tian-Schan USSR - China.

Specimens seen: Rozanov s.n., W. Tian-Schan, Fergana USSR (G).

Can be separated from *C. fruticosus* Pall. on account of its low, suffruticose intricately branched habit, its smaller leaves, the absence of the two spines at the base of the pedicel; its solitary flowers, very short peduncle, linear bracts, very small bracteoles and lanceolate-oblong outer sepals.

12. *C. ulcinus* Boiss., *Diagn. Pl. Or. Nov.* 1 (7): 26. 1846; Boiss., *Fl. Or.* IV: 89. 1875.

Type: Aucher-Eloy 4936, Muscat (Mascat), Oman, holotype (G-Boiss.), seen. Isotypes (LE, W).

Plate II. fig. 30-36.

A low tomentellous suffrutex. Underground parts unknown. Shoots intricately branched. Leaves fleshy, the lowermost ones not seen, the next lower ones

recurved, oblanceolate, 8-10 mm. long, ca. 3 mm. wide, i.e. 2.5-3.5 times as long as wide, obtuse or retuse, with decurrent base, margin plicate, indumentum tomentellous, nervation pinnate; the upper leaves like the lower ones but smaller. Inflorescences axillary, scorpioid cymes, consisting of up to 4 congested flowers. Peduncle very short. Bracts small, suborbicular, acute, ca. 3 mm. long. Bracteoles suborbicular, tomentellous on the outside, sericeous on the inside. Pedicel wanting. Sepals sericeous, unequal; the outer ones oblong-obovate, acuminate, 7 mm. long; the three other ones lanceolate, acuminate, with a very narrow membranous margin, 6 mm. long. Corolla of unknown colour, 8 mm. long, as long as the calyx, each segment with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the longest one 6 mm.; filaments glabrous; anthers oblong, obtuse. Ovary conical, hairy at the top, at the base surrounded by a glabrous cup-shaped disc; style glabrous, filiform; stigmas filiform, 1.5 times as long as the style. Capsule not seen. Time of flowering unknown.

Distribution: known from the type only, which was collected at Muscat, Oman.

13. C. urosepalus Pau in Trab. Mus. Nac. Cienc. Nat. Madrid. Bot. 14:27. 1918; Rech. f., Fl. Iran (Conv.): 8. 1963.

Type: M. de la Escalera X, Kūh-e-sēfid, Iran (MA), seen.

Icon.: Rech. op. c. t.l. fig. 1.

Plate II. fig. 37-43.

A 4-10 cm. high, suffrutescent plant. Root ligneous. Shoots angular, intricately sericeous, with an admixture of spreading hairs. Leaves firmly herbaceous, sessile, linear, 12-17 mm. long, ca. 2 mm. wide, i.e. 6-8 times as long as wide, apex acute, base decurrent (broad and scarious in the radical ones), margin entire (scarious in the radical ones), indumentum sericeous with spreading hairs, uninerviate. Flowers solitary or in an axillary group of 2 or 3, sessile. Bracts linear, acuminate, ca. 10 mm. long; the bracteoles of the first formed flowers shifted to the front. Pedicel short, quadrangular, because of the decurrent outer sepals. Sepals unequal, with long and shiny spreading hairs; the outer ones oblong-obovate, long acuminate, 14 mm. long; the middle one with the right and the left half unequal, one half glabrous and membranous; the inner ones ovate, long acuminate, with both halves glabrous

and membranous. Corolla 20 mm. long, 1.5 times as long as the calyx, with bands of long and shiny hairs on the outside, but the tube quite glabrous. Stamens unequal; filaments glabrous; anthers sagitate with retuse top. Ovary hairy, with a glabrous cupshaped disc at the base; style hairy, as long as the filiform stigmas. Capsule not seen. Fl. June. Fruiting time not known.

Growing in mats on dry slopes, alt. 1500 ft.

Distribution: known from Iran only.

Specimens seen: Iran: Koelz 18056, Galichir, * Bakhtiari (W).

Subsectio 3. Serospinescentes Sa'ad subsectio nov.

The older branches with spiny tips; the young ones not spiny, but rigid.

Flowers congested in terminal or axillary capitula.

14. C. lanatus Vahl, Symb. Bot. 1:16.1790; Boiss., Fl. Or. IV: 89.1875; Halacsy, Conspec. Fl. Gr. II: 203.1902; Ramis, Bestimmung, Fl. Aegypt.: 153.1929; Dinsmore in Post, Fl. Syr. Palest. Sinai ed. 2, II: 204.1933; Täckholm, Stud. Fl. Eg.: 171.1956.

Type: Forskål s.n., Sinai U.A.R. (Egypt), herb. Forsk. no. 456, holotype (C-Forsk.) seen.

Homonym: *C. cneorum* Forsk., Fl. Aegypt. Arab. 63.1775, non L. 1753.

C. forskalei Del., Fl. Egypt. 46.t.18.f.3.1813.

Type: Delile s.n., El Sâlhfyâ, U.A.R. (Egypt); holotype (MPU), not seen.

C. el-arishensis Boulos in Bull. Fac. Sci. Cairo Univ. 34:77.1958.

Type: Boulos 183 A, N. El-Arish U.A.R. (Egypt); lectotype (CAI) seen.

Misapplied name: *C. sericeus* auct. non Burm.; Choisy in DC., Prodr. IX:400.1845.

Plate III. fig. 19-27.

A 17-35 (-10) cm. high suffrutescent plant. Root ligneous, up to 60 cm. long, 6 mm. in diameter. Base of the shoots ligneous, branched; older branches tomentellous, younger ones tomentose to woolly, simple or branching, bearing leaves in the lower and flowering in the upper half. Leaves firmly herbaceous, sessile; the lower ones spatulate to linear-oblongate, 12-25 mm. long, 3-5 mm. wide, 5-6 times as long as wide, attenuate towards the base;

* 1) Locality from the label.

the cauline ones linear-lanceolate to linear, 12-32 mm. long, 2-3.5 mm. wide, 4-7 times as long as wide, apex acute, base cuneate, margin entire, indumentum tomentose to tomentellous, pinnately nerved. Flowers up to 6 in a compact axillary cincinnus. Peduncle wanting or very short, i. e. much shorter than the subtending bract. Bracts tomentellous, lanceolate-oblong, acute. Bracteoles leafy, ovate, acute, with shiny spreading hairs, 10 mm. long, 5 mm. wide, not exceeding the calyx, situated in front of the flower because there is no space for their development in a lateral position. Pedicels wanting. Sepals unequal, tomentellous; the outer ones 10 mm. long, 5 mm. wide, elliptical, with the upper part green and acuminate; the middle one like the inner ones, lanceolate, acuminate, with both halves hairy and membranous, 7 mm. long, 2 mm. wide. Corolla 19 mm. long, twice as long as the calyx, nearly white, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the longest one 10 mm.; filaments glabrous; style as long as the cylindrical stigmas. Fruit not seen. Fl. Feb.-Decemb.

In deserts and on sandy dunes.

Distribution: Egypt, Palestine, Kuwait?, * Oman.

Specimens seen:

U. A. R. (Egypt): Kotschy 109, M. Azrak near Cairo (Cahira) (W); Wiest 545, Cairo (GOET, HAL, HBG, JE, L, W); Hildebrandt 47, Ismâîliya (L).

Palestine: Bové 433, near Jaffa (K).

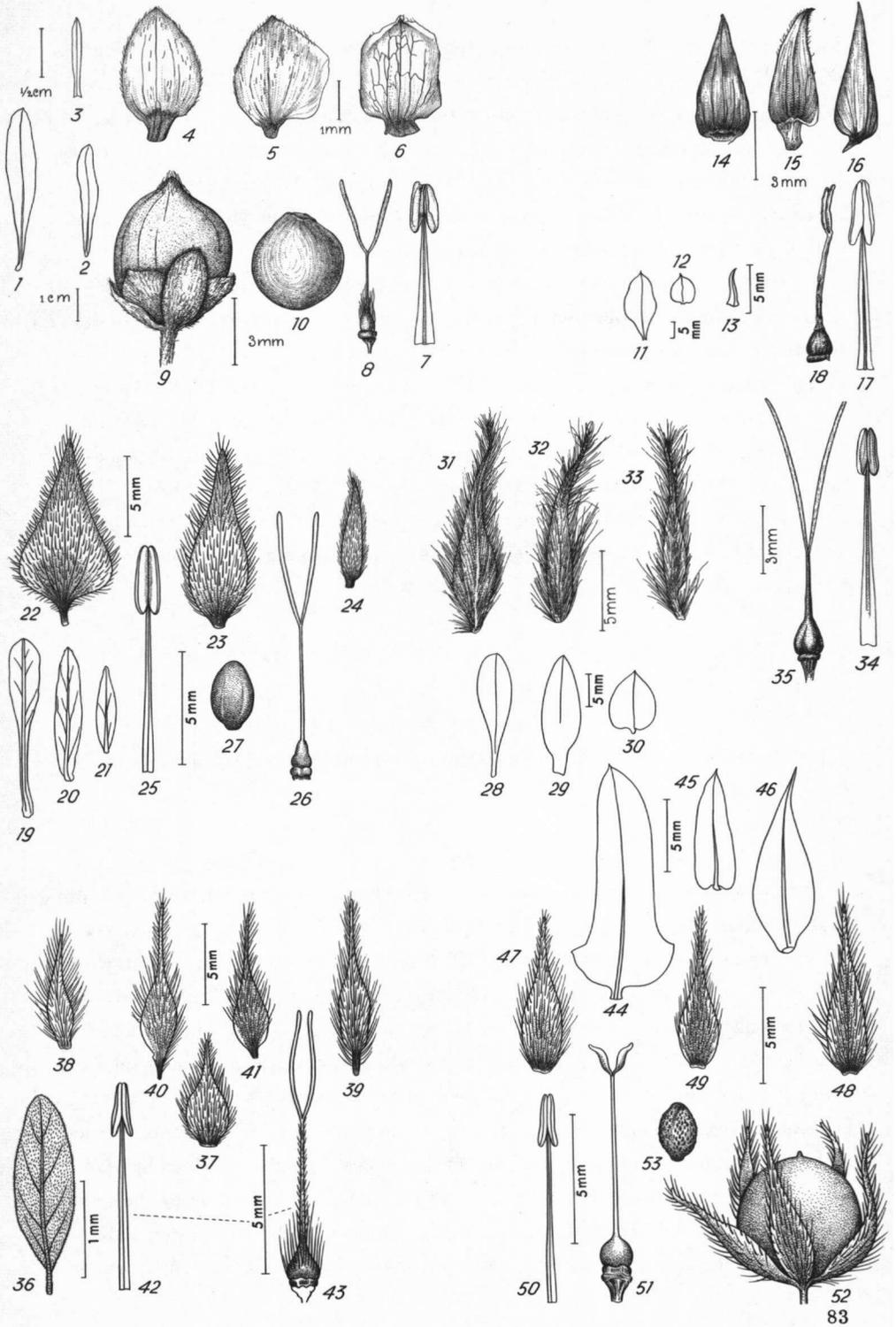
Oman: Fernandez 541, Oman (K).

Dickson, Wil. Fl. Kuwait & Bahrain 33, 1955, mentioned its occurrence in Kuwait, but this can not be accepted as proved, as his description is not sufficiently clear.

Boulos l. c. described a specimen of *C. lanatus* as a new species under the name *C. el-arishensis*. That the author of this synonym did not recognize the identity of his specimen was due to the fact that the basal part, characterized by the presence of old, spiny shoots, was lacking. As the genus *Convolvulus* is divided into sections according to the habit of the plants, he thought that his species belonged to the series *Pannosi* Boiss. He compared it wrongly with *C. secundus* and distinguished it from the latter on account of the colour of the hairs, but this can not be taken in the genus *Convolvulus* as a specific character. By studying the types of hair met

* 1) Dickson l. c.

Plate III. fig. 1-10 *C. chondrilloides*; 1,2: leaves; 3: bract; 4: outer sepal; 5: middle sepal; 6: inner sepal; 7: stamen; 8: pistil; 9: capsule; 10: seeds [1-8: Bommüller 7640 (W); 9,10: Schmid 6469 (W)]; fig. 11-18 *C. divaricatus*; 11,12: leaves; 13: bracteole; 14: outer sepal; 15: middle sepal; 16: inner sepal; 17: stamen; 18: pistil [11-18: Drabov 287 (B)]; fig. 19-27 *C. lanatus*; 19-21: leaves; 22: bracteole; 23: outer sepal; 24: inner sepal; 25: stamen; 26: pistil; 27: seed [19-26 Khattab et Sharobeim 2923 (CAIM); 27: Schimper 727 (HAL)]; fig. 28-35 *C. oxysepalus*; 28,29: leaves; 30: bract; 31: outer sepal; 32: middle sepal; 33: inner sepal; 34: stamen; 35: pistil [28-35 K.H. et F.Rechinger 3211 (E)]; fig. 36-43 *C. turrillianus*; 36: leaf; 37: bract; 38: bracteole; 39: outer sepal; 40: middle sepal; 41: inner sepal; 42: stamen; 43: pistil [36-43: Miragan 830 E (W)]; fig. 44-52 *C. virgatus*; 44,45: leaves; 46: bracteole; 47: outer sepal; 48: middle sepal; 49: inner sepal; 50: stamen; 51: pistil; 52: capsule; 53: seed [44, 45, 52, 53: K.H. et F.Rechinger 3988 (W); 46-51: Aucher-Eloy 4955: (W)].



with in the genus *Convolvulus*, the present author could ascertain that stellate hairs are not found in the species of this genus occurring in the area dealt with in this revision. To distinguish *C. lanatus* from *C. secundus* in case the spiny basal part is lacking, we can make use of the fact that the leaves of the latter are rugose and not tomentellous, the young branches not more than 2 mm. in diameter, the sepals not tomentellous and the outer ones not elliptical with the upper part green and acuminate.

Choisy l.c. cited under the name *C. sericeus* Burm. specimens which can not be identified with Burman's species, and which, moreover, belong to different species. Specimens identified by Choisy in herb. DC-G and re-identified by the present author are: Schimper 727, Arabia petraea; this is *C. lanatus* Vahl; Bové 503 is a paratype of *C. spicatus* Peter ex Hallier f.; Aucher 3340 is *C. oxyphyllus* Boiss. ssp. *oxyphyllus*, whereas Baghdad-Aley 1822 and Oliver s.n., Orient 1821 are *C. oxyphyllus* Boiss. ssp. *oxycladus* Rech.f. Choisy therefore confused various species, though on account of his description these specimens might indeed all be put under *C. lanatus* Vahl.

15. *C. oxysepalus* Boiss., Diagn. Pl. Or. Nov.1(7): 23. 1846; Boiss., Fl. Or. IV: 90. 1875; Rech. f. Fl. Iran (Conv.) 11. 1963.

Type: Aucher-Eloy 4948, between Dārāb (Darap) et Tārom (Taroun), Iran; holotype (G-Boiss.).

Plate III. fig. 28-35.

A tomentellous low i.e. 11-21 cm. high suffrutescent plant. Root and stem base ligneous. Shoots rigid, branched. Leaves coriaceous; radical ones sessile, linear-oblongate or spatulate, 11-20 (-25) mm. long, 2-5 (-10) mm. wide, 3.5 times as long as wide, acute or obtuse; cauline leaves petiolate, petiole $\frac{1}{4}$ as long as the blade, blade 10-15 mm. long, 4-8 mm. wide, ca. 2 times as long as wide, acute, margin entire, tomentellous, nerves conspicuous on the lower surface. Inflorescences in the form of compact cymes at the top of the branches. Bracts broadly ovate, ca. 10 mm. long, 6 mm. wide, acute. Bracteoles lanceolate, acuminate, as long as the sepals. Sepals with long spreading hairs, 10-11 mm. long; the outer ones elliptical-oblong, acuminate; the three inner ones identical, lanceolate, acuminate, with the right and the left half slightly membranous. Corolla of unknown colour, 15 mm. long, 1.5 times as

long as the calyx, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the longest one 11 mm. ; filaments glabrous; anthers oblong, with retuse top. Ovary ovoid, glabrous, with a cupshaped disc at the base; style filiform, glabrous; stigmas filiform, twice as long as the style. Capsule obovoid, glabrous, membranous, 4.5 mm. long, 2.5 mm. wide; seeds unknown. Fl. Apr.-May, Fr. May.

Mountains and slopes, 1400-1600 m.

Distribution: known from Iran only.

Specimens seen:

Iran: Rechinger 3864, Kūh-e Jebāl Bārez, between Bam et Djiroft, Kermān (W); Rechinger 4005, M. Kāravānder between Khāsh (Vasht) et Īranshahr, S. Iran (E, W).

16.C. turrillianus Parsa in Kew Bull. 2:213.1948; Rech. f. , Fl. Iran (Conv.): 10.1963.

Type: Parsa 566, Karevandar, S. Iran; holotype (K).

Icon.: Rech. op. c. t. 3; inflorescence not correctly drawn.

Plate III. fig. 36-43.

An 18-21 cm. high, appressed sericeous suffrutescent plant. Shoots branched, erect-spreading. Leaves coriaceous, lower cauline ones with a 3-12 mm. long petiole, blade elliptical to obovate-elliptical, 15-25 mm. long, ca. 7 mm. wide, 1.5-2 times as long as wide, obtuse to subacute; upper cauline leaves sessile, elliptical, 10-15 mm. long, 5-8 mm. wide, ca. twice as long as wide, acute, base cuneate (leaves of sterile branchlets smaller); margin entire, pinnately nerved. Flowers numerous in a compact cyme. Bracts ovate, acuminate, with long and shiny spreading hairs. Bracteoles linear-lanceolate, not exceeding the calyx. Pedicels wanting. Sepals unequal, with long shiny hairs, 8-9 mm. long; the outer ones oblong to narrowly obovate, long acuminate; the middle one with the right and the left half unequal, one half membranous; the inner ones ovate, long acuminate, with both halves membranous. Corolla yellow, 18 mm. long, with hairy bands on the outside, but the tube quite glabrous. Stamens unequal; filaments glabrous; anthers oblong with retuse top. Ovary hairy, ovoid, with a glabrous cupshaped disc at the base; style hairy, 1.5 times as long as the filiform stigmas. Capsule not seen.

Fl. March. Fr....

In mountains.

Distribution: known only from S. Iran.

Specimens seen:

Iran: Mirzayan 830.E, Khash, K̄aravānder (W); Mirzayan 831 E, Khash (W);
Mirzayan 829 E, Saravan (W).

17. *C. virgatus* Boiss., Diagn. Pl. Or. Nov. 1(7):24.1846; Boiss., Fl. Or. IV: 88.1875; Rech. f., Fl. Iran (Conv.):11.1963.

Type: Aucher-Eloy 4955, S. Iran; holotype (G-Boiss.) seen.

Isotype (W).

C. mascatensis Boiss., Diagn. Pl. Or. Nov. 1(7): 25.1846.

C. virgatus Boiss. var. *subaphyllus* Boiss., Fl. Or. IV:89.1875.

Type: Aucher-Eloy 4938, Muscat, Oman (G-Boiss.) seen.

Isotype (W).

Plate III. fig. 44-52.

A glabrous or sparsely hairy suffrutescent plant. Shoots branched, rigid; the older branches with stiff tips. Leaves firmly herbaceous; the radical ones not seen; the cauline leaves shortly petiolate, linear-oblong or linear, 17-25 mm. long, 2-4 mm. wide, 4.5-11 times as long as wide, acute, with a spinescent mucro, base truncate, cuneate or with small auricles, margin entire, glabrous, pinnately nerved. Flowers solitary or 3-5 (-several) in a compact axillary cincinnus. Peduncle rigid, much longer than the subtending bract. Bracts like the leaves, 10-22 (-44) mm. long. Bracteoles lanceolate to linear, acuminate, longer than the short pedicel, but not exceeding the calyx. Sepals unequal, long sericeous; the outer ones 10-11 mm. long, 3 mm. wide, linear-oblong or oblanceolate, long acuminate; the middle one with the right and the left half unequal, one half membranous; the inner ones 8 mm. long, lanceolate, long acuminate, with both halves membranous. Corolla of unknown colour, 11-14 mm. long, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens subequal, the longest one 8 mm.; filaments with glands on the dilated part; anthers oblong with retuse top. Ovary glabrous, with a cupshaped disc at the base; style glabrous, 6 times as long as the shortly cylindrical stigmas. Capsule glabrous, subglobose, 4 mm. long and wide, 1- or 2-seeded; seeds dark brown, tubercled, 3 mm. long, 2.5 mm. wide. Fl. Jan-May, Fr. May.

On mountains and slopes; alt. 1500-1600 m.

Distribution: S. Iran, Oman reg. Muscat.

Specimens seen:

Iran: Rechinger 3647, Kūh-e, Jebāl Bārez between Bam & Djīroft, Kermān (W);
Rechinger 3988, M. Kāravānder between Khāsh (Vasht) & Iranshāhr (E, W),
Rechinger 3460, Lar, Bandar 'Abbās (E, W); Salvatian 819 E, Sarbāz, Rāsk (W);
Behkoudi 822 E, Biābān (W); Behkoudi 821 E, Mināb (W).

Sectio II. Inermes Boiss.

Shrubs or subshrubs, shoots not twining, either erect and rigid or prostrate.

Subsectio 4. Inermes

Shoots rigid, either intricately branched with the branches divaricate or fastigiately branched.

Series a. Inermes

Inflorescence axillary and consisting of 2-7 flowers or reduced to a single flower. Bracts and bracteoles present.

18. C. chondrilliodes Boiss., Diagn. Pl. Or. Nov. 1(11):83. 1849; Boiss., Fl. Or. IV: 92. 1875; Rech. f., Fl. Iran (Conv.): 13. 1963.

Type: Aucher-Eloy 4941, S. Iran; lectotype (G-Boiss.) seen.

Isotypes (P, W).

C. chondrilloides Boiss. ssp. eriocalycinus Born. & Gauba in Fedde, Repert. 51: 215, 1942.

Type: Gauba 1624, Karaj (Keredj), Iran (B) seen.

Evolvulus virgatus Choisy in DC., Prod. IX: 446. 1845, non Willd. ex Spreng. 1825.

Type: Aucher-Eloy 1410, near Baghdad, Iraq; holotype (G-DC) seen.

Plate III. fig. 1-10.

A glabrous, slightly hairy or, rarely, puberulous, 50-75 (-120) cm. high plant. Underground parts unknown. Shoots striated, upper part nearly leafless base ligneous. Leaves firmly herbaceous; the radical ones petiolate; petiole 1/3 times as long as the blade; the latter spatulate to oblanceolate, 18-35 mm. long, 5-10 mm. wide, ca. 3.5 times as long as wide, top obtuse to subacute, base gradually attenuate into the petiole; cauline ones sessile, linear to

lanceolate, 25-30 mm. long, 2-20 mm. wide, i. e. 4-12 times as long as wide, top acute, base cuneate, margin entire, appressed hairy or puberulous, pinnately nerved. Flowers up to 6 in partly dichasial and partly monochasial inflorescence or solitary. Bracts small, filiform, much shorter than the peduncle. Bracteoles minute. Pedicel hairy or glabrescent, as long as the sepals. Sepals unequal, variable in shape, either with appressed hairs or glabrous; the outer ones oblong and acute to ovate and obtuse, mucronulate, 2-4 mm. long; the middle one with the right and the left half unequal; the inner ones convex, suborbicular, mucronulate, with both halves membranous. Corolla white, 13 mm. long, 4-6 times as long as the calyx, with hairy bands on the outside, but the tube quite glabrous. Stamens unequal, the longest one 7 mm.; filaments glabrous anthers sagitate, with retuse top. Ovary hairy, but with a glabrous annular disc at the base; style filiform, as long as the filiform stigmas. Capsule hairy, ovoid, exceeding the persistent calyx, 7 mm. long, 5 mm. wide, unilocular and one-seeded; seeds black, glabrous, subglobose, 4 mm. long and wide. Fl. May-Aug. Fr. Jul. Aug.

In the steppe; on dry mountains and plains; on limestone hills; rarely in dry fields. 1400-1600 m.

Distribution: Iraq and Iran.

a. var. chondrilloides

Sepals hairy.

Specimens seen:

Iraq: Bornmüller 1533, between Rāwāndiz (Riwandous) & Arbīl (Erbil) (B); Iran: Davis 803 h Karaj (Keredj) (E); Gauba 970 ibid. (W), Jacobs 6787, Sheshom, Lorestan (W); Rechinger 14633, Kermanshāh (W); Kjöie 1303, Bīsheh (C); Taghilon 946 E, Tehran (W), Kotschy 421, Elbrus, prope Derbend, paratype, pro parte (G-Boiss).

b. var. burzianus Sa'ad nov. var., sepalis glabris a typo diversa.

Type: Koelz 16059, Tehran, Iran (W).

Sepals glabrous.

Specimens seen: Kotschy 421 Elburz (Elburs), Iran pro parte (E, W).

Some of the specimens of Kotschy 421 possess hairy sepals as described by Boiss., Diagn. l. c., whereas other ones are provided with completely glabrous ones.

c. var. villosus Bornm. l. c.

Type: Strauss s. n. in M. Schahù, Iran (JE).

The shoots and the leaves puberulous.

Specimens seen:

Iran: Haussknecht s. n., Kuh Echkel, Jul. 1868 (BM, JE).

19. *C. divaricatus* Regl. & Schmalh. in Act. Hort. Petrop. 2, 4: 338. 1879;
Grigoryev, Fl. U.S.S.R. XIX: 18. 1953.

Type: Koralkan s. n., Khiva (Chiwa) (LE), not seen.

Plate III. fig. 11-18.

A 20-30 cm. high, puberulous or tomentose suffrutescent plant. Shoots firmly herbaceous, divaricately branched. Leaves herbaceous, sessile; the radical ones linear-oblongate, ca. 22 mm. long and 4 mm. wide, i. e. 5 times as long as wide, acute, gradually attenuate towards the base; the cauline leaves ovate or suborbicular, 8-15 mm. long, 7-12 mm. wide, ca. 1.25 times as long as wide, acute, mucronulate, base rounded, margin entire, puberulous or tomentose, pinnately nerved. Flowers solitary or 2 or 3 in an axillary monochasium, on a peduncle which is much longer than the subtending bract. Bracts like the leaves. Bracteoles small awl-shaped, longer than the short pedicel. Sepals unequal, convex, puberulous or tomentellous, 6 mm. long; the outer ones lanceolate, acuminate; the middle one with the right and the left half unequal, one half glabrous and membranous; the inner ones ovate, acuminate with both halves glabrous and membranous. Corolla slightly yellow or slightly pink, 11 mm. long, twice as long as the calyx, with hairy bands on the outside, but the tube quite glabrous. Stamens unequal, the longest one 7 mm.; filaments glabrous; anthers oblong-sagitate, with retuse top. Ovary ovoid, glabrous or hairy at the top; style glabrous or slightly hairy, twice as long as the filiform stigmas. Capsule not seen. Fl. May-June.

In sandy desert.

Distribution: Turkmeniya, C. Asia:* kyzyl-kum, extending to Balkhash and Pamir-Alai.

Specimens seen:

USSR: Litwinow 1425, Repetek, Turkmeniya (C); Drabov 287, desert

* 1) Grigor. l. c.

Majun-kum * (B,C); Paulsen 1755, near Hdsh-Adshi *, Transcaspica (C).

20. C. dorycnium Linn., Syst. Nat. ed. 10, II: 923. 1759; Choisy in DC., Prodr. IX: 403. 1845; Boiss., Fl. Or. IV: 91. 1879; Halacsy, Consp. Fl. Graec. II: 303. 1902; Dinsmore in Post, Fl. Syr. Palest. Sinai, ed. 2, II: 204. 1933; Täckh., Fl. Egypt. : 171. 1956; Rech. f., Fl. Iran (Conv.): 12. 1963.

Type: in herb. Linn. 218.50, lectotype (LINN).

Plate IV. fig. 1-14.

A 58-95 cm. high frutescent plant. Root thick, ligneous. Shoots with terminal and axillary inflorescences, rigid, divaricately branched, woolly to shortly appressed-pilose. Leaves chartaceous, sessile; the radical ones linear-spathulate or linear-oblong, 35-60 mm. long, 7-14 (-20) mm. wide, 4-5 times as long as wide, acute, decurrent, hirsute; cauline leaves linear-oblong or linear-oblongeolate, 14-40 mm. long, 2-7 mm. wide, 6 times as long as wide, acute, attenuate to a narrow base, appressed-pilose; margin entire, pinnately nerved. Flowers solitary or up to 7, in an axillary strongly unequal dichasium, with the apical flowers usually concaulescent to the stout lateral ramifications. Bracts like the leaves or linear, much shorter than the stout peduncle. Bracteoles small, cylindrical. Pedicels shorter than the calyx, quadrangular because of the decurrent outer sepals. Sepals unequal; the outer ones varying from 2.5 to 5 mm. in length, either oblong and acute or acuminate, or obovate and re-tuse or obtuse, mucronulate. Corolla pink, 12-17 mm. long, with hairy bands on the outside, but the tube quite glabrous. Stamens unequal, the longest one 8-11 mm. long; filaments glabrous; anthers oblong, with retuse apex. Ovary glabrous or with few hairs at the top, ovoid, with a cupshaped disc at the base; style thick, as long as the filiform or cylindrical stigmas. Capsule glabrous, oblong or obovate, 5-6 mm. long, 4 mm. wide, unilocular and one-seeded; seed brown, densely puberulous, subglobose, 3 mm. long, 2.5 mm. wide. Fl. April-Juli; Fr. Oct.

In hills, on plains, in arid and rocky places, on acid and calcareous soils, in steppes, at the border of fields.

a. ssp. dorycnium

Rechinger l. c.

* 2) Localities from the label.

Sepals obovate-rotundate, or broadly oblong, obtuse or retuse, shortly mucronulate.

Distribution: Greece, Crete, Egypt, Tunisia, Libya.

Specimens seen:

Greece: Orphanides 205, Athīnai (C, HAL, W); Rechinger 7541, Astipálaia (Astropala or Stampalia) (JE, W).

Krīti:(Crete) Rechinger 12820, Sitia (W).

Tunisia: Cosson, Adanson, Letourneux, Reboud, Barratte and Bonner s.n., Hammamet-Sousse (Hammame-Sousa) (E).

Libya: Pampanini and Pichisermolli 6203, Barce Piede del II Ciglion ¹⁾ (G); Guichard KG/Lib/422 Bugheilan ¹⁾ (BM).

U.A.R. (Egypt): Fischer 53, without locality (M).

b. ssp. oxysepalus (Boiss.) Rech.f., Fl. Iran (Conv.): 12.1963 (Ark. f. Bot. 5, 1: 326. 1959, Comb. invalid. as no basionym is given.).

C. dorycnium var. oxysepalus Boiss., Fl.Or.IV: 92.1875.

Type: Boissier s.n., Tiberias, Palestine, lectotype (G-Boiss.) not seen
Isotypes (K, P).

Sepals oblong to lanceolate, acuminate or subacute, long mucronate.

Distribution: Syria, Lebanon, Palestine, Turkey, Iran.

Specimens seen:

Syria: Gailardot 447 bis, Quatana (Katana) (JE); Barkoudah 678, N.W. Damascus (V).

Turkey: Balansa 698, Bouloukli near Mersin, Cilicia (C, E, GOET, JE, W).

Palestine: Bornmüller 1105, near Ramlah (B, E, HBG, JE, W).

Cyprus: Sintenis & Rigo 589, Nicosia (W).

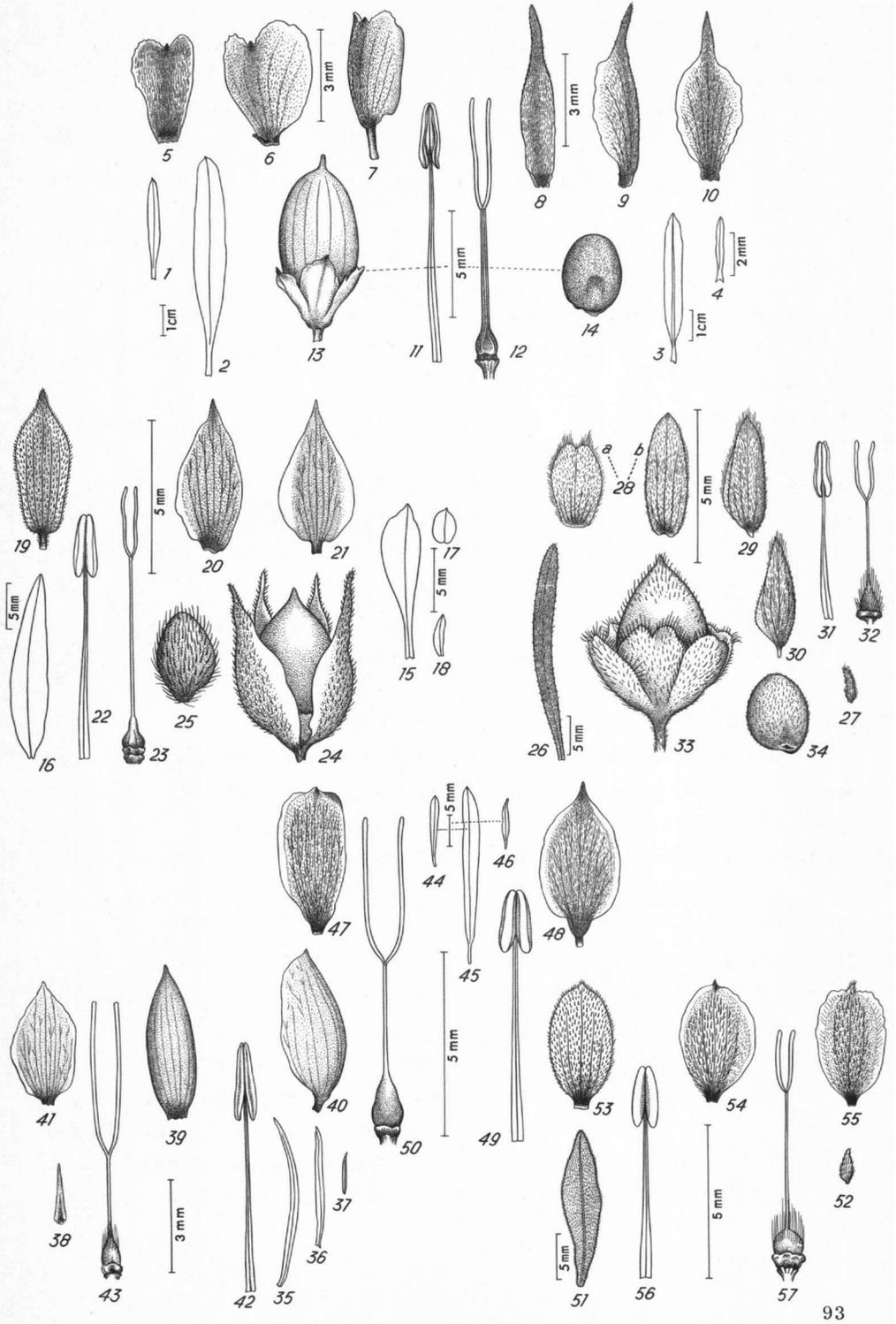
Iran: Stapf 376, Shīrāz (W); Kotschy 436 *ibid.*, paratype (P).

c. ssp. subhirsutus (Rgl. & Schmalh.) Sa'ad stat.nov.

Basionym: *C. hirsutus* Rgl. & Schmalh. in Act. Hort. Petrop. 6, (1):339. 1879
Grigoryev, Fl. USSR, XIX: 20.1953; Rechinger f., Fl. Iran (Conv.) 12.1963.

* 1) Localities from the label.

Plate IV. fig. 1-14 *C. dorycnium*; 1-3: leaves; 4: bracteole; 5-7: var. *dorycnium*; 5: outer sepal; 6: middle sepal; 7: inner sepal; 8-10: var. *oxysepalus*; 8: outer sepal; 9: middle sepal; 10: inner sepal; 11: stamen; 12: pistil; 13: capsule; 14: seed [1-4: Leonis s.n. (W); 5-7: Heldreich 1264 (STU); 8-12: Handel-Mazehi 1948 (W); 13-14: Heldreich 36a (W)]; fig. 15-25 *C. eremophilus*; 15,16: leaves; 17: branchlets' leaf; 18: bracteole; 19: outer sepal; 20: middle sepal; 21: inner sepal; 22: stamen; 23: pistil; 24: capsule; 25: seed [15-25: Rechinger 1313 (W)]; fig. 26-34 *C. erinaceus*; 26: leaf; 27: bracteole; 28a,b: different forms of outer sepals; 29: middle sepal; 30: inner sepal; 31: stamen; 32: pistil; 33: capsule; 34: seed [26, 27, 28b-32: Aitchison 606 (C); 28a, 33, 34: Granitov 442 (C)]. fig. 35-43 *C. koeianus*; 35-37: leaves; 38: bracteole; 39: outer sepal; 40: middle sepal; 41: inner sepal; 42: stamen; 43: pistil [35-43: Kjøie 684 (B)]; fig. 44-50 *C. leptocladus*; 44,45: leaves; 46: bract; 47: outer sepal; 48: inner sepal; 49: stamen; 50: pistil [44,47,50: Scharif 832 E (W); 45,46: Rechinger 3389 (W); fig.51-57 *C. lindbergii*; 51: leaf; 52: bracteole; 53: outer sepal; 54: middle sepal; 55: inner sepal; 56: stamen; 57: pistil [51-57: Lindberg 409 typus (W)].



Type: Regel 270, Kulschek Karatau, Kazahstan, USSR, lectotype (LE) seen
Isotype (K).

C. tschimganicus Pop. and Vved. in Bull. Univ. Asie Centr. (Taschkent)
15 (12): 13. 1927.

Type: Popov 288, Tian-Schan, M. Tschimgan, holotype (TAK), not seen.
Isotype (G).

Plant densely leafy; shoots subherhaceous; sepals herbaceous; the outer
ones oblong and subacute or acute.

Distribution: Afghanistan; E. Iran; USSR: Turkmeniya, Uzbekistan,
Kazakhstan.

Specimens seen:

Iran: Furse & Syngé 512, Shahrud (E. W).

Afghanistan: Duckelmann & Neubauer 607 Herat (W).

USSR: Sintenis 1111, Turkmeniya, Ashkhabad (JE); Vvedensky 444, Uzbekistan,
Taschkent, Tien-Shan Mont (C, W); Regel 21442, M. Karatavic,¹⁾ paratype (BM).

21. *C. eremophilus* Boiss. et Buhse, Nov. Mem. Soc. Nat. Mosc. 12:148. 1860;
Boiss., Fl. Or. IV: 90. 1875; Rech. f., Fl. Iran (Conv.): 11. 1963.

Type: Buhse 1463, near Kāshān, Iran; holotype (G-Boiss.) seen.

C. erinaceus C. A. Meg., Verz. Couc.: 102. 1831, non Ledebour 1831 (op. note).

C. evoluloides Boiss. Diagn. 1(7):25. 1846 non Desf. 1798.

Type: Aucher-Eloy 4952, Makran, Iran-Pakistan (G-Boiss.) seen.

Plate IV. fig. 15-25.

Suffrutescent, 27-37 cm high, puberulous, erinaceous; Shoots elongate
with patent branches. Leaves chartaceous, sessile; the lower ones spatulate,
10-20 mm long, 3-5 mm wide, i. e. 4 times as long as wide, top subacute, base
decurrent; the upper leaves oblong-linear, 10-12 mm long, 2-3 mm wide, i. e.
4-5 times as long as wide, acute, base cuneate, leaves of the branchlets
suborbicular, acute, ca 3mm long, 2.5 mm wide; margin entire, puberulous,
pinnately nerved. Inflorescences axillary, consisting of up to 7 flowers arranged
in a dichasium with monochasial branches or in a monochasium or else reduced
to a single flower. Peduncle rigid, subtended by a small bract. Bracteoles

* 1) Locality from the label.

minute. Pedicel very short, recurved, quadrangular because of the decurrent bases of the two outer sepals. Sepals unequal; the outer ones puberulous, oblong, acuminate, 5 mm long, 2 mm wide; the middle one glabrescent with the right and the left half unequal; the inner ones convex, ovate, acuminate. Corolla of unknown colour, 11 mm long; the segments with a hairy band on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the longest one 8 mm; filaments glabrous; anthers oblong, retuse at the top. Ovary conical, glabrous, at the base surrounded by a cupshaped disc; style glabrous, filiform, twice as long as the filiform stigmas. Capsule glabrous, conical, 5 mm long, 2 mm wide, one-celled and one-seeded; seeds black, covered with stiff white hairs, 3 mm long, 2 mm wide. Fl. & Fr. June-Jul.

On sandy and rocky soils and on mountains.

Distribution: Iran, Azerbaydzhan, U.S.S.R.

Specimens seen:

Iran: Rechinger 1313, Sabzevār (E, W); Rechinger 5286 ibid. (E); Bunge s. n. between Esfahān & Tehrān (C).

C. erinaceus C. A. Mey., Verz. Pfl. Cauc. 102. 1831 is considered to be conspecific with *C. eremophilus* Boiss., but as Meyer in his book referred to Ledebour, so *C. erinaceus* Ledeb. in Eichw. Casp. Cauc. 11. t. 7. 1831-33 must have been published at an earlier date than *C. erinaceus* C. A. Mey. and *C. eremophilus* Boiss. therefore is to be accepted as the legitimate name of this species.

22. *C. erinaceus* Ledeb. in Eichw., Pl. nov. Casp.-Cauc. 11. t. 7 (1831-33); DC., Prodr. IX: 404 (1845); Ledeb., Fl. Ross. III: 88 (1846-51); Boiss., Fl. Or. IV: 87 (1875); Rech. f. (Conv.), Fl. Iran: 9 (1963).

Type: Eichwald 474, E. Caspian Sea, Tjuk-Karagan, holotype (LE) seen
Isotype (HAL).

C. subsericeus Schrenk subsp. *hamadae* Vved. in Sched. ad herb. Fl. As. Med. Fasc. XII, n: 0.290; p: 32. 1927.

Fasc. XII, n: 0.290; p: 32. 1927.

C. hamadae (Vved.) Petrov in Bull. Soc. Nat. Mosc. n. s. 44: 135. 1935.

Type: Popov 290, M. Karatu, Kazakhstan, USSR, holotype (LE) seen
Isotype (B).

Icon: Eichwald l. c. (inflorescence not correctly drawn).

Plate IV. fig. 26-34.

A 20-50 cm high, shortly but densely sericeous suffrutescent plant. Root ligneous, reaching a length of one meter. Shoots strongly branched; the upper part subaphyllous; the lower one leafy. Leaves firmly herbaceous, sessile; the radical ones linear-oblong, 20-30 mm long, ca. 3 mm wide, i. e. 7-10 times as long as wide, base decurrent; the cauline leaves filiform, 15-20 mm long, ca. 1 mm wide, 15-20 times as long as wide, top acute, base cuneate, margin entire, indumentum sericeous, nerves immersed in the indumentum, but the midrib prominent. Flowers axillary, solitary or in pairs. Bracts small, filiform, 3-10 mm long, recurved, much shorter than the stout patent peduncles. Bracteoles minute, Pedicels sericeous, recurved, as long as the sepals. Sepals shortly sericeous, 3-4 mm long; the outer ones oblong, acute or obovate, obtuse, 2 mm wide; the middle one with the right and left half slightly unequal, one half membranous; the inner ones lanceolate and acute or broadly obovate, and obtuse, both halves membranous and hairy. Corolla of unknown colour, 6-8 mm long, with sparsely hairy bands on the outside, but the tube quite glabrous. Stamens unequal, the longest one 6 mm; filaments glabrous; anthers oblong, with retuse top. Ovary hairy or, rarely, glabrous, ovoid, with a glabrous cupshaped disc at the base; style glabrous, filiform, 1.5 times as long as the filiform stigmas. Capsule hairy or glabrous, narrowly ovoid, acute, 4 mm long, 2 mm wide, unilocular, one-seeded; seed nearly black, hairy, subglobose, 2.5 mm long, 2 mm wide. Fl. May-Sept.

In vallies, on hills, mountains, slopes, in steppes, in waste places on sandy soil and in submobile sand.

Distribution: Iran, Afghanistan, USSR Kazakhstan, Turkmeniya.

a. var. erinaceus.

Ovary hairy, Shoots erinaceous.

Specimens seen:

Afghanistan: Hedge 3839, Maimana (Maymana) (E).

Iran: Gilli 3082, Kārīz (Yussuf-abad) (W).

USSR: Afnassiev 3767, Kyzyl Kum (C, W); Granitov 442, Kara-kum (B, C, W);

Litminow 1647, Krasnovods, Turkmeniya (W).

b. var. kermanensis (Bornm.) Sa'ad stat. nov.

C. spinosus Burm., var. *kermanensis* Bornm. in Beih Bot. Centr. 61: 82. 1948.

C. spinosus Burm., var. *subinermis* Parsa Kew Bull. 213. 1948.

Type: Bornmüller 3886, between Mahān and Kermān, Iran (B).

Isotypes (G, HBG, JE, K, P, STU, W).

Ovary glabrous. Shoots divaricate.

23. *C.koeieanus* Bornm. ex Kōie, Beitr. Fl.Südwest-Irans I, in Dan.Sc.Inv. 4:37. 1945; Rech.f., Fl.Iran (Conv.): 13.1963.

Type: Kōie 1301, Chah Basan ¹⁾, Luristan, Iran, lectotype (C) seen

Isotype (B).

Icon: Kōie op c. 38.

Plate IV. fig. 35-43.

Suffrutescent, 28-40 cm high; base ligneous, strongly branched. Shoots fastigiate, thin, branched, densely appressed puberulous. Leaves chartaceous, folded and recurved, sessile, filiform, 10-30 mm long and hardly 1 mm wide, top acute, base hardly dilated, margin entire, upper side of the basal leaves puberulous and the lower side appressed pubescent, but the upper leaves appressed pubescent on both sides, uninerved. Flowers axillary or up to 3 in an axillary monochasium. Bracts like the leaves but smaller, much shorter than the slender peduncles. Bracteoles minute, shorter than the pedicels, but the pedicel as long as the sepals. Sepals glabrous, mucronate, 4 mm long, the outer ones oblong and acute; the middle one with the right and the left half unequal, one half membranous; the inner ones convex, obovate, acute, with both halves membranous. Corolla pale pink, 15 mm long, each segment with a hairy band on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the longest one 9 mm; filaments glabrous; anthers oblong-sagitate. Ovary hairy in the upper part but at the base surrounded by a glabrous, cup-shaped disc; style glabrous, filiform; stigmas filiform, twice as long as the style. Capsule not seen. Fl. Apr. Fr. ?

Altitude 500 -1200 m.

Distribution: known from Iran only.

Specimens seen:

Iran: Kōie 1302, 60 km N.E. Desfūl, paratype (B); Kōie 684, Bīsheh, paratype (B).

* 1) Locality from the label.

24. *C. korolkowii*, Regl. et Schmalh in Act. Hort. Petrop. 6 (1): 338. 1879; Petrow in Bull. Soc. Nat. Mosc. Nov. Serie, 44: 136. 1935; Grigoryev, Fl. USSR XIX: 18. 1953.

Type: Korolkow s. n., above Dzhingil'dy (Chalata-ati) Uzbekistan USSR, holotype (LE), not seen.

A 30-40 cm high suffrutex. Shoots puberulous, flexuous or \pm rigid and zigzag. Leaves chartaceous, sessile; the lower ones spatulate to linear, 18-28 mm long, 3-4 mm wide, i. e. 4.5 - 8 times as long as wide, acute or subacute, base decurrent; upper leaves linear, 15-25 mm long, ca 2 mm wide, i. e. 7-12 times as long as wide, acute or subacute, base cuneate; margin undulate, puberulous, uninervate. Flowers axillary, solitary or up to 3 on persistent, more or less patent peduncles. Bracts small, oblong, ca 5 mm long, one mm wide, much shorter than the peduncles, acute, recurved. Bracteoles minute, as long as or shorter than the pedicel. Pedicel curved, shorter than the calyx. Sepals unequal, shortly appressed puberulous; the outer ones oblong or elliptic-oblong, acute or obtuse, mucronulate, 2-4 mm long, shorter than or as long as the inner ones; the middle one with the right and the left half unequal, one half hairy and membranous; the inner ones either orbicular, obtuse and mucronulate or ovate and acute, with both halves hairy and membranous. Corolla yellowish or slightly pink, 10-12 mm long; the segments with a hairy band on the outside, but the tube quite glabrous. Stamens unequal, the longest one 7 mm; filaments glabrous; anthers oblong-sagitate, with obtuse top. Ovary hairy, at the base surrounded by a glabrous cup-shaped disc; style filiform, glabrous or slightly hairy, twice as long as the filiform stigmas. Capsule hairy, ovoid, 4 mm long, 3 mm wide, as long as the persistent calyx. Fl. and Fr. May-June.

In deserts, semideserts and mountains at the foot of alt. 300-450 m.

Distribution: N. Iran, N. Afghanistan, Kyzylkum and Kara Kum USSR ¹⁾; Turkmeniya.

Specimens seen:

Iran: Schmid 6275, Sarakhs, Ostan 9 (W); Rechinger 1285, between Damghan and Sabzevār., Mayāmey (W); Rechinger 5286, between Mashhad and Shahrud (W);

* 1) Grigoryev l. c.

Afghanistan: Hedge and Wendelbo 3569, between Ankhui and Shibarghan, Maimana (E).

25. C. leptocladus Boiss., Diagn. Pl. Or. Nov. 1 (7): 25. 1846., Fl. Or. IV: 91. 1875; Rech. f., Fl. Iran (Conv.): 11. 1963.

Type: Aucher-Eloy 4942, S. Iran; holotype (G-Boiss.) seen

Isotypes (LE, P).

Plate IV. fig. 44-50.

A densely appressed-pilose suffrutescent plant. Shoots fastigiate. Leaves herbaceous, sessile; the lower ones linear to linear-spathulate, 18-23 mm long, ca 2 mm wide, i.e. 9-11 times as long as wide, acute, decurrent; upper leaves filiform, 7 mm long, 1 mm wide, top acute, margin entire, indumentum appressed-pilose, uninervate. Flowers two or three in axillary monochasia or dichasia or solitary, on slender patent peduncles. Bracts small, much shorter than the peduncles, ca 2 mm long, recurved, glabrous above.

Bracteoles minute. Pedicels thin and recurved, as long as the calyx. Sepals convex, unequal; the outer ones obovate, mucronate, 3 mm long, 2 mm wide; densely appressed-pilose; the three inner ones identical, ovate, mucronate, 4 mm long, 3 mm wide, glabrescent, membranous. Corolla white, 11 mm long, each segment with a hairy band on the outside, but the tube quite glabrous. Stamens unequal, the longest one 8 mm; filaments glabrous; anthers oblong, with retuse top. Ovary glabrous, conical, at the base surrounded by a cupshaped disc; style glabrous, filiform; stigmas filiform, 2.5 times as long as the style. Capsule not seen. Fl. Mar. -Apr.

In deserts, alt. 700 m.

Distribution: Iran, Iraq¹⁾.

Specimens seen:

Iran: Scharif 947E, Chāh Bahār (W); Behboudi 832 E. Mīnāb, Iran; Rechinger 3389, Hājjiābad, Lar (W).

26. C. lindbergii Sa'ad nov. spec.

Plate IV. fig. 51-57.

* 1) Rechinger l.c.

Planta suffruticosa, circ. 28 cm alta, divaricate ramificata, dense sed breviter sericea, in parte basali lignea. Radix perpendicularis etiam ligneus. Caules et eorum rami basin versus rigidi, in parte superiore flexiles. Folia radicalia nondum visa; caulina sessilia, chartacea, uninervia, costa subtus prominente, inferiora lineari-lanceolata, 17-20 mm longa et 4-5 mm lata, apice cuspidata; folia ad medium caulem inserta lanceolata, circ. 6 mm longa et 3 mm lata, apice acuta. Flores solitarii vel bini in axillis bractearum inserti et pedunculo bractea multo longiore elati. Bracteae parvae, subulatae, apice cuspidata. Bracteolae minutae, pedicello breviores. Pedicellus calyci aequilongus. Sepala inaequalia, omnia tamen dense sericea; exteriora oblonga, 3 mm longa, apice acuta; medianum cum dimidio dextro a dimidio sinistro diverso, dimidio altero glabro et membranaceo; interiora elliptico-oblonga, apice mucronulata, basi truncata, tota glabra et membranacea. Corolla colore ignoto, 10 mm longa, segmentorum quinque unoquoque virgam medianam in parte superiore extus pilosam exhibente. Stamina inaequilongae, longissimo 7 mm longo; filamenta glabra; antherae oblongae, apice retusae. Ovarium globosum, pubescens, basi disco cupuliformi carnosum et glabro circumdatum; stylus filiformis, glaber, bis ad ter longior quam stigmata; stigmata etiam filiformia. Capsula nondum visa. Florens mensi Aprili.

Typus: Lindberg 409, ad Yaktschal ¹⁾ in terra Afghanorum, in planitie arida (W, sub nomine *C. pseudocantabricus* Schrenk).

Distribution: known from Afghanistan only.

This species differs from *C. pseudocantabricus* Schrenk by its densely sericeous indumentum, the chartaceous leaves, of which the lower ones are linear-lanceolate with a rigid tip and the middle ones smaller and relatively wider, the small subulate bracts, the sericeous sepals and the globose pubescent ovary.

27. *C. pseudocantabricus* Schrenk in Fisch et Mey., Enum. Pl. Nov. 1:21. 1841; Boiss., Fl. Or. Suppl. 348. 1888; Grigor., Fl. USSR XIX: 20. 1953; Rech. f., Fl. Iran (Conv.): 12. 1963.

Type: Schrenk s. n., Dzhungaria-Tarbagatai (Koksu-River) USSR (LE) seen Plate V. fig. 1-8.

* 1) Locality given on the label

A 20-40 cm high, densely appressed pilose, broomlike suffrutescent plant, ligneous and branched at the base. Root ligneous, ca 8 mm in diameter. Shoots branched in the lower half and bearing axillary flowers or inflorescences in the upper half; the inflorescence of the main stem consisting of racemously arranged cymes; the branchlets ending in solitary flowers. Leaves firmly herbaceous, sessile; the radical ones linear-lanceolate to linear, 20-35 mm long, ca 4 mm wide, 5-11 times as long as wide, top acute, base decurrent; the cauline leaves linear, 25-50 mm long, 2-3 mm wide, 10-20 times as long as wide, acute, with a narrow base (leaves of the branchlets much smaller), margin entire, glabrous above, appressed-pilose beneath, uninervate. Bracts linear or filiform, up to 15 mm long, 1 mm wide. Bracteoles minute. Pedicel shorter than the calyx. Sepals glabrous; the outer ones 4-7 mm long, oblong and acute or obovate, obtuse and mucronulate; the middle one with the right and the left half unequal, one half membranous; the inner ones with both halves membranous, oblong and acute or obovate and obtuse and mucronulate, as long as the outer ones or longer. Corolla pink, 17-20 mm long, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens slightly unequal; filaments glabrous; anthers oblong, obtuse. Ovary glabrous, ovoid, with a cupshaped disc at the base; style glabrous, as long as the filiform stigmas. Capsule glabrous, ovoid or obovoid, 6 mm long, 4 mm wide, unilocular, one-seeded; seed dark brown, hirsute, 3.5 mm long, 3 mm wide. Fl. May-Jul. Fr. June-Jul.

In steppes, on hills, mountains, slopes, in vallies, in forests, growing on limestone rocks and among stones; alt. 700-1800 m.

Distribution: Iran; Afghanistan; Uzbekistan, Kazakhastan, Turkmeniya USSR.

a. var. pseudocantabricus.

C. askabadensis Bornm. et Sint. ex Bornm. in Beih. Bot. Centr. 20 (2): 181. 1906.

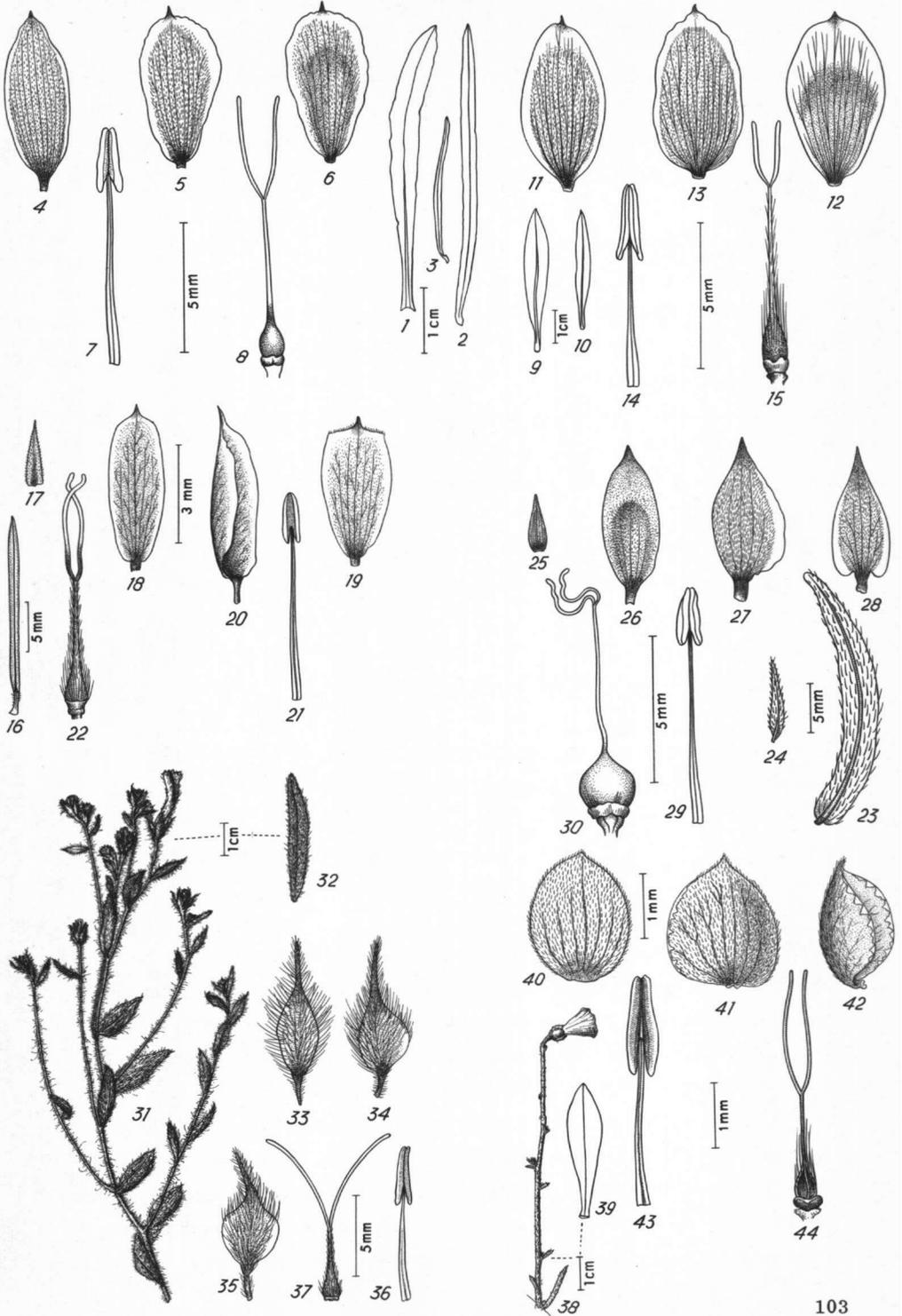
Type: Sintenis 1892, Kizy-Arvat, Turkmeniya USSR, holotype (B) seen
Isotypes (JE, L, STU).

ssp. *askabadensis* (Bornm. et Sint ex Bornm.) Vvedensky in Sched. ad herb. Fl. As. Med. exs. VII no. 154. 1925.

Type: Mokeeva et Popov s. n., Syr Dar'ya, M. Alexandri, USSR (not seen).

Plate V. fig. 1-8 *C. pseudocantabricus*; 1-3: leaves; 4: outer sepal; 5: middle sepal; 6: inner sepal; 7: stamen; 8: pistil [1-8: Gauba 1623 (B)]; fig. 9-15: *C. sarothrocladus*; 9,10: leaves; 11: outer sepal; 12: middle sepal; 13: inner sepal; 14: stamen; 15: pistil [9,10: 653 without collector (JE); 11-15: Haussknecht s.n. (W)]; fig. 16-22: *C. scoparius*; 16: leaf; 17: bracteole; 18: outer sepal; 19: middle sepal; 20: inner sepal; 21: stamen; 22: pistil [16-22: Bourgeau 1427 (C)]; fig. 23-30: *C. turcomanicus*; 23: leaf; 24: bract; 25: bracteole; 26: outer sepal; 27: middle sepal; 28: inner sepal; 29: stamen; 30: pistil [23-30: Sintenis 487 (E)]; fig. 31-37: *C. aucheri*; 31: a part of a plant; 32: leaf; 33: outer sepal; 34: middle sepal; 35: inner sepal; 36: stamen; 37: pistil [31-37: without collector 1944 (W)]; fig. 38-44: *C. gracillimus*; 38: part of a plant; 39: leaf; 40: outer sepal; 41: middle sepal; 42: inner sepal; 43: stamen; 44: pistil [38-44: Rechinger 16080 (W)].

PLATE V



Sepals oblong, acute, 7 mm long; the outer ones as long as the inner ones.

Specimens seen:

USSR: Sintenis 798, Ashkhabad, Turkmeniya (B, JE, STU); Drobov 2779, Fergana, Uzbekistan (C).

Iran: Gauba 1623 Elburz (B).

Afghanistan: Volk 169 k, Kabul (W).

b. var. dianthoides (Kar. et Kir.) Sa'ad stat. nov.

C. dianthoides Kar. et Kir. in Bull. Soc. Nat. Mosc. 708. 1841.

Type: Karelin et Kirilloff 329, around M. Tarbagatai USSR, holotype (MW) not seen.

Isotypes (BM, K, W).

ssp. *dianthoides* Vvedensky in Sched. ad herb. FL. As. Med. exs. VII. no. 154. 1925.

Type: Mokeeva et Popov 154, Syr-Dar'ya Kazakhstan USSR, holotype (not seen).

Isotypes (C, W).

Sepals 4-5 mm long, obovate, obtuse, mucronulate; the outer ones usually shorter than the inner ones.

Specimens seen:

Afghanistan: Ian Hedge et Wendelbo 4010, Mazar.-1 Sherif (E).

28. *C. rectangularis* Rech. f., Symb. Afghan. in Biol. Skr. Dan. Vid. Selsk. 10(3): 1958; Rech. f., Fl. Iran (Conv.): 17. 1963.

Type: Volk 1018, naar Charikar, Afghanistan; holotype (W) seen.

Shoots simple or slightly branched, striated, 1-1.5 mm in diameter, hirtellous. Leaves coriaceous, shortly petiolate, 1/10 the length of the blade, radical ones not seen, the cauline leaves linear-lanceolate, ca 22 mm long and 4 mm wide, 5 times as long as wide, top acute, with a spinescent tip, base truncate or with two auricles, uninervate, midrib prominent, margin entire, hirtellous. Flowers solitary, on stout patent persistent axillary peduncles. Bracts like the leaves, longer than the peduncle. Pedicel recurved, weak, longer than the bracteoles but shorter than the calyx. Sepals unequal, tomentellous; the outer ones ovate-elliptical acute, 10 mm long; the middle one not seen; the inner ones lanceolate, obtuse and mucronulate, with both halves membranous. Corolla of unknown colour, 20 mm long, with hairy bands on the

outside, but the lower part of the limb and the tube quite glabrous. Stamens and pistil not seen. Capsule glabrous, ovoid, 10 mm long, 7 mm wide; seeds brown with a wrinkled surface, 5 mm long, 4 mm wide. Fl. Fr. Jul.

Known from the type only.

29. *C. sarothrocladus* Boiss. et Haussk. in Boiss., Fl.Or.IV: 92.1875; Rech. f., Fl.Iran (Conv.): 13.1963.

Type: Haussknecht 653, between Kirkūk & Sulaymānīyah, Iraq; lectotype (G-Boiss.) seen.

Plate V. fig. 9-15.

A 30-40 cm high suffrutescent plant with fastigiate shoots; the latter appressed pubescent with an admixture of short spreading hairs. Shoots branched. Leaves chartaceous, sessile, the lower cauline ones obovate or spatulate to linear-oblongate, 25-60 mm long, 7-28 mm wide, 2-6 times as long as wide, obtuse or acute, base decurrent; the upper leaves linear, 15-35 mm long, 2-4 mm wide, 7 times as long as wide, acute or acuminate, with a narrow base; margin entire, indumentum appressed-pubescent, pinnately nerved. Flowers axillary, solitary or rarely in pairs. Bracts linear, shorter than the long peduncle. Bracteoles minute, shorter than the pedicel. Pedicel as long as the sepals. Sepals glabrous, unequal, convex, scarious, 6 mm long; the outer ones oblong or obovate, mucronulate; the middle one with the right and the left half unequal; the inner ones oblanceolate, mucronulate, both halves with a narrow transparent border. Corolla white, 12 mm long, twice as long as the calyx, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Ovary ovoid, with hairs at the top and a glabrous, small, cup-shaped disc at the base; style stout, hairy, as long as the filiform stigmas. Capsule glabrous, obovoid, 5 mm long, 4 mm wide; seeds immature. Fl. & Fr. June.

In sand.

Distribution: Iraq, Iran.

Specimens seen:

Iraq: Haussknecht 650, Derbent-i-Basian ¹⁾, paratype (G-Boiss.); Haussknecht s. n., between Kirkūk & Derbent i Basian (JE).

* 1) Localities from the labels.

Iran: Koelz 15840, Chamchid ¹⁾, Luristan (E).

30. *C. scoparius* Linn. f., Suppl.: 135.1781; Desr. in Lam., Encycl. III: 553. 1789; Choisy in DC., Prod. IX: 404.1845.

Breweria? *Scoparia* (L.f.) Lindb., Fl. Med.: 400.1838 (rejected name).

Rhodorrhiza scoparia (L.f.) Webb in Lindb., Bot. Reg. 27: Misc. Not. 69.n.152. 1841.

Type: Masson s.n., Barrancas, Canary Isl. (BM), seen.

Rhodorrhiza virgata Webb. et Berth., Phytogr. Canar. 3:30.t.138.18 1844 ¹⁾.

C. scoparius var. *virgatus* (Webb et Berth.) Choisy l.c.

Type: Despereaux s.n., Canary Isl. M. Sanet Jacob (FI) not seen.

Plate V. Fig. 16-22,

A glabrous or sparsely and shortly appressed pilose frutescent plant. Shoots branching, striated. Leaves firmly herbaceous, early deciduous, sessile; the radical ones not seen; the cauline leaves filiform, 15-25 mm long, ca. 1 mm wide, top acute, base cuneate, margin entire, indumentum appressed-pilose, uninervate. Flowers up to 6 in terminal and axillary either unequally dichasial or monochasial inflorescences. Peduncles shorter than the subtending bract. Bracts like the cauline leaves. Bracteoles oblong, acuminate, hairy, with a half-clasping base, 3 mm long. Pedicel stout, shorter than the bracteoles. Sepals unequal, appressed pilose; the outer ones 5-6 mm long, oblanceolate, obtuse, mucronulate; the middle one with the right and the left half unequal; the inner ones broadly obovate, with retuse and mucronulate top and an auriculate base with both halves hairy and membranous. Corolla white, 10-12 mm long, twice as long as the calyx, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the longest one 6 mm; filaments glabrous; anthers oblong, obtuse, with a brown centre. Ovary ovoid, villous, with a glabrous cupshaped disc at the base; style villous, stout, as long as the filiform stigmas. Capsule not seen. Fl. March-Jul.

In arid regions in gravel and on cliffs and stones, alt. 200-500 m.

* 1) localities from the labels.

* 2) year according to Dr. Stearn, Br. Mus.

Distribution: known from the Canary Islands only.

Specimens seen:

Canary Islands: Bornmüller 976, Tenerife, Güimar (HBG, JE, STU, W), Husnot 375, Tenerife, Bofadero (W), Burchard 89, Tenerife, Santa Ursula (CAIM, E); Seventenius 253, Nivaria, S. Ursula (LISE).

31. *C. turcomanicus* (Kuntze) Petrov in Bull. Soc. Nat. Mosc. s. n., 44: 136. 1935.

Basionym: *C. dorycnium* var. *turcomanicus* Kuntze in Acta H. Petrop. 10, 1: 221. 1887.

Type: no specimens mentioned.

Icon: Petr. l. c.

Plate V. fig. 23-30.

Suffrutescent, very shortly appressed-pilose or puberulous, 44 cm high. Shoots rigid, divaricately branched. Leaves firmly herbaceous, sessile; the lower ones not seen; the upper leaves linear, 25 mm long, 2.5 mm wide, i. e. 10 times as long as wide, top acute, base cuneate, margin crisate, on both sides appressed-pilose, uninervate. Flowers solitary or up to three on peduncles which are much longer than the subtending bract. Bracts ovate to lanceolate-ovate, acute with curved, rigid apex, 5-12 mm long, 3-5 mm wide, i. e. 1.6-2.5 times as long as wide. Bracteoles minute, subulate, shorter than the hairy pedicel. Sepals glabrous, 4 mm long, longer than the pedicel; the outer ones oblong acute; the middle one with the right and the left half unequal, one half membranous; inner ones ovate, acuminate, entirely membranous. Corolla yellowish to slightly pink, 14 mm long, 3.5 times as long as the calyx; each segment with a hairy band on the outside, but the lower part of the limb and tube quite glabrous. Stamens unequal; filaments glabrous; anthers oblong-sagitate, retuse at the apex. Ovary glabrous, broadly ovoid, at the base surrounded with a cup-shaped disc; style glabrous, filiform, 3 times as long as the cylindrical stigmas. Capsule glabrous, broadly ovoid, exerted from the persistent calyx, 5 mm long and 4 mm wide. Fl. and Fr. June.

In sandy hills.

Distribution: Turkmeniya.

a. var *turcomanicus*

The whole plant appressed-pilose.

Specimens seen:

USSR: Turkmeniya: Sintenis 487 p.p. Ashkhabad (BM, E, L); Sintenis 330, p.p. *ibid.* (B); Litwinow 1641, *ibid.* (BM).

b. var. villosus Sa'ad nov. var. a typo indumento puberulo recedens.

The whole plant puberulous.

Specimens seen:

USSR: Sintenis 487, p.p. Ashkhabad Turkmeniya (B); Sintenis 330, p.p. *ibid.* (B, STU); Sintenis 1246, Bala Ischem (B).

Series b. Ebracteati Sa'ad series nov.

Flowers solitary at the top of the branches; bracts and bracteoles wanting.

32. C. aucheri Choisy in DC., Prodr. IX: 402. 1845; Boiss., Fl. Or. IV: 96. 1875; Bouloum., Fl. Lib. Syr. text: 230. 1930; Dinsmore in Post, Fl. Syr. Pal. Sinai, ed. 2, II: 205. 1933.

Type: Aucher-Eloy 1405, Gaziantep (Antab), Turkey, lectotype (G-DC) seen. Isotype (G-Boiss.).

Plate V. fig. 31-37.

A herbaceous plant. Underground parts unknown. Shoots tomentose with spreading hairs; divaricately branched and rigid. Leaves firmly herbaceous; the basal ones on the main stems oblong, ca 42 mm long and 5 mm wide, i. e. 8 times as long as wide, top acute, base halfclaspings; upper leaves lanceolate, 15-25 mm long, 5-10 mm wide, i. e. 3-4 times as long as wide, acute, base cuneate; leaves of the branchlets smaller; all with an entire margin, tomentose with long + appressed hairs, pinnately nerved. Branches of the first and second order with a solitary flower at the top. Sepals tomentose with spreading hairs, unequal; the outer ones lanceolate, abruptly-acuminate, 7 mm long; the middle one with unequal halves, one half membranous; the inner ones broadly obovate-caudate, on both sides membranous. Corolla pink, 22 mm long, i. e. three times as long as the calyx, on the outside with hairy bands, but the lower part of the limb and tube quite glabrous. Stamens unequal, the longest one 12 mm; filaments glabrous; anthers oblong-sagitate, retuse at the apex. Ovary hairy, conical, surrounded at the base with a shallow, glabrous, cup-shaped disc; style hairy; stigmas filiform, three times as long as the short style. Capsule not seen. Fl. Sept.

Distribution: Turkey, Syria?

Specimens seen:

collector unknown, no. 1944, Gaziantep (Aintab), collected 1834 (W); Balls 1184, Turkey without locality (K); Post 242, Elgabal El Ahmar, N. Syria or S. Turkey (BM),

Its occurrence in Syria is still dubious. Choisy l. c. mentioned a specimen collected by Aucher in Aleppo, but this specimen is not in herb. G-DC. The locality of Post cannot be found on maps, so it is not possible to say if the specimen was collected in N. Syria or in S. Turkey.

33. *C. gracillimus* Rech. f., Anz. Math.-nat. Kl. Österr. Akad. Wiss. 92:274, 1955; Rech. f., Fl. Iran (Conv.): 10.1963.

Type: Koelz 16080, Tehran, Iran (W) seen.

Isotype (E).

Icon: Rech., Fl. Iran: t. 1. f. 2. 1963.

Plate V. fig. 38-44.

Suffrutescent, appressed-pilose. Shoots tender, divaricately branched. Leaves chartaceous, sessile, lower ones linear spatulate, ca 28 mm long, ca 3 mm wide, 9 times as long as wide, acute, base decurrent, the upper leaves linear, ca 8 mm long and 2 mm wide, 9 times as long as wide, acuminate, base cuneate, margin entire, puberulous, pinnately nerved. Flowers solitary at the top of branches. Bracts and bracteoles absent. Pedicel curved. Calyx small, rounded. Sepals appressed-pilose, unequal; the outer ones suborbicular, 2 mm long, obtuse, the middle one with unequal halves, one half glabrous and membranous; the inner ones convex, obtuse, mucronulate, both halves glabrous and membranous. Corolla white, 6 mm long, 3 times as long as the calyx; each segment with a hairy band on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the longest one 4 mm; filaments glabrous; anthers oblong, retuse at the top. Ovary conical, hairy, at the base surrounded by a glabrous cupshaped disc; style hairy, filiform, as long as the filiform stigmas. Capsule not seen. Fl. June-Fr.

In deserts.

Distribution: known from Iran only.

34. C. linoides Bornm. in Fedde, Repert. 24: 242. 1928.

Type: Spitzel s.n., Mecca, Arabia (B) seen.

Plate VI. fig. 1-5.

Perennial, 30 cm high, rather rigid, at the base divaricately branched. Shoots fastigiate, shortly appressed, pilose, the hairs with two arms. Leaves firmly herbaceous; the lower ones not seen; the upper leaves linear, ca 20 mm long, ca 2 mm wide, i.e. 10 times as long as wide, top acute, base cuneate (branchlets' leaves smaller and filiform); margin entire, indumentum consisting of short appressed, hairs, uninervate. Flowers solitary at the top of the branches and branchlets. Bracts and bracteoles wanting. Sepals with appressed hairs, the upper part green, the lower colourless, unequal; the outer ones oblanceolate, 3 mm long, acute; the middle one with the right and the left half unequal, one half membranous; the inner ones ovate-orbicular, acute, membranous. Corolla of unknown colour, 6 mm long, twice as long as the calyx, each segment with a hairy band on the outside, but the lower part of the limb and the tube quite glabrous; filaments glabrous; anthers not seen. Ovary hairy at the top; style and stigmas not seen. Capsule ovoid, hairy at the top, exerted from the persistent calyx, 4 mm long, 3 mm wide, bilocular and 4-seeded; seeds glabrous and shiny, 2 mm long, 1 mm wide. Flowering and fruiting time not known.

Distribution: known from the type only.

Subsectio 5. Floridi Sa'ad subsectio nov.

Shrubs with numerous flowers at the top of the branches in the form of a panicle.

35. C. floridus Linn.f., Suppl. Pl.: 136. 1781; Desr. in Lam., Encycl. III: 552. 1789; Choisy in DC., Prodr. IX: 404. 1845.

Type: Masson s.n., round the river Bryancas without locality; id. 1778 lecto-type (BM) seen.

Rhodorrhiza florida Web. in Lindl., Bot. Reg. Misc. Not. n. 152. 70. 1841.
var. *genuina* Pitard in Pitard & Proust, IIs. Canar. Fl. Archip.: 281. 1908.
var. *angustifolia* Pitard l.c.

Type: Bornmüller s.n., Tenerife, Bajamar (not seen).

var. *densiflora* Christ.in Bot. Jahrb. 9 (1): 125, 1887.

Type: Hilleber s.n., Punta de Tenerife (not seen).

Plate VI. fig. 6-13.

A 180 cm high shrub, with very short, appressed hairs. Stems terete. Leaves firmly herbaceous, sessile, linear-lanceolate to linear, 60-110 mm long, 5-23 mm wide, 4-13 times as long as wide, acute, subacute or obtuse, base attenuate or cuneate, margin entire, indumentum very shortly appressed-pubescent, midrib prominent beneath, pinnately nerved. Flowers at the top of the branch in a basimesotonic inflorescence. Bracteoles small, longer than the pedicel, but not exceeding the calyx. Sepals unequal, 4 mm long, convex, appressed-pilose with a ciliate margin; the outer ones linear-lanceolate, acuminate, 4 times as long as wide, the middle one oblong-elliptic, twice as long as wide, acute, with unequal halves, one half glabrous and membranous; the inner ones suborbicular, retuse, mucronulate, both halves glabrous, membranous. Stamens unequal, the longest one 6 mm; filaments glabrous; anthers sagitate, obtuse. Ovary hairy, ovoid, at the base surrounded by a cupshaped disc, which is glabrous on the outside, hairy on the inside; style hairy, filiform; stigmas filiform, 1,5 times as long as the style. Capsule cylindrical-ovoid, acute, hairy at the top, 7 mm long, 3 mm wide, unilocular with one seed; seed ellipsoid, brown, densely covered with short hairs. Fl. & Fr. March-June.

In arid regions, on stones and cliffs.

Distribution: Grand Canaria, Tenerife, Palma ¹⁾, Gomera ¹⁾.

Specimens seen:

Canary Isles: Bornmüller 2616, Tenerife, Sta. Cruz. (HBG, JE), Bornmüller 977, Tenerife, Tagnana (HBG, JE, STU, W); Børgesen 191, Tenerife, Oratava ²⁾ (C); Sventenius 252, Canary, Nivaria ²⁾ (LISE); Burchard 240, Grand Canaria (CAIM, E).

Subsectio 6. Lanuginosi Peter.

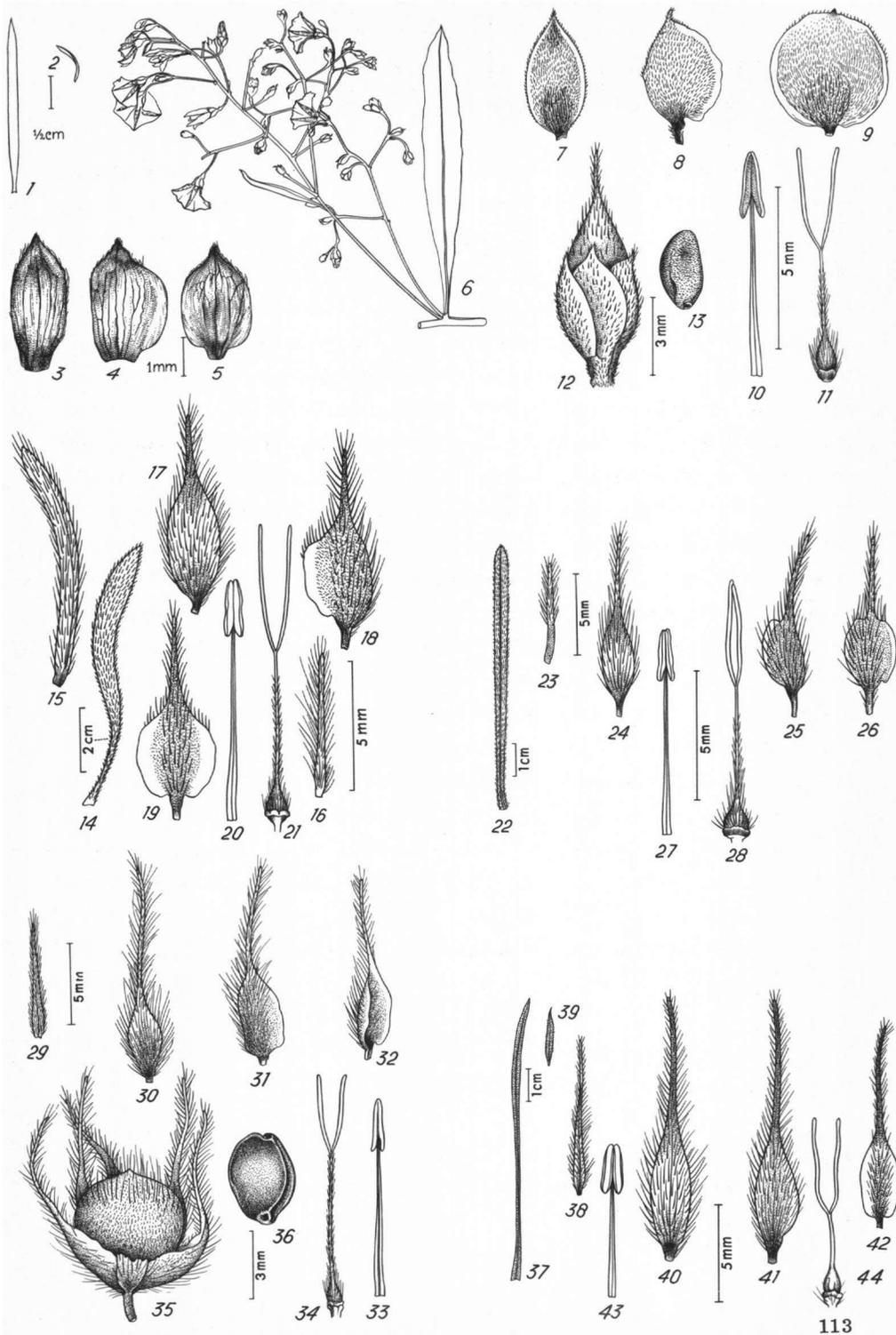
Flowers numerous, in terminal heads; base of the shoots ligneous; indumentum sericeous.

* 1) Pitard l.c.

* 2) Locality given on the label.

Plate VI. fig. 1-5 *C. linooides*; 1,2: leaves; 3: outer sepal; 4: middle sepal; 5: inner sepal [1-5: Spitzel s.n. typus (B)]; fig. 6-13 *C. floridus*; 6: apart of a branch showing the axillary buds; 7: outer sepal; 8: middle sepal; 9: inner sepal; 10: stamen; 11: pistil; 12: capsule; 13: seed [6: without a collector, Tenerife (W); 7-13: Bornmüller 2616 (HBG)]; fig. 14-21 *C. abdallahi*; 14: leaf; 15: bract; 16: bracteole; 17: outer sepal; 18: middle sepal; 19: inner sepal; 20: stamen; 21: pistil [14-21: Davis 21640 typus (K)]; fig. 22-28 *C. calverti*; 22: leaf; 23: bracteole; 24: outer sepal; 25: middle sepal; 26: inner sepal; 27: stamen; 28: pistil [22-28: Calvert et Zokrab s.n. (E)]; fig. 29-36 *C. schirazianus*; 29: bracteole; 30: outer sepal; 31: middle sepal; 32: inner sepal; 33: stamen; 34: pistil; 35: capsule; 36: seed [29-34: Kotschy 379 (W); 35, 36: Stapf 365 (W)]; fig. 37-44 *C. lanuginosus* var. *lanuginosus*; 37: leaf; 38: bract; 39: bracteole; 40: outer sepal; 41: middle sepal; 42: inner sepal; 43: stamen; 44: pistil [37-43: Stud. Biol. Ren. Trai 912/1962 (U)].

PLATE VI



36. C. abdallahi Sa'ad nov. spec.

Plate VI. fig. 14-21.

Planta humilis, circ. 8 cm alta. Pars subterranea nondum nota. Caules erecti, compressi, sericei, in parte basali lignei et ramosiores. Folia omnia in parte basali caulis aggregata, sessilia, lineari-spathulata, 12-15 mm longa et circ. 2 mm lata, chartacea, apice acuta vel subacuta, basi dilatata et amplexicauli, scariosa, margine integro, supra glabra et subtus appresse puberula, uninervia, plerumque conduplicata. Flores solitarii vel in capitulum terminale aggregati; capitulum e floribus usque ad six compositum. Bracteae filiformes, conduplicatae, capitulo breviores. Bracteolae lineari-lanceolatae, calyci aequilongae, acuminatae. Pedicellus nullus. Sepala ovata, 6 mm longa, acuminata, exteriora hirsuta; medianum cum dimidio altero hirsuto, altero glabro; interioro basi minute auriculata, concava, membranacea, glabra. Corolla alba, 20 mm longa, segmentorum quinque unoquoque virga mediana in parte superiore pilosa instructo. Stamina inaequilonga, longius longitudine corollae dimidiam partem attingens; filamenta glabra; antherae oblongae, apice retusae. Ovarium ovoideum, dense velutinum, basi disco cupuliformi carnoso dentato circumdatum; stylus pilosus, stigmatibus filiformibus aequilongus. Capsula nondum visa. Florens mensi Junio.

Typus: Davis 21640, in Anatolia, 5 km ad septentrionem urbis Kastamonu dictae, in monticulo margae naturam habente ad alt. 900 m lectum (Turkey) (K).

Distribution: known from the type locality only.

Related to *C. calvertii* Boiss., but the leaves are narrower, folded and with a glabrous upper surface, the inner sepals are ovate and auriculate at the base, the corolla is 3.5 times as long as the sepals, and also to *C. cataonicus* Boiss., from which it can be distinguished by the terminal capitulum and by the 6 mm long sepals.

37. C. calvertii Boiss., Diagn. II (3): 124.1856; Boiss., Fl.Or. IV: 94.1875; Grigoryev, Fl. USSR, XIX: 24.1953; Rechinger f., Fl. Iran (Conv.): 14.1963.

Type: Calvert 1282, near Tortum, Turkey, lectotype (G-Boiss.) seen.

C. lanuginosus Desr. ex Ledebour, Fl. Ross, III: 1846-51, non Desr. in Lam., Encyc. III: 552.1789.

C. lanuginosus Desr. var B Desr. l. c.

Type: in the orient (Jus.-P) seen.

C. ruprechtii Bois., Fl.Or.IV: 96.1875.

Type: Ruprecht s.n., Kutuschi, Daghestan (S. E. Russia), lectotype (G-Boiss.) seen.

C. tauricus (Bornm.) Juzep. in Nat.Syst. herb. Inst. Bot. Acad.Sci. USSR, 12: 214.1950.

Basionym: *C. calvertii* Boiss. var. *tauricus* Bornm. in Beih.Bot.Centralbl. 22(2): 181.1906.

Type: Callier 155, Krym near Beylogorsk (Krassubazar), USSR, holotype, not seen.

Isotypes (E, HBG, JE, STU, W).

C. bracteosus Juz.Op.c.p.217.

Type: Pallas s.n., Čakyr³⁾-dagnear Eklizi³⁾-burun, Krym (Tauria) USSR, not seen.

Plate VI. fig. 22-28.

A 10-22 cm high herb with a strongly branched, suffrutescent base. Root ligneous. Shoots simple or slightly branched, appressed-pilose, with long spreading hairs, leafy and angular in the lower half, but compressed and leafless in the upper part. Leave herbaceous, sessile; the outermost radical leaves short, scarious, broadly triangular; the inner ones linear, 20-70 mm long, 3-5 mm wide, 6-14 times as long as wide, acute, broadly attenuate towards the base; cauline leaves linear or linear-oblong, 20-55 mm long, 2-5 mm wide, 5-10 times as long as wide, acute or acuminate, attenuate at the base; margin entire, usually sericeous or sericeous with an admixture of spreading hairs, pinnately nerved. Flowers 2 to several in a compact cyme, usually situated at the top of the branches or branchlets, sometimes on axillary peduncles, rarely flowers solitary. Bracts subtending the cymes on the branches like the leaves, but those subtending the cymes on the branchlets, linear and acuminate, 15-35 mm long, 3-5 mm wide, ca 7 times as long as wide. Bracteoles like the bracts, but smaller. Sepals unequal, 6-13 mm long, with long spreading hairs; the outer ones oblong or lanceolate, long-acuminate; the middle one with the right and the left half unequal, one half membranous; the inner ones convex, broadly obovate or broadly oblong, truncate at the base, caudate, with both halves glabrous and membranous. Corolla pink, 15-20 mm long, 1.5 - 2 times as long as the calyx, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the longest one ca. 2/3 the length

* 1) Grigor. l.c.

* 2) Rechinger l.c.

* 3) Localities from literature

of the corolla; filaments glabrous; anthers oblong, with retuse top, Ovary glo-
bular, velutinous, with a glabrous annular disc at the base; style hairy, filiform,
as long as the filiform stigmas. Capsule subglobose, hairy, 6 mm long and
wide; seeds dark brown, puberulous, 3 mm long, 2.5 mm wide. Fl. Apr. -Jul.
Fr. not known.

On dry clay and on calcareous mountains and hills, gravel banks and
sheltered steep slopes, alt. 2550 m.

Distribution: Turkey, Krym (USSR), Caucasus, Turkmeniya ¹⁾ moun-
tains, W. Iran ²⁾.

Specimens seen:

Turkey: Sosnowsky 139, Oltu (B, JE); Davis & Polunin 22, 590, Bitlis/Van, SE
Pelli (E); Stainton & Henderson 5372, prov. Malya, Kongal-Hekimhan (E);
USSR: Callier 4563, near Beylogorsk (Krasubazar), Krym (Crimea) (B, C, E,
JE, L).

C. lanuginosus Desr. ex Ledeb., Fl. Ross. III: 88.1846-51. This
is not a new name, but a misidentification by Ledebour, as he thought that it
was the plant described by Desrousseaux. *C. saxatilis* M.B., Fl. Tour.-
Cauc. 1:146.1808-19; This name is not accepted for this species because its
identity is uncertain.

38. *C. commutatus* Boiss., Diagn. Pl. Or. Nov. 1 (11): 81.1849; Boiss., Fl. Or.
IV: 94.1875; Grigoryev, Fl. USSR, XIX: 23, 1953; Rech. f., Fl. Iran (Conv.):
14.1963; Rech. f., Fl. Iraq: 484.1964.

Type: Aucher-Eloy 1411, near Mosul, Iraq; holotype (G-Boiss.) seen.

C. modestus Boiss., Diagn. op. c.p. 82.

Type: Aucher-Eloy 4947, Azerbaydzhan USSR; holotype (G-Boiss.) seen.

Isotype (W).

An (8) 16-29 cm high plant, strongly branched from the base and densely
appressed-pilose. Shoots stout and lignescent, branched in the lower half.
Leaves firmly herbaceous, sessile; radical ones spatulate or linear-
oblanceolate, 3-5 cm long, 4-8 (-12) mm wide, 7-8 times as long as wide, acute
or subacute, base broadly scarious and gradually attenuate; cauline leaves

* 1) Grigor. l.c.

* 2) Rechinger l.c.

elliptical to linear-oblongate, 2.5-4 cm long, 2-8 (-12) mm wide, 5-13 times as long as wide, acute or acuminate, attenuate at the base, margin entire, sericeous, pinnately nerved. Flowers 3 to several in a compact cyme at the top of the shoots or branches or sometimes in the axils of the upper leaves, pedunculate or sessile; the axillary cymes as well as those at the top of the branches sometimes reduced to a single flower. Bracts like the leaves. Bracteoles oblong, long acuminate, with a scarious base; the lower ones ca 2.5 cm long and 3 mm wide, but the upper ones smaller. Pedicel shorter than the sepals. Sepals like the bracteoles with long and shiny spreading hairs, unequal; the outer ones lanceolate, long acuminate, 12-15 mm long; the middle one with the right and the left half unequal, one half membranous; the inner ones ovate, long acuminate, 10-12 mm long, convex, with both sides glabrous and membranous. Corolla pale blush-pink or white with pink stripes on the outside, 2-2.5 (-2.8) cm long, with hairy bands on the outside, but the tube glabrous. Stamens unequal, the longest one $\frac{3}{5}$ the length of the corolla; filaments glabrous; anthers oblong, retuse at the top. Ovary velutinous, broadly ovoid, with a disc at the base which on the outside is glabrous but hairy on the inside; style hairy, filiform, twice as long as the filiform stigmas. Capsule hairy, ovoid, 8 mm long, 5 mm wide, unilocular and one-seeded; seed nearly black, densely puberulous, 4 mm long, 3 mm wide. Fl. & Fr. Jun.-Jul.

On mountains, dry slopes, on the edge of tied lands, alt. 1800-2600 m.

Distribution: Iran. Iraq; Azerbaydzhan and Armenia¹⁾, USSR, Turkey²⁾

Specimens seen:

Iran: Gauba 976, between Tehran & Firūzkūh (W); Koelz 17536, k-e-Safid (Safed Kuh) Luristan (W); Rechinger 684, M. Elburz, Karaj (Keredi) (W); Riaux & Galvan 347, Hamadan (W); Kóie 1305 Īstgāh -e Eznā (B); Behboudi 8, Kermanshah (W); Schmid 6132, Ostan 2, between Now Deh -e Arbāb (Noudeh) & Sharud (W).

39. *C. lanuginosus* Desr. in Lam., *Encycl.* III: 551.1789; Willkomm, *Prodr. Fl. Hisp.* II: 516.1870; Cost., *Fl. Franc.* II: 509.1903; Sauvage & Vindt, *Fl. Maroc* II: 35.1954.

* 1) According to Grigoryev.

* 2) Karamanoğlu, *Comm. Facult. Sc. Univ. Ankara Ser. C.*, 13:231.1963-64.

Type: specimen sin. loc. (P-Lam) seen.

Plate VI. fig. 37-44.

A 10-30 cm high herb; base strongly branched, subligneous. Root ligneous, 4 mm in diameter, Shoots herbaceous, simple or slightly branched; woolly, appressed-pubescent with an admixture of spreading hairs or sericeous, i. e. the indumentum varying in the proportion of the appressed and spreading hairs. Leaves herbaceous, sessile; radical ones linear to filiform, 32-60 mm long, 1-2 mm wide, 16-60 times as long as wide, top acute, attenuate at the base; cauline leaves filiform or linear, 25-50 mm long, 1-3 mm wide, 9-50 times as long as wide, acute or acuminate, base dilated, margin entire, appressed pubescent with some spreading hairs added, uninervate with the midrib prominent beneath. Flowers in a compact cyme at the top of the shoots. Bracts leafy, linear-lanceolate, subacute or acuminate, 8-22 mm long, 2-8 mm wide, 3-4 times as long as wide. Bracteoles filiform, as long as the calyx. Pedicel wanting. Sepals unequal, variable, with long spreading hairs, 8-11 mm long; outer ones lanceolate or oblanceolate, acuminate; middle one with the right and the left half unequal, one half glabrous and membranous; the inner ones cuspidate, as long as the outer ones or shorter, ovate or lanceolate, with both halves glabrous and membranous. Corolla pink, 22-25 mm long, 2-2.5 times as long as the calyx, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the longest one 11 mm; filaments glabrous; anthers sagittate with retuse top, Ovary glabrous, ovoid, with a cupshaped disc at the base; style glabrous; stigmas filiform, 1.25 times as long as the style. Capsule not seen.

Calcareous hills and mountains, rocks, rock fissures and on poor stony soil, in the garigue, alt. 200-500 m.

Distribution: Spain, France, Morocco.

a. var. lanuginosus

C. argenteus Pourr. in Mém. Acad. Toul. III: 316.1788, non Lam. 1778.

Type: Pourrad s.n., Montserrat, Spain (P) seen;

C. linearis DC., Fl. Fr. Suppl.: 424.1815, non Lam. 1778.

C. -lanuginosus var. *argenteus* Choisy in DC., Prodr. IX: 401.1845. excluded *C. oleifolius* Desr. var. *B.* Desr.

var. *canesiensis* Choisy l.c.

Type: Dufour s.n., Valence, Spain, lectotype (G-DC) seen.

C. lanuginosus var. *sericeus* Boiss., Voy. Bot. Mid. Espagn. Enum. Pl. Roy. Gren II: 416. 1839-45.

Type: no type mentioned.

Stems and leaves sericeous with a few spreading hairs; leaves narrow; cauline ones filiform, acuminate, ca 1 mm wide.

Specimens seen:

Spain: Stud. biol. Rheno-Trai. 727/1951. Sierra de Carbera (U); Stud. biol. Rheno-Trai 912/1962, Sierra Nevada (CAI); Bourgeau 1622, Cartagena (FI, G). France: Chambeiron, Huet & Jaquin 3157, between Beausset and Cadière near Toulon (G, JE); Rouy 5696, île de la Sidrière, Aude (G, W),

b. var. *villosus* Boiss., Voy l. c.

C. capitatus Cav., Icon & Descrip. Pl. Hisp. II: 72. t. 189. 1793, non Desr. 1789.

Type: Cavanilles s. n., reg. Valencia, Spain (MA + ?), not seen.

C. saxatilis Vahl, Symb. Bot. III: 33. 1794.

Type: Barnodes s. n., Spain (C).

Leaves and stems sericeous but the appressed hairs mixed with a large number of spreading hairs, sometimes woolly; leaves broader than in the typical variety; cauline ones linear or lanceolate, ca. 3 mm wide, acute.

Specimens seen:

Morocco: Font Quer 357, Djebel Tarysunt (Bocioia) (RAB).

Spain: Leresche 2, Montserrat near Barcelona (C); Bourgeau 1297, Sierra de Gador, prov. Almeria (E).

C. lanuginosus and *C. calvertii* Boiss. show a strong resemblance to each other but they are geographically completely separated, *C. lanuginosus* inhabiting the western part of the Mediterranean region, while *C. calvertii* inhabits the eastern part. However, many authors wrongly identified *C. calvertii* with *C. lanuginosus*, and others cited specimens of *C. calvertii* under *C. lanuginosus*, although *C. lanuginosus* is easily distinguishable by its glabrous ovary and its filiform bracteoles.

40. *C. schirazianus* Boiss., Diagn. Pl. Or. Nov. 1 (11): 82. 1849; Boiss., Fl. Or. IV: 94. 1875; Rech. f., Fl. Iran (Conv.): 13. 1963.

Type: Kotschy 379, near Shirāz (in M. Sabst-Buschom), Iran; lectotype (G-Boiss) seen.

Isotypes (C, E, GOET, FI, W).

C. chamaerhacos Bornm. in Mitt. Thüring. Bot. Ver. n. f. 37:53. 1927.

Type: Strauss s. n., in mountain opposite Arāk (Sultanabad) 4.6.1910, holotype (B) seen.

Plate VI. fig. 29-36,

A 30-40 (-50) cm high plant with suffrutescent, branched base. Shoots appressed-pilose, slender, compressed in the upper part, leafy in the lower part, leafless at the top, but the middle part with a few leaves. Leaves firmly herbaceous, sessile; radical ones linear-oblongate, 10-20 mm long, 2 mm wide, 5-10 times as long as wide, upper part gradually attenuate into a very narrow, folded, acute apex, base broadly scarious; cauline leaves linear-lanceolate, 15-30 mm long, 2-3 mm wide, 7-10 times as long as wide, acuminate, base slightly dilated, margin entire, indumentum appressed-pilose, midrib prominent. Flowers in compact cymes at the top of the shoots and their branchlets. Bracts with appressed hairs mixed with long and shiny spreading ones, oblong or lanceolate, cuspidate. Bracteoles like the bracts. Pedicels very short, shorter than the calyx. Sepals with long sericeous hairs, convex, 8-10 mm long; the outer ones lanceolate, long acuminate; the middle one with the right and the left half unequal, one half membranous; the inner ones broadly oblong, caudate, with both halves glabrous and membranous. Corolla 25 mm long, yellow, with hairy bands on the outside, but the tube glabrous. Stamens unequal, the longest one 12 mm; filaments glabrous; anthers oblong, slightly retuse at the top. Ovary velutinous, conical, with an annular disc at the base; style filiform, as long as the filiform stigmas. Capsule hairy, subglobose, 5 mm long and wide; seeds immature. Fl. Apr. -Jun. Fr. Jun.

In mountains, alt. 1000-2000 m.

Distribution: endemic in Iran.

Specimens seen:

Iran: Aucher-Eloy 4945, S. Iran, paratype (G-Boiss, W); Stapf 365 near Shirāz (in M. Sabst-Buschom) (W); Stapf 375 *ibid.* (W); Stapf 371 *ibid.* (W); Schmid 5474, Dowlatabād (Dowlatabad) Ostan 7 (W).

41. *C. sericocephalus* Juz. in Notul. Syst. ex Herb. Inst. Bot. Nam. Kom. Acad. Sc. URSS. 12: 219. 1950; Grigor., Fl. USSR XIX: 24. 1953.

Type: Juzepczuk s.n., bet. Sympheropolen et Belogorsk (Krasubazar) (LE), not seen.

Plate VII. fig. 1-7.

A 20-30 cm high herb. Shoots herbaceous, simple or slightly branched, densely appressed pilose, but provided also with a few spreading hairs. Leaves herbaceous; radical ones petiolate, with the petiole as long as the blade, blade linear oblanceolate to linear, 20-50 mm long, 3-4 mm wide, 6-12 times as long as wide, top acute, base broadly scarious; cauline leaves sessile, blade like that of the radical ones, but base cuneate, margin entire, indumentum densely appressed pilose, pinnately nerved. Flowers congested at the top of the shoots and their branches in a capitulum consisting of one dichasium and 1-3 monochasia, or sometimes solitary or in pairs in the axil of the bracts. Bracts leafy, linear-subulate, longer than the capitulum. Pedicel wanting. Bracteoles filiform, not exceeding the calyx. Sepals unequal, 14 mm long covered with appressed as well as spreading hairs; the outer ones obovate, long cuspidate; the middle one with the right and the left half unequal, one half glabrous and membranous; the inner ones shorter than the outer ones, convex, suborbicular, caudate, with both halves glabrous and membranous. Corolla pink (or nearly white?), 18-20 mm long, 1.5 times as long as the calyx, with hairy bands on the outside, but the tube quite glabrous. Stamens unequal, the longest one 11 mm; filaments glabrous; anthers oblong. Ovary hairy, conical, with a glabrous cup-shaped disc at the base; style hairy, as long as the filiform stigmas. Capsule not seen. Fl. May.

Distribution: known from the Krym (Crimea), USSR only.

Specimens seen:

Krym: Yanata et Doych s.n., Feodosia (LE).

This species differs from *C. schirzianus* Boiss., in the linear-oblanceolate to linear leaves, in the bracts which are as long as or longer than the capitulum, and in the 14 mm long sepals.

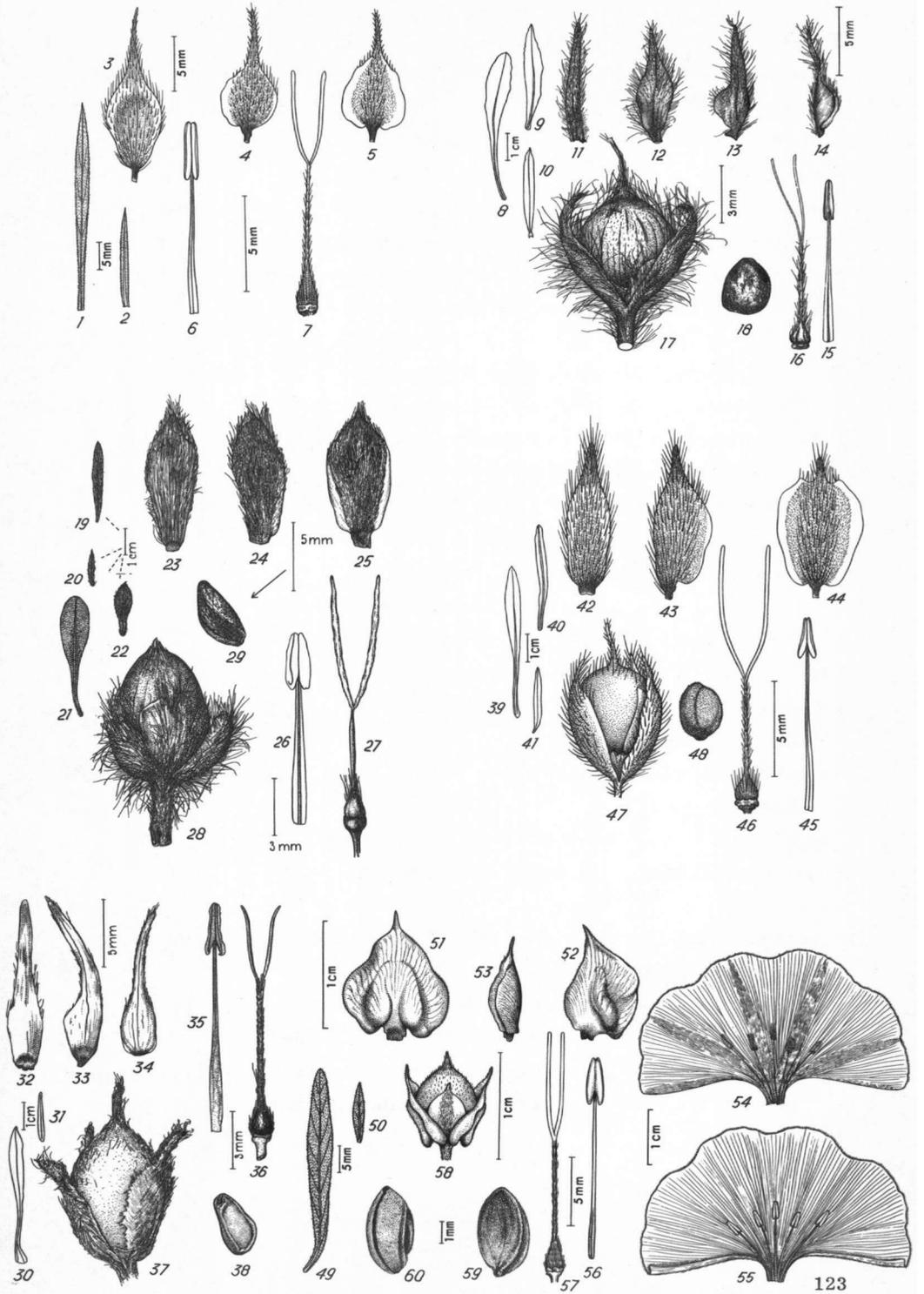
Subsectio 7. Oleifolii Peter.

Shoots with axillary and terminal flowers \pm congested at the top.

series c. Oleifolii. Sepals not gibbous.

42. C. cantabricus Linn., Sp. Pl. 1: 158. 1753; Choisy in DC., Prodr. IX: 402. 1845; Willkomm, Fl. Hisp. II: 515. 1870; Boiss., Fl. Or. IV: 95. 1875; De Halacsy, Consp. Fl. Graec. II: 305. 1902; Cost., Fl. Franc. II: 514. 1903; Borg, Descrip.

Plate VII. fig. 1-7 *C. sericocephalus*; 1: leaf; 2: bract; 3: outer sepal; 4: middle sepal; 5: inner sepal; 6: stamen; 7: pistil [1-7: Yanata et Doych s.n. (LE)]; fig. 8-18 *C. cantabricus*; 8-10: leaves; 11: bracteole; 12: outer sepal; 13: middle sepal; 14: inner sepal; 15: stamen; 16: pistil; 17: capsule; 18: seed [8-18: Haussknecht s.n. (JE)]; fig. 19-29 *C. cneorum*; 19,20: ssp. *cneorum*; 19: leaf; 20: bract; 21,22: ssp. *latifolius*; 21: leaf; 22: bract; 23: outer sepal; 24: middle sepal; 25: inner sepal; 26: stamen; 27: pistil; 28: capsule; 29: seed [19, 20, 23-27: Tadarò s.n. (U); 21, 22: without collector (W); 28,29: Huter 668 (W)]; fig. 30-38 *C. lineatus* var. *lineatus*; 30: leaf; bracteole; 32: outer sepal; 33: middle sepal; 34: inner sepal; 35: stamen; 36: pistil; 37: capsule; 38: seed [30-36: Spencer s.n. 17-4.1893 (C); 37, 38: Herb. Roux 8.7.1860 (C)]; fig. 39-38 *C. oleifolius*; 39,40: leaves; 41: bracteole; 42: outer sepal; 43: middle sepal; 44: inner sepal; 45: stamen; 46: pistil; 47: capsule; 48: seed [39-46: K.H. Rechnering 7819b (W); 47-48: Tunta 901 (W)]; fig. 49-60 *C. holosericeus*; 49: leaf; 50: bracteole; 51: outer sepal; 52: middle sepal; 53: inner sepal; 54,55: corolla; 56: stamen; 57: pistil; 58: capsule; 59,60: seeds [49-58: Sintenis 4082 (JE), 59,60: Sintenis 4082b (GOET)]



Fl. Malt. Isl. : 450.1927; Dinsmore in Post, Fl. Syr. Palest. Sin. ed. 2, II: 205. 1933; Sauvage & Vindt, Fl. Maroc. II: 35.1954; Rechinger fl., Fl. Iran (Conv.): 14.1963.

Type: 218.48 in herb. Linn., lectotype (LINN) seen.

The specimen fits Linnaeus' description (l. c.) in so far that the leaves are lanceolate and acute and that the inflorescences comprise up to 4 flowers, but as Linnaeus described the flowers as arranged in pairs, it is possible that he could not distinguish the flowers clearly.

C. terrestris Linn., Sp. Pl. ed. 2, 1: 224.1762.

Type: 218.49 herb. Linn., lectotype (LINN) seen.

C. linearifolius Mill., Gard. Dict. ed. 8. n. 28.1768.

Type: cultivated specimen, authentic one (BM) seen.

C. linearis Lam., Fl. Fr. II: 27.1778.

Type: specimen in Tournefort's herb. (P) seen. As Lamark referred to Tournefort's specimen, so I choose this as the type.

C. dorycnioides Den. Rep. Lig. 283.1844.

Type: Traverso s. n., Palmar Isl. Liguria, Italy or France not seen.

C. cardiosepalus Boiss., Fl. Orient. IV: 96.1875.

Type: Balansa 698, near Bouloukli, Turkey (G-Boiss.) seen.

C. cantabricus L. var. *villosus* Post., Fl. Syr. Palest. Sin.: 560.1896.

Type: in herb. Post, not seen.

C. cantabricus L. ssp. *medius* Bornm., Beih. Bot. Centralbl. 20 (2): 181.1906.

Type: Strauss s. n., Sultanabad, 1898, Iran, not seen.

f. hirsutus Lindb., Iten. Medit. in Acta Soc. Sci. Fenn. n. s. B.1 (2): 121. 1932.

Type: Gefäss s. n., in Tioumliline valley above Azrou, Morocco, not seen.

f. adpresso-pilosus Lindb. l. c.

Type: Gefäss s. n., Begharia near Palermo, not seen.

C. euxinus Petrov in Bull. Soc. Nat. Mosc. 44:142.1935,

Nestrove s. n., M. Machmoze¹⁾ near Lomashenny, authentic specimen (LE) seen.

C. terminalis Salisb., Prodr.: 125.1796 (nom. illegit.).

Plate VII. fig. 8-18.

* 1) Locality from the label

Herb with a ligneous base, 15-50 cm high. Shoots simple or branched in the lower half, flowering in the upper half; the lower part of the shoot usually more or less villous, but the upper half sometimes more or less appressed-pilose. Leaves herbaceous, sessile; radical ones lanceolate-spathulate to linear-spathulate, usually 15-70 (-190) mm long, sometimes 6-12 mm wide, i. e. 2.5-10 times as long as wide, acute, subacute or obtuse, gradually attenuate at the base; cauline one sessile, from linear-spathulate to linear, 1.5-4 (-8) cm long, 2-4 (-2) mm wide, i. e. 7-10 times as long as wide, acute, cuneate at the base; margin entire, appressed-pilose with or without an admixture of spreading hairs, pinnately nerved. Inflorescences in axillary dichasia comprising up to 7 flowers or by abortion reduced to a single one. Peduncle much longer than the subtending bract. Bracts very narrowly elliptical to linear. Bracteoles linear. Pedicel shorter than the calyx. Sepals slightly unequal, with more or less spreading hairs, often with adhering black particles, the lower part convex and colourless, while the upper part is green; the outer ones oblanceolate, acuminate or, rarely, acute, 7-8 mm (-5) long; the middle one with unequal right and left halves, one half membranous; the inner ones convex, obovate, caudate, 7 mm long, both halves membranous. Corolla pink, 2-2.5 cm long, three times as long as the calyx; the segments with a hairy band on the outside, but the tube glabrous. Stamens unequal, the longest one 10 mm; filaments glabrous; anthers oblong, slightly retuse at the top. Ovary with long velutinous hairs, ovoid, at the base surrounded by a glabrous cupshaped disc; style hairy; stigmas filiform, as long as the style. Capsule ovoid, hairy, 5.5 mm long, 4 mm wide, with 2-4 seeds in one or two locules; seeds dark brown, very densely puberulous. Fl. May-Aug., Fr. June.-Aug.

In mountains and hills, on stony and calcareous ground, in garigue, in cultivated fields, alt. up to 750 m, rarely up to 1500 m.

Distribution: west and east Mediterranean, Balkan, Caucasus, extending into Iran.

Specimens seen:

Iran: Rechinger f. 2071, Mazandaran, Noslur (W); Gauba & Sabeti 975, Gorgan, Hádjar (W).

Palestine: Meyers & Dinsmore 1862, Ramla (L).

Lebanon: Holleman-Haye s. n., Latakia (Lattaqufe) (U).

Turkey: Davis & Hedge D 26973, Antakya (Hatay) (E); Dudley 34927, prov.

Aydin: Söke -Priene (E).

Greece: Orphanides 1154, Lycchetto near Athinai (JE).

Jugoslavia: Stud. -Biol. Rheno-Traj. 1048, Blagaj near Mostar (W); Noë 852, Rijeka (Fiume) (L).

Sicily: Todaro 627, Palermo (JE, U).

Corsica: Stud. biol. Rheno-Trai 469/1965, Pont Leccia (U).

Sardinia: Stud. Biol. Rheno-Trai. 85/ 1965, near Nueoro (U).

France: Jordan 702, surroundings of Lyons (G, JE, L): stud. biol. Rheno-Trai 233, Montpellier (U).

Spain: Willkomm 266, Yesa (C).

Morocco: Jahandiez 246, Sefrou (C), Van Steenis 19152, Taza (L).

43. C. cneorum Linn., Sp. Pl. I: 157. 1753; Choisy in DC., Prodr. IX: 401. 1845; Boiss., Fl. Or. IV: 93. 1875; Arcangeli, Fl. Ital. ed. 2: 372. 1894.

Type: Icon. Moris, Hist. 2:11. S. I. t. 3. f. I. 1680.

No specimen in herb. Linn., but as the picture shows that the flowers are numerous, and that the leaves are \pm lanceolate and more or less obtuse, it fits the description given by Linnaeus.

C. argenteus Desr. in Lam., Encycl. III: 552. 1789.

Type: cult. specimen (P-Lam) seen, but in the text it is said that the plant grows in Crete (Canadie).

C. argenteus Salisb., Prodr. 125. 1796 (nom. illeg.).

Plate VII. fig. 19-29.

A 12-30 cm high suffrutescent plant with a sericeous indumentum, in which a few spreading hairs occur. Root ligneous, perpendicular, 1 cm in diameter. Shoots simple at the top. Leaves firmly herbaceous, sessile; radical ones not seen; cauline leaves linear-ob lanceolate or oblong, 20-35 mm long, 3-7 mm wide, i. e. 3-7 times as long as wide, obtuse, acute or subacute, base decurrent, margin entire, indumentum sericeous, nerves immersed in the indumentum, midrib prominent. Flowers in a compact terminal cyme; the latter dichasial with monochasial branches. Outer bracts like the leaves, not exceeding the inflorescence; inner bracts like the bracteoles, linear. Pedicels wanting or very short. Sepals unequal, with long sericeous hairs, acute to shortly acuminate, 8-9 mm long; the outer ones oblong or lanceolate; the middle one with the right and the left half unequal, one half membranous; the inner ones lanceolate with both halves membranous. Corolla white,

17-23 mm long, 2-2.5 times as long as the calyx, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal; filaments glabrous; anthers sagitate. Ovary either densely hairy or hairy at the top only, with a cupshaped glabrous disc at the base; style stout, glabrous or hairy; stigmas cylindrical, 1.5 times as long as the style. Capsule hairy, ovoid-oblong, exceeding the persistent calyx, 9 mm long, 5 mm wide, bilocular, 4-seeded; seeds brown, trigonous, densely puberulous, 5 mm long, 2 mm wide. Fl. March-May. Fr. May-Jul.

On mountains, rocky maritime cliffs and on calcareous soil.

Distribution: Italy, Sicily, Capri, Jugoslavia, Spain ¹⁾.

a. ssp. cneorum.

Leaves linear oblong or linear lanceolate; the greatest width distinctly below the middle (distance from top to widest part 1-1.5 times as long as that from base to widest part).

Distribution: Sicily.

Specimens seen:

Sicily: Parlatore 45, Palermo M. Catalfano (W); Todaro 159 ibid. (HAL);

Todaro 1327 ibid. (JE).

b. ssp. latifolius (Reichenb.) Sa'ad stat. nov.

C. cneorum var. *latifolius* Reichenbach f., Icon. Fl. Germ. & Helvetic. in Fl. Germ. Excurs XVIII: 83. t. 134. MCCCXXV f. III. 1858.

Type: Petter 48, Yugoslavia coast (Dalmatia) (W).

Leaves oblanceolate, obtuse or subacute; the greatest width distinctly above the middle (distance from top to widest part, $\frac{1}{2}$ - $\frac{1}{3}$ times as long as that from base to widest part).

Distribution: Italy, Capri, Jugoslavia, Tunisia.

Specimens seen:

Capri: Guadagno 3434 (HBG); Fiori, Bequinot and Pampanini 142 bis, ibid.

(E, G).

Yugoslavia: Villa Di 671, Lošigi, Is. (W); Bornmüller 291, Lapad ²⁾ (B); Ferman and van Hill 331, ibid. (U).

Italy: Kamphövener 1, Napoli (C).

* 1) Willkomm, Prodr. Fl. Hisp. II: 517. 1870, but its occurrence in Spain is dubious.

* 2) A peninsula in Jugoslavia according to some old maps.

Tunisia: Cuénod s.n., Viorbons ³⁾, may 1913 (G).

On some labels this species is said to avoid the volcanic Islands of the Medit. Sea.

44. *C. lineatus* L., Syst. Nat. ed. 10 (2): 923. 1759; Choisy in DC. Prodr. IX: 403. 1845; Willkomm, Prodr. Fl. Hisp. II: 516. 1870; Boiss., Fl. Or. IV: 97. 1875; Arcangeli, Comp. Fl. Ital. ed. 2. 372. 1894; Battandier, Fl. Alger. II: 592. 1888; de Halacsy, Consp. Fl. Graec. II: 304. 1902; Coste, Fl. Franc. II: 1903; Borg, Desr. Fl. Malt. Isl.: 450. 1927; Dinsmore in Post, Fl. Syr. Palest. Sinai ed. 2, II: 205. 1933; Palhinha, Fl. Portug. ed. 2. 581. 1939; Grigoryev, Fl. USSR XIX: 26. 1953; Sauvage et Vindt, Fl. Maroc II: 37. 1954; Täckholm, Stud. Fl. Egyp.: 171. 1956; Rechinger f., Fl. Iran (Conv.): 15. 1963; Karamanoglu Sp. Conv. Turk. in Communic. Facult. Sc. Univers. Ankara 13: 235. 1964.

Type: in herb. Linn. 218. 43 (coll. in Spain by Loeffleng), lectotype (LINN) seen. Plate VII. fig. 30-38.

A 4-20 (30-40) procumbent or ascending herb. Underground parts consisting of a branched rhizome. Shoots simple or branched, tender, herbaceous, adpressed-sericeous. Leaves firmly herbaceous; the radical ones petiolate, the petiole as long as or half as long as the blade, the blade oblanceolate to linear-oblanceolate, 25-50 mm long, 3-15 (-20) mm wide, 2.5-8 times as long as wide, gradually attenuate into the petiole; with a broad scarious base, cauline ones sessile or, rarely, shortly petiolate, oblanceolate to linear or elliptic, 15-40 mm long, 4-8 mm wide, 4-5.5 times as long as wide, base cuneate or attenuate into a short petiole, top acute, subacute or obtuse, indumentum shiny sericeous, pinnately nerved. Inflorescences terminal and axillary, the terminal ones dichasial, but the axillary ones either reduced to a single flower or consisting of up to 5 flowers arranged in a monochasium or dichasium. Bracts like the cauline leaves, much longer than the short peduncles. The bracteoles linear-lanceolate, as long as or exceeding the calyx. Pedicel short. Sepals unequal, 6-12 mm long, sericeous, variable in shape, consisting of a green and flat upper part and a colourless convex lower one, the green part as long as or longer or shorter than the colourless part; the outer ones lanceolate-linear to oblong, acute to acuminate; the middle one with

* 3) Locality given on the label.

unequal halves, one half membranous; the inner ones broadly ovate suborbicular, caudate, with both halves membranous. Corolla pink, 1.7-2.5 cm long, 2-2.5 times as long as the calyx, with hairy bands on the outside, but the tube quite glabrous. Stamens unequal, the longest $\frac{1}{2}$ as long as the corolla; filaments glabrous; anthers oblong, retuse at the top. Ovary hairy, with a membranous and glabrous cup-shaped disc at the base; style stout and hairy, as long as the filiform stigmas. Capsule hairy, oblong-ovoid or obovoid, 6-7 mm long, 4-5 mm wide, bilocular, 4-seeded; seeds blackish, covered with very short pubescent hairs, 3 mm long, 1.5 mm wide. Fl. Fr. Apr. -Jul.

On waste places and fields, along roads, in a salty meadow. In the steppe, on sandy hills, bare stony soil, on slopes, alt. 300-1300 m.

Distribution: East and West Mediterranean region, Balkan, round the Black sea, Iran, Afghanistan, extending to Pamir-Alai and Tien-Shan.

a. var. lineatus

C. spicifolius Desr. in Lam. Encyc. III: 549.1789.

Type: cultivated plant in the Jardin du Roi (P-LA) seen.

C. intermedius Loisel. in Journ. Bot.: 264, Not. 40, 1809.

Type: Requier s.n., Avignon, France (P) not seen.

Isotype (K).

C. gerardi Roem. et Schult., Syst. IV: 294.1819.

Type: no specific specimen mentioned as a type.

C. besseri Spreng, Syst. I: 610.1825.

Type: Besser s.n., Pedolia S.W. Ukraine, USSR (B + ?) not seen.

C. nitens C. Koch in Linnaea 22: 743.1849.

Type: Koch s.n., prov. Yerevan (Friwan), Armenia USSR (B + ?), not seen.

C. suendermannii Bornm. in Fedde, Repert. 43: 152.1938.

Type: a cultivated specimen, from the Lindau Botanical Garden, collected by Sündermann on M. Ali-Botush, Bulgaria (B) seen.

C. humilis Salisb. Prodr.: 125.1796 (nom. illegit).

C. lineatus var. *pentapetaloides* Batt. in Bull. Soc. hist. nat. Afr. Nord, 12: 27.1921, vide Sauvage et Vindt, l.c. p. 38.

C. lineatus var. *minutus* Maire et Weiller, Contr. etud. Fl. Afr. Nord. 29, in Bull. Soc. Hist. Nat. Afr. Nord 31:28.1940.

Type: Maire et Weiller 628, Grand Atlas, Tizin-Tighoughizin, holotype (AL), not seen.

Isotype (RAB).

Blade of the radical leaves mostly elliptical, 7-15 (-20) mm wide, 2.5-4 times as long as wide, top subacute or obtuse.

Specimens seen:

U.A.R. (Egypt): Ehrenberg s.n., Alexandria (C, L); Shabetai z 1704, Matruh (CAIM).

Morocco: Jahandiez 456, Daiet Achle ¹⁾ (Moyen Atlas) (C, E, RAB).

Spain: Bourgeau 1976, Cerro Negro near Madrid (G).

Greece: Rechinger 17741, between Kozáni and Sérvia (W).

Turkey: Dudley 35623, Denizli-Cardar (E); Davis and Dodds 18640, Prov. Ronya, Cihanbeyli (E).

USSR: Androssov 3770 a, Balschie Barsuki, Prov. Aktiyubinsk, Kazakhstan (C); Karnauch 171, Novazovicus distr. ¹⁾, Chomutove ¹⁾ (CAI); Sintenis 799, Ashkhabad (Aschabad), Turkmeniya (B, W).

Syria: Barkoudah 410, Goutah, E Damascus (U).

Iran: Rechinger, Aellen and Esfandiari 4314; Prov. Khurasan, Torbat-e-Hydariyeh (Turbet-e-Haidari) (E).

Afghanistan: Hedge and Wendelbo 3724, Maimana (Maymana) near Belchiragh (Belcheragh) (E).

b. var. angustifolius Kotschy, Ins. Cyp. 285.1865.

C. cyprius Boiss. Fl. Or. IV: 93.1875.

Type: Kotschy 627, Lamnia ¹⁾ near Capo Getto ¹⁾, Cyprus (G-Boiss.).

Isotype (W).

The blade of the radical leaves linear to linear-oblongate, 2-5 mm wide, 6-8 times as long as wide, top acute.

Specimens seen:

Cyprus: Davis 3573 k, Akrotiri (E).

Spain: Porta and Rigo 203, Almeria (W).

Portugal: Ferreira 1759, Capo Mendego ¹⁾ (C).

Tunisia: Pitard 615, Sfax (L).

France: Hubert 53, Charente-inferieur (C, JE, W).

Italy: Porta and Rigo 295, Iapygia near caput Leuciae (JE, W).

Turkey: Davis, Dodds and Cetik 19247, Bakir Dagi, Prov. Kayseri (E).

* 1) Locality given from the label.

45. *C. oleifolius* Desr. in Encyc. Lam. III: 552. 1789; Boiss., Fl. Or. IV: 93. 1875; Halacsy, Consp. Fl. Graec. II: 304. 1902; Borg. Fl. Malt.: 449. 1927; Dinsmore in Post, Fl. Syr. Palest. Sin. ed. 2, II: 204. 1933; Täckholm, Stud. Fl. Egypt.: 171. 1956.

Type: herb. Lam. (P).

C. oleifolius Desr. var. B, Desr. l.c.

Type: herb. de Jussieu (P) seen.

var. *angustifolius* Bég. and Vacc., Spec. Nouv. rar. Fl. Lib.: 2. 1912 (vide Pampan., Prodr. Fl. Cynr.: 371. 1931).

Type: Vaccari s.n., Derna, Libya, 20.4.1912, not seen.

var. *deserti*: Pamp, in Archiv. Bot. 12 Nouv. Ser. II: 40. 1936.

Type: no specimens mentioned.

var. *pumilis* Pamp. l.c. 1936.

Type: no specimens mentioned.

C. linearis Curt., Bot. Mag. t. 289. 1795.

Type: Icon. l.c.

"*C. lineatus* L" sec. Sibth et Sm., Fl. Graec.: 81, t. 199. 1913, p.p. quod pl. depict. non L. 1759.

C. tournefortii Sieb. ex Spreng., Syst. I: 611. 1825.

Type: Sieber s.n., Cap. Maleca Kriti (Crete), lectotype (LE).

Plate VII. fig. 39-48.

A 20-40 (6-54) cm high, sericeous suffrutescent plant with ligneous base, Shoots firmly herbaceous, leafy, simple or branched from the upper part. Leaves herbaceous, sessile; radical ones lanceolate to linear, 25-60 mm long (2-) 4-8 mm wide, 3-15 times as long as wide, obtuse or subacute, attenuate at the base; cauline leaves linear to filiform, 12-32 mm long, 1-4 mm wide, 7-22 times as long as wide, acute or subacute, base cuneate, margin entire, indumentum sericeous, pinnately nerved. Shoots ending in a dichasium; the other flowers up to 5 congested in axillary entirely dichasial or at the base dichasial inflorescences, which are inserted on the upper half of the shoots; the upper ones so near to each other that they seem to form a lax terminal inflorescence. Bracts like the leaves, longer than the peduncles. Bracteoles subulate, 8-10 mm long, ca 1.5 mm wide, longer than the short pedicel. Sepals tomentose, (5-) 7-9 mm long, oblong to oblong-lanceolate, acute to acuminate; the middle one with the right and the left half unequal, one half membranous;

the inner ones broadly oblong, long acuminate, with both halves membranous. Corolla pink, (-15) 18-22 mm long, 2.5-3 times as long as the calyx, with hairy bands on the outside, but the tube quite glabrous. Stamens unequal, the longest one 11 mm; filaments glabrous; anthers oblong-sagittate, retuse at the apex. Ovary hairy, with a glabrous cupshaped disc at the base; style stout, hairy; stigmas filiform, 1.5 times as long as the style. Capsule hairy, subglobose, 5 mm long and wide, shorter than the persistent calyx, uni- or bilocular, 2- or 4-seeded; seeds brown, densely hairy, 3 mm long, 2 mm wide. Fl. Feb.-Jun. Fr. Jun.

On limestone rocks, on tilled soil, on maritime hills and cliffs, alt.300 m.

Distribution: eastern part of the Mediterranean Region.

Specimens seen:

U.A.R. (Egypt): Drar 230, Matrûh, El Qassaba (CAIM).

Libya: Toubert 437, Derna (JE); Maire and Weizler 1118, Jebel Lakbar (JE).

Cyprus: Davis 2449 k, Koni Kebi (E); Davis 3195, Athalassi near Nicosia (E).

Rhodes Island: Bourgeau 115, near Salakos (GOET, W).

Kriti (Crete): Rechinger f.12287, distr. Khandia (W).

Greece: De Heldreich 1158, Attiki (Attica) (E, G, JE, STU, W).

C. cneorum L., Sp. Pl. 1: 157. 1753 B. *Dorycnium Alpini* exot. 74. t. 73. 1627. Some authors of floras treated this variety under *C. oleifolius* Desr. It is not possible to identify the species of *Convolvulus* to which the plant shown in this picture belongs.

Series d. Physocalycini Petrov. The inferior part of the outer sepals gibbous.

46. *C. holosericeus* Marsch. Bieb., Fl. Taur. Gauc. 1: 147. 1808; Choisy in DC., Prodr. IX: 403. 1845; Ledeb., Fl. Ross. III: 91. 1846-51; Bouloum, Fl. Lib. Syr. text: 229. 1950; Grigor., Fl. USSR. XIX: 25. 1953.

Type: Bieberstein s.n., Krym (Tauria) (LE), not seen.

Plate VII. fig. 49-60.

A strongly branched, sericeous plant with a ligneous base. Shoots herbaceous, simple or slightly branched. Leaves herbaceous, sessile; radical ones linear-oblongate or spatulate, 20-44 mm long, 2-6 (-9) mm wide, 4-13 times as long as wide, acute or obtuse, base broadly scarious; the cauline leaves linear-oblong or linear, 18-45 mm long, 4-6 mm wide, 5-11 times as long as wide, acute, base attenuate; margin entire, sericeous, midrib prominent.

Bracts like the leaves. Flowers terminal and axillary, solitary or in pairs. Peduncle as long as or shorter than the subtending bract; the solitary terminal flower and the uppermost axillary flowers congested. Bracteoles linear, not exceeding the calyx. Pedicel shorter than the calyx. Sepals unequal; the outer ones ovate to ovate-orbicular, gibbous, 10-15 mm long, 5-12 mm wide, 2-1.25 times as long as wide; the middle one with the right and the left half unequal, one half membranous; the inner ones convex, suborbicular, long-mucronate, 7-10 mm long, with both halves membranous. Corolla pale yellow or white, 20-27 mm long, 2-1.8 times as long as the calyx, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens subequal; filaments glabrous; anthers oblong with retuse apex. Ovary ovoid, densely puberulous and with a glabrous disc at the base; style hairy, twice as long as the filiform stigmas. Capsule hairy, ovoid, 7 mm long, 5 mm wide, uni- or bilocular, 1- or 2-seeded; seeds dark brown, densely puberulous, 4 mm long, 2.5 mm wide. Fl. May-June Fr. Jul.

On mountains and hills, on clay and calcareous hillsides and in the steppe, rarely in vineyards or with *Quercus coccifera*.

Distribution: Turkey; Krym (Crimea) USSR; Yugoslavia; Caucasus¹⁾, Bulgaria²⁾.

a. var. holosericeus.

Outer sepals 10 mm long, 5 mm wide, twice as long as wide.

Specimens seen:

Turkey: Davis, Dodds and Cetik 18621 A, Cihanbeyli, Konya (E); Bornmüller 3441, Divriği (Divriki) (B, JE); Balansa 1169, Osak (Ouchak) (GOET, JE, W). Yugoslavia: Bornmüller 1568, Negotin (B, JE, HBG).

USSR: Snedinski s. n., Krym (Tauria) Simferopol (W).

b. var. macrosepalus Haussk. and Bornm. ex Bornm. in Mitth. Thür. Bot. Ver. N. Folge, 6:66.1894.

Type: Sintenis 427, Harput (Kharput), Turkey, lectotype (LD), not seen.

Isotypes (B, E, HBG, JE, W).

Outer sepals very large, more than half as long as the corolla, 15 mm long, 12 mm wide, 1.25 times as long as wide.

* 1) Stayanov and Stefanov, Fl. Bulg. 911.1948

* 2) Grigoryev l. c.

Distribution: Turkey.

Specimens seen:

Turkey: Davis and Hedge 29166, Elâzığ-Pertek (E); Sintenis 2334, Kemaliye (Egin), paratype (JE).

Subsectio 8. Compacti Boiss.

Pulvinate dwarf plants (3-17 cm high). Old shoots ligneous, provided with adventitious roots; branches often wanting or short.

47. C. aitchisonii Clarke in Journ. Lin. Soc. 19: 179. 1882; Boiss., Fl. Or. Suppl. : 348. 1888; Rechinger f., Fl. Iran (Conv.): 15. 1963.

Type: Aitchison 15, from Alizai to Habib-Kalla, Kurram (Kurrum) Valley, Afghanistan-Pakistan, holotype (K) seen.

Cushion-shaped, 8-11 cm high; basal part and root ligneous. Shoots simple, herbaceous, tomentellous-densely villous. Leaves chartaceous, sessile, densely aggregated at the base of the shoots, linear to linear-oblong, 20-25 mm long, 2-3 mm wide, ca 10 times as long as wide, acute to subacute, with a broad scarious clasping base, margin entire, on both sides densely villous, pinnately nerved. Flowers sessile, up to 4 in a compact helicoid cyme; these cymes inserted along the upper half of the shoots. Bracts like the leaves but smaller and without the clasping scarious base. Peduncle much shorter than the bract or wanting. Bracteoles shorter than the calyx, lanceolate, acuminate, covered with long sericeous hairs. Pedicels wanting. Sepals unequal, covered with long sericeous hairs, the upper part green, the lower part colourless; the outer ones oblanceolate-oblong, acuminate, 14 mm long; the three inner ones are identical; they are linear-lanceolate, long acuminate, 12 mm long. Corolla of unknown colour, 20 mm long. 1.5 times as long as the calyx, segments with a hairy band on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the longest 1/3 the length of the corolla; filaments glabrous; anthers oblong, obtuse. Ovary glabrous, filiform; stigmas filiform, 1.5 times as long as the style. Capsule not seen. Fl. December.

Very characteristic for the open plains. Alt. 1000-2000 m.

Distribution: Afghanistan-Pakistan, Pakistan ¹⁾

* 1) Rechinger l.c.

It can be distinguished from *C. calvertii* Boiss. and *C. commutatus* Boiss. by the axillary flowers borne on the upper half of the shoots, its pulvinate aspect and its glabrous ovary.

48. *C. anaticus* Sa'ad nov. spec.

Plate VIII. fig. 1-8.

Herba valde ramosa, parte subterranea nondum nota. Caules veteriores lignei, radicibus adventitiis instructi et valde ramosi; caules juniores graciles, 12 mm longi, appresse pubescentes. Folia sessilia, firme herbacea; folia radicalia linearia, 30-40 mm longa et circ. 4 mm lata, apice acuta et mucronulata, parte basali dilatata et scariosa, utrimque puberula; folia caulina foliis radicalibus similiora, in parte inferiore caulis longe distantia; flores in axilla bractearum solitarii, ad apicem caulis congesti. Pedunculus quam bractea multo brevior. Bracteae foliis similiores. Bracteolae etiam lineares, usque ad 12 mm longae et 1 mm latae. Pedicellus bracteolis brevior. Sepala inaequalia, omnia tamen apice sparse puberulo excepto glabra; exteriora lanceolata, 12 mm longa, apice acuminata; medianum cum dimidio dextro a dimidio sinistro diverso; interiora elliptico-oblonga, apice caudata. Corolla alba, 17 mm longa, segmentorum quinque unoquoque virga mediana in parte superiore extus pilosa instructo. Stamina inaequilonga; filamenta glabra; antherae oblongae, apice retusae. Ovarium conicum, puberulum, basi disco glabro circumdatum; stylus pilosus, quam stigmata filiformia quater longior. Capsula subglobosa, 4 mm alta et diam., ad apicem puberula; semina matura nondum visa. Florens et fructiferens mensi Julio.

Typus: Handel-Mazzetti 2226, in Tauro Cataonico inter urbem Malatya et vicum Kâhta (Kjacta), Kurdistania (W, sub nomine *C. cataonicus* Boiss. et Hauskn.), ad limitem silvae in Astragaleto crescente in substrato septicinico.

Distribution: known from Turkey only.

This species comes nearest to *C. orophilus* Sa'ad and *C. cataonicus* Boiss. et Hauskn. From *C. orophilus* it differs by the linear, acute and mucronulate, on both sides puberulous leaves, the lanceolate, 12 mm long, acuminate outer sepals, the 17 mm long corolla and the style which is but slightly longer than the stigmata, and from *C. cataonicus* by its linear leaves and by its sepals which, apart from a few hairs at the top, are entirely glabrous.

Plate VIII fig. 1-8: *C. anatolicus*; 1,2: leaves; 3: bracteole; 4: outer sepal; 5: middle sepal; 6: inner sepal; 7: stamen; 8: pistil [1-8: Handel-Mazzetti 2226 (W)]; fig. 9-18: *C. assyricus*; 9,10: Leaves; 11: bracteole; 12: outer sepal; 13: middle sepal; 14: inner sepal; 15: stamen; 16: pistil; 17: capsule; 18: seed [9-16: Stainton 5109 (E); 17,18: Balansa 973 (W)]; fig. 19-26 *C. boissieri*; 19: leaf; 20: outer sepal; 21: middle sepal; 22: inner sepal; 23: stamen; 24: pistil; 25: capsule; 26: seed [19-24; Bourgeau 784 (G), 25,26: Hackel 8 (W)]; fig. 27-35 *C. cataonicus*; 27,28: leaves; 29: outer sepal; 30: middle sepal; 31: inner sepal; 32: stamen; 33: pistil; 34: capsule; 35: seed [27-35 Haussknecht s.n. (W)]; fig. 36-43 *C. compactus*; 36: leaves; 37,38: bracteoles; 39, 41,42: sepals of ssp. *compactus*; 39: outer sepal; 41: middle sepal; 42: inner sepal; 40: outer sepal of ssp. *parnassicus*; 43: pistil [36-39, 41-42: Kotschy 139 (W); 40: Bornmüller 1518b (HBC)]; fig. 44-51 *C. konyacus*; 44: leaves; 45, 46: bracteoles; 47: outer sepal; 48: middle sepal; 49: inner sepal; 50: stamen; 51: pistil [44-51: Dudley D 35857 *typus* (E)].

49. *C. assyricus* Griseb., Spicil. Fl. Rum-el. Bithyn. II: 75. 1844 (in nota); Boiss., Fl. Or. IV: 99. 1875.

Type: Donietti s.n., East Anatolia or Mesopotamia, holotype (GOET) seen.

C. strigulosus Boiss., Diagn. Pl. Or. Nov. 1 (11): 83. 1849.

Type: Aucher-Eloy 4939, between Ankara (Angora) and Tokat, Turkey, holotype (G-Boiss.) seen.

Plate VIII. Fig. 9-18.

Cushion-shaped; indumentum consisting of spreading strigose hairs. Root ligneous. Leaves firmly herbaceous, caespitose, sessile, narrowly obovate, 15-20 mm long, ca. 5 mm wide, i. e. 3-4 times as long as wide, acute, basal part scarious, dilated, decurrent on the stems, margin entire, glabrous above, hairy beneath, uninervate. Bracts like the leaves. Bracteoles ca 10 mm long, linear, acuminate, but like the leaves with a dilated scarious base. Sepals unequal, shortly pubescent, the outer ones oblong, 3 mm long, acute, the middle one with unequal halves, one half glabrous and membranous; the inner ones suborbicular, mucronulate, entirely glabrous and membranous. Corolla pink, 22 mm long, 7 times as long as the calyx, the segments with a hairy band on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the longest one 11 mm; filaments glabrous; anthers retuse at the apex. Ovary conical, hairy, surrounded at the base with a glabrous cup-shaped disc; style hairy, as long as the filiform stigmas. Capsule ovoid, 4 mm long and 3 mm wide, hairy, exserted from the persistent calyx, with 1 or 2 locules and, by abortion, 1 or 2 seeds; seeds brown, very densely covered with short, faintly coloured hairs, 2-5 mm long and 2 mm wide. Fl. May-Jul. Fr. Aug.

Mountains, hills, stony cliffs, bare slopes, red sandy soils, alpine region, alt. 1000-2000 m.

Distribution: Turkey.

Specimens seen:

Turkey: Balansa 973, Kayseri (Césarée) (GOET, W); Balls 245 *ibid.* (E);

Hausknecht s.n., between Bircik (Bir) & Sürüc (Surug) (W); Bornmüller 3546, Sivas (Sivas) (B, W); Stainton & Henderson 5100, between Sivas & Kayseri (E).

50. *C. boissieri* Steud., Nom. ed. 2, I: 407. 1841.

Homonym: *C. nitidus* Boiss., Elench. pl. Nov. 47. 1840, non Desr. 1789;

Willkomm, Prodr. Fl. Hispan. II: 517. 1870.

Type: Boissier s.n., Sierra Nevada, Spain; holotype (G-Boiss) seen.
Isotypes (C, E, G, GOET, HAL, JE, K, L, W).
Plate VIII. fig. 19-26.

A compact or, rarely, loose cushion-plant. Root ligneous, The younger shoots herbaceous, sericeous. Leaves + fleshy, sessile, spatulate, linear-oblong or rarely linear-oblongate, 10-24 mm long, (2-) 3-6 mm wide, 3-4 times as long as wide, obtuse, contracted towards the broad scarious base, margin entire, sericeous, plicate, nerves prominent. Flowers all terminal or terminal and axillary. Bracts of the axillary flowers like the leaves. Peduncle very short, much shorter than the subtending bract. Bracteoles of the terminal flower wanting, of the axillary ones small and filiform. Sepals unequal, sericeous, variable in shape; the outer ones oblong, oblanceolate or ovate, acuminate or caudate, 6-10 mm long, 2-4 mm wide; the middle one with the right and the left half unequal, one half membranous; the inner ones broadly obovate or oblong, caudate, with both halves membranous. Corolla pink, 18-20 mm long, 2-3 times as long as the calyx, with hairy bands on the outside, but the tube quite glabrous. Stamens unequal; anthers oblong, retuse at the apex. Ovary ovoid, velutinous, with a shallow cup-shaped disc at the base; style hairy and stout, as long as the filiform stigmas. Capsule hairy, subglobose, 5 mm long and wide, uni- or bilocular, 2- to 4-seeded; seeds dark brown, 3 mm long, 2 mm wide, glabrous. Fl. Jun.-Jul. Fr. Jul.

On mountains, in arid places, on calcareous rocks and in fields, alt. 1650-2500 m, rarely at 200 m.

Distribution: known only from Spain.

Specimens seen:

Spain: Bourgeau 1296, Sierra Nevada, Dornájo ¹⁾ (E, G, GOET, W); Jahandiez 217 ibid. (E); Porta & Rigo 546 ibid (HBG, JE, W); Podro del Campo 66, near Granada, Sierra del Mana ¹⁾ (RAB, W).

51. C. cataonicus Boiss. et Hausskn. in Boiss., Plant. Or. Nov. dec. 1:5. 1875; Boiss., Fl. Or. IV: 98. 1875.

Type: Haussknecht s.n., Berit Dag (Berytdagh), Cilicia-Cappadocia (Cataonia), Turkey: holotype (G.-Boiss.) seen.

* 1) Locality from the label.

Isotype: (W).

Plate VIII. fig. 27-35.

A 11-17 cm high caespitose plant. Root ligneous. Shoots simple, appressed pilose or the hairs partly appressed and partly spreading. Leaves herbaceous, sessile; radical ones linear-oblongate or linear, 1.5-2.5 cm long, ca 2.5 mm wide, 7-10 times as long as wide, top subacute, base broadly scarious and gradually attenuate; cauline leaves few, linear or linear-oblongate, ca 2 cm long, 2-3 mm wide, i. e. 5-10 times as long as wide, acute, base attenuate; margin entire, glabrous above, pubescent beneath, uninervate. Flowers at the top of the shoots congested, but the other ones further apart, all solitary in the axil of the bracts. Peduncle shorter than the subtending bract. Bracts linear, leafy, ca 2 cm long, 2 mm wide. Bracteoles small, linear, longer than the short pedicel, but not exceeding the calyx; the bracts and bracteoles with a scarious base. Sepals unequal, hirsute; the outer ones elliptical or oblong, long acuminate, 9-10 mm long; the middle one with the right and the left half unequal, one half membranous; the inner ones elliptical-oblong, caudate, with a more or less cordate base and with both halves membranous. Corolla white, 16-18 mm long, with hairy bands on the outside, but the tube quite glabrous. Stamens unequal, the longest one 10 mm; filaments glabrous; anthers oblong-sagitate, with retuse top. Ovary ovoid, velutinous, and with a glabrous shallow cupshaped disc at the base. Capsule hairy, oblong, 6 mm long, 3 mm wide. Fl. Jun.-Aug. Fr. Aug.

In mountain fields, *Astragalus* steppe, alt. 1400 m.

Distribution: known from Turkey only.

Specimens seen:

Turkey: Stainton & Henderson 5471, Malatya, Döngöşehir (E).

52. *C. compactus* Boiss., *Diagn. Pl. Or. Nov. 1* (4): 40. 1844; Boiss., *Fl. Or. IV*: 98. 1875.

Type: Pinard s. n., Caria (former province in SW Turkey), Turkey; lectotype (G-Boiss.) seen.

Isotype (W).

C. cochlearis Griseb., *Spicil. Fl. Rumel*, 2:76 (in nota), 1844.

Type: Donietti s. n., Anatolia orientali or Mesopotamia; holotype (GOET) seen. Plate VIII. fig. 36-43.

Cushion-shaped. Root thick, ligneous, perpendicular. Young shoots very short, 3-7 cm high, or stemless. Leaves + fleshy, sessile, rhomboid, 3-11 mm long, as long as wide, rarely up to three times as long as wide, acute, margin entire, sericeous or sericeous with an admixture of long spreading hairs, nerves conspicuous or rarely inconspicuous. Shoots ending in a solitary flower, and sometimes also with sessile axillary flowers which are usually congested at the top. Bracts like the leaves. Bracteoles linear, as long as the calyx. Pedicel wanting. Sepals variable, equal or unequal, covered with long sericeous hairs; the outer ones oblong-lanceolate and acuminate or rhomboid and caudate or acuminate, 7-13 mm long; the middle one with unequal halves; the inner ones convex, obovate-oblong, caudate, with both halves membranous. Corolla pink or purple, 15-18 mm long, 1.5-2 times as long as the outer sepals; segments with a hairy band on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the longest one 7-9 mm long; filaments glabrous; anthers oblong, retuse at the top. Ovary ovoid, hairy, at the base surrounded by a glabrous disc; style hairy, as long as the filiform glabrous stigmas. Capsule ovoid, hairy, 4 mm long, 3 mm wide, unilocular and with 1 or 2 seeds; seeds dark brown, densely covered with very short, but faintly coloured hairs. Fl. May-Aug. Fr. Jul-Aug.

In arid, cultivated, and calcareous mountains and hills, on rocks, slopes and with steppe; alt. 610-4500 m.

General distribution: Turkey, Greece, Yugoslavia, Albania.

a. ssp. compactus.

Sepals equal, oblong or oblanceolate, long acuminate.

Distribution: Turkey.

Specimens seen:

Turkey: Boissier s.n., Honaz Dağı (Cadmus), paratype (G-Boiss., GOET, W); Davis 21878, Gürün, Malatya (E); Davis 16125, Kizilviran between Konya & Beysehir (E); Balls 1366, Pozanti; Cilicia (E).

b. ssp. parnassicus (Boiss. et Orph.) Sa'ad stat. nov.

C. parnassicus Boiss. et Orph. in Boiss., Diagn. Pl. Or. Nov. 2 (3): 125.1856.

Type: Orphanides 2532, Parnassos or Liá 'Koura, Greece, holotype (G-Boiss.) seen.

Sepals unequal; the inner ones much shorter than the outer ones; the outer ones rhomboid, acuminate or caudate.

Distribution: Greece, Yugoslavia, Albania.

Specimens seen:

Greece: Bartholomatos 2963, Peteras (JE); Guicciardi 2963, Parnassōs (L); Maire et Petitmengin 1250, *ibid.* (B, W); Rechinger 9545, f̄asmas Thraki (Thracia) (G, JE, W).

Yugoslavia: Bornmüller 4482, Radoka plan Vardar river (Raduse, Wadar riv.) (B, HBG, JE).

Albania: Aliston et Sandwith 2154, near Hog, between Korçë and Ersek (K).

Grisebach, *Spicilegium Florae Rumeliae pars 4* (= vol. 2, p. 1-160) was received by the bookseller Hinrichs at Leipzig between 12 and 14 August 1844. This can be taken as the date of publication of *C. cochlearis*. Boissier, *Diagnoses plantarum orientalium novarum part 4*, 1844 is not listed by Hinrichs. Since both part 4 and part 5 appeared, in 1844 it can at any rate be assumed that part 4 was published earlier in the year 1844 than part 5; part 4 came out between May and October 1844, and a letter from Boissier to Bentham makes it reasonable to accept June as the month of publication.

In view of the above information it must be assumed that the specific name proposed by Boissier has priority over that proposed by Grisebach, since the latter's book was not published before August.

53. *C. konyacus* Sa'ad nov. spec.

Plate VIII. fig. 44-51.

Herba pulvinata, circ. 5 cm alta, argenteo-sericea, caule primario brevi vel toto suppresso. Radix perpendicularis 10 mm diam., ligneus. Caules veteriores radicibus adventitiis instructi, ramificati, lignei; caules juniores herbacei. Folia sessilia, lineari-oblancoolata vel linearia, 8-25 mm longa et circ. 1.5 mm lata, apice obtusa, parte basali dilatata et scariosa. Flores solitarii in axillis, ad apicem caulium et eorum ramorum aggregati, Bractee lineari-oblancoolatae vel lineares, apice acutae, basi dilatae. Pedunculus quam bractea suffulciens multo brevis vel nullus. Bracteolae lineares pedicello longiores sed non ultra calycem protrudentes. Sepala inaequalia, omnia tamen hirsuta; exteriora oblancoolata 10-15 mm longa, cuspidata; medianum cum dimidio dextro a dimidio sinistro diverso, dimidio altero glabro et membranaceo; interiora elliptico-oblonga, 7-12 mm longa, apice caudata, basi truncata, tota glabra et membranacea. Corolla

dilute rosea, 18-25 mm longa, segmentorum quinque unoquoque virgam medianam in parte supra tubum sita extus pilosa, exhibente. Stamina inaequilonga, longissimo 10 mm longo; filamenta glabra; antherae oblongae, apice obtusae et mucronulatae. Ovarium conicum, dense pilosum, basi disco cupuliformi circumdatum; stylus brevis pilosus; stigmata filiforma, stylo dimidia parte longiora; capsula nondum visa. Florens mensi Junio.

Typus: Dudley D 35857, inter Beyschir et Konya, in Asia Minore (E), in planitie arida, ad altitudinem 1250 m.

Distribution: Turkey.

Specimens seen:

Turkey: Balls 1366, Pozanti, Cilicia Taurus (K); Davis & Code D 37177, between Eskişehir and Sivrihisar (K).

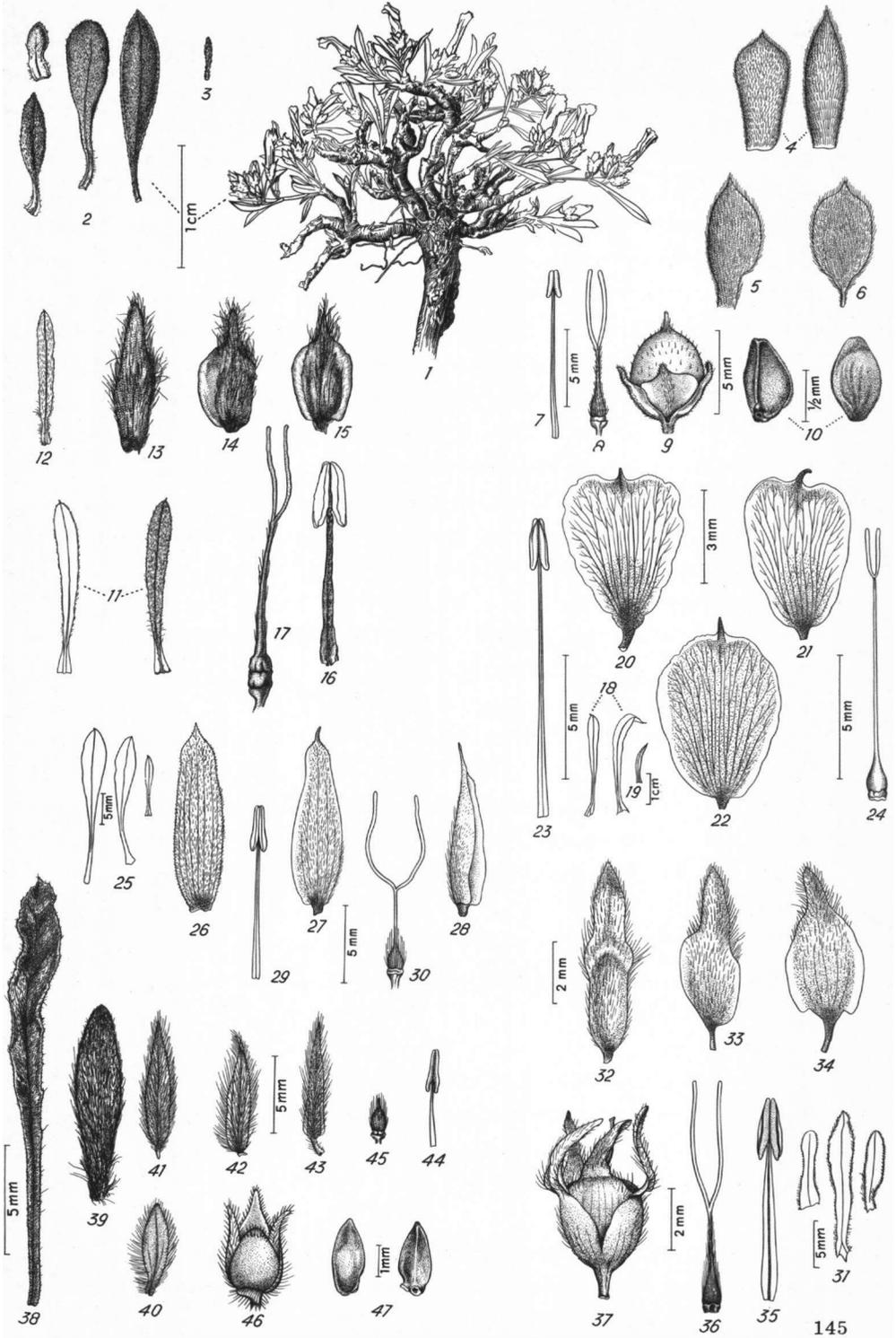
This species differs from *C. compactus* Boiss., *C. libanoticus* Boiss. and *C. pulvinatus* Sa'ad by its linear to linear-oblong leaves, which are only circ. 1.5 mm wide; from *C. compactus* it differs, moreover, by the conical shape of the ovary, the presence of a cupuliform disc at the base of the latter, and a style which is shorter than the stigmata, from *C. libanoticus* by the on both sides sericeous leaves, the 10-15 mm long, oblong and caudate, hirsute outer sepals and by the larger size of the flowers, and from *C. pulvinatus* by the absence of spreading hairs in the indumentum, by the oblong and caudate instead of oblong and acuminate outer sepals, and by the oblong and obtuse instead of sagittate and retuse anthers.

54. *C. libanoticus* Boiss., Diagn. Pl. Or. Nov. 1 (11): 82. 1849; Boiss., Fl. Or. IV: 97. 1875; Bouloum., Fl. Lib. Syr. text: 230. 1930; Dinsmore in Post, Fl. Syr. Pal. Sinai, ed. 2, II: 205. 1933.

Type: Boissier s. n., Les Cèdres, Lebanon, lectotype (G-Boiss.) seen. Plate IX. fig. 1-10.

A cushion-shaped herb. 3-7 cm high. Root ligneous. Shoots simple or slightly branched, appressed-pilose to pubescent. Leaves herbaceous, sessile, the lower ones oblong to linear, 13-22 (-50) mm long, 2-4 mm wide, i. e. 3.5 - 8 (-10) times as long as wide, acute, base broadly scarious and decurrent; cauline ones like the lower leaves but sometimes narrower; margin entire, glabrous above, pubescent beneath, uninervate. Shoots with a terminal dichasium consisting of two or three flowers, accompanied by similar axillary

Plate IX. fig. 1-10 *C. libanoticus*; 1: habit; 2: leaves; 3: bracteole; 4: different forms of outer sepal; 5: middle sepal; 6: inner sepal; 7: stamen; 8: pistil; 9: capsule; 10: seed [1-8: Zerny s.n. (W); 9,10: Kotschy 54 (W)]; fig. 11-17 *C. maziicum*; 11,12: leaves; 13: outer sepal; 14: middle sepal; 15: inner sepal; 16: stamen; 17: pistil [11-17: Sauvage 13602 (RAB)]; fig. 18-24: *C. orophilus*; 18: leaves; 19: bracteole; 20: outer sepal; 21: middle sepal; 22: inner sepal; 23: stamen; 24: pistil [18-24: Handel-Mazzetti; 2572 typus (W)]; fig. 25-30 *C. pulvinatus*; 25: leaves; 26: outer sepal; 27: middle sepal; 28: inner sepal; 29: stamen; 30: pistil [25-30: Scheibe 1075 typus (B)]; fig. 31-37 *C. radicosus*; 31: leaves; 32: outer sepal; 33: middle sepal; 34: inner sepal; 35: stamen; 36: pistil; 37: capsule [31-37: Heldreich 961 (STU)]; fig. 38-47: *C. asyrensis*; 38: leaf; 39: bract; 40: bracteoles; 41: outer sepal; 42: middle sepal; 43: inner sepal; 44: stamen; 45: ovary; 46: capsule; 47: seeds [38-47: collector unknown 102,148 typus (W)].



dichasia or by axillary flowers. Bracts like the leaves, longer than the short peduncle. Bracteoles linear, longer than the pedicel, but not exceeding the calyx. Sepals unequal, pubescent, 6 mm long; the outer ones obovate or oblanceolate, in the upper part green and in the lower part colourless, both parts convex, separated from each other by a constriction; the middle one with the right and the left half unequal, one half membranous; the inner ones square, acute, with a truncate base, membranous. Corolla flesh-coloured, 15 mm long, 2.5 times as long as the calyx, each segment with a hairy band on the outside, but the tube quite glabrous. Stamens unequal, the longest one 9 mm; filaments glabrous; anthers oblong, with retuse top. Ovary hairy, conical, at the base surrounded by a glabrous, cup-shaped disc; style hairy; stigmas filiform, twice as long as the style. Capsule hairy, subglobose, 5 mm long and wide, bilocular, and with 3-4 seeds; seeds brown-red, densely puberulous, 2 mm long, 1.25 - 1.75 mm wide. Fl. and Fr. Jun.-Jul.

On mountains, slopes and rocky plains, subalpine, alt. 1700-3000 m.

Distribution: Lebanon, Syria, Turkey.

Specimens seen:

Turkey; Davis 13514, Muğla (Mughla) Sandras Dag (E); Davis 13539, ibid. (E).

Syria: Kotschy 54, near Damascus (W).

Lebanon: Bornmüller 12134, Les Cèdres (B).

The paratype Aucher-Eloy 1399, Les Cèdres, is not represented in (G-Boiss.).

55. C. mazicum Emberger & Maire, Morocc. Nov. (Arch. Sc. Moroc.) 2:7. 1929; Sauv. et Vindt, Fl. Moroc. II: 38. 1954.

C. cantabricus L. ssp. *mazicum* (Emberg), Maire, Cat. Pl. Moroc. III: 588. 1934.

C. mazicum Emberg. et Maire var. *mazicum* Sauv. et Vindt, op. c. p. 39.

Type: Maire s.n., J. Guebb-er-Rahal, Moyen Atlas, NE Morocco, lectotype (AL), not seen.

Isotypes (MPU, P).

C. mazicum Emb. et Maire var. *atlantis* (Emberg.) Sauv. et Vindt l. c.;

C. cantabricus L. ssp. *atlantis* Emberger, Contr.: 625 in Bull. Soc. Sci. Nat. Moroc., XV: 214. 1935 (nom. non valid., nam sine descr. Lat.).

Plate IX. fig. 11-17.

A 3-13 cm high suffrutescent cushion-plant. Root ligneous. The younger shoots herbaceous, slender, sericeous with an admixture of spreading hairs.

Leaves firmly herbaceous, sessile, linear-oblongate to linear, 20-30 mm long, ca. 4 mm wide, 5-6 times as long as wide, acute or subacute, base broadly scarious and attenuate, margin entire, glabrous above, densely hairy beneath, uninervate. Flowers solitary or in pairs, terminal or axillary; peduncle shorter than the subtending bract. Bracts like the leaves. Bracteoles linear-oblongate, longer than the pedicel, but not exceeding the calyx. Pedicel as long as the calyx. Sepals unequal, hirtellous, the lower part convex and colourless, the upper part flat and green; the outer ones oblong to linear-oblong, gradually attenuate towards the acuminate top, 10-12 mm long, ca 3 mm wide; the middle one with the right and the left half unequal, one half glabrous and membranous; the inner ones broadly oblong, caudate, auriculate at the base, 7-9 mm long, with both halves broad and membranous. Corolla pink or, rarely, white, 16 mm long, ca 1.5 times as long as the calyx, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Anthers oblong, sagitate, with retuse top. Ovary broadly ovoid, velutinous and with a fleshy cup-shaped disc at the base; style hairy, 1.5 times as long as the filiform stigmas. Capsule not seen. Fl. May-July.

On mountains, in crevices, on lime-stone rocks, 2100-3000 m alt.

Distribution: known from Morocco only.

Specimens seen:

Morocco; Sauvage 16896, Bou-Halla ¹⁾ (RAB); Balls B. 3086, Djebel Ghat (RAB); Sauvage 2422, Moyen Atlas (LISE); Guinet, Sauvage et Vilmorin 215, J. Bou-Iblane ¹⁾, Moyen Atlas (RAB); Guinet, Sauvage et Vilmorin 846, Ayāchi, Dj. Maskar (RAB).

56. C. orophilus Sa'ad nov. spec.

Plate IX. fig. 18-24.

Herba pulvinata. Radix perpendicularis 12 mm diam., ligneus. Caules veteriores lignei, radicibus adventitiis instructi et valde ramosi; juniores simplices, graciles, 13 cm longi, appresse pubescentes. Folia sessilia, firme herbacea, utrimque sericea; radicalia lineari-oblongata, 30-35 mm longa et circ. 6 mm lata, apice acuta vel acuminata, basin versus attenuata, parte basali dilatata et scariosa; caulina foliis radicalibus similiora, minora tamen, in parte inferiore caulis longe distantia. Flores solitarii in axillis bractearum

* 1) Locality from the label.

ad apicem caulis. Pedunculus brevis vel nullus. Bractee foliis caulinis similiores, minores tamen. Bracteolae parvae, conduplicatae. Pedicellus bracteolis aequilongus vel eis brevior. Sepala inaequalia, omnia tamen scariosa, apice appresse puberula et nervis prominulis instructa; sepala exteriora oblanceolata, 6 mm longa, mucronulata; medianum cum dimidio dextro a dimidio sinistro diverso; interiora obovata, apice retusa et mucronulata. Corolla colore ignoto, 20 mm longa, distincte quinque-lobata, lobis margine undulato, segmentorum quinque unoquoque virga mediana extus in parte superiore pilosa instructo. Stamina inaequilonga; filamenta glabra; antherae oblongae, apice obtusae. Ovarium conicum, glabrum vel apice parce puberulum, basi disco circumdatum; stylus crassus, ter vel quater longior quam stigmata filiformia. Capsula ovoidae, 8 mm alta et 5 mm diam., glabra vel apice parce pubescens, e calyce persistente protrudens. Florens et fructiferens mensi Julio.

Typus: Handel-Mazzetti 2572, in monte Hasarbaba Dagħ prope lacum Goldschik in Tauro Armeniaco (Kurdistania occidentali) ad alt. 2100 m (W, sub nomine *C. cataonicus* Boiss. et Hausskn.).

Distribution: Turkey.

Specimens seen:

Turkey: Davis and Polunin 23, 282, Bitlis; Tatvan (BM, K),

This species comes nearest to *C. anatolicus* Sa'ad, *C. libanoticus* Boiss. and *C. cataonicus* Boiss. For the differences between this species and *C. anatolicus* see the note attached to the description of the latter. From *C. libanoticus* it differs by its longer, appressed pubescent shoots, its longer leaves which are gradually narrowed towards the base, the scarios, distinctly nervate sepals, which, moreover, bear a few appressed hairs at the top and of which the outer ones are mucronulate, by the larger size of the corolla, by the entirely or almost entirely glabrous ovary and by the ovoid capsule, and from *C. cataonicus* by the on both sides sericeous leaves, the scarios, shortly mucronulate sepals, which, moreover, are provided at the top with a few appressed hairs, and by the relative length of calyx and corolla, the corolla being three times as long as the calyx.

57. *C. pulvinatus* Sa'ad nov. spec.

Plate IX. fig. 25-30.

Herba dense pulvinata, circ. 6 cm alta, sericea, sed praeter pilos

appressos etiam pili patentes adsunt. Radix perpendicularis 7 mm diam., ligneus. Caules e basi lignea emergentes, ceterum herbacei; veteriores tamen lignei, ramificati. Folia omnia sessilia, herbacea, oblanceolata vel lineari-oblanceolata, 12-20 mm longa et 3-4 mm lata, apice acuta vel subacuta, basin dilatam et scariosam versus attenuata, uninervia. Flores solitarii in axillis, pedunculo quam bractea brevior instructi, ad apicem caulis congesti. Bracteae foliis sterilibus similiores. Bracteolae bracteis similiores, minores tamen. Pedicellus nullus. Sepala inaequalia, omnia 11 mm longa, sericea sed dimidio superiore etiam pilis patentibus instructa; exteriora oblonga et acuminata, apicem versus viridia; medianum cum dimidio dextro a dimidio sinistro diverso, dimidio altero glabro et membranaceo; interiora convexa, lanceolata, tota glabra et membranacea. Corolla colore ignoto, 1.5 cm longa, segmentorum quinque unoquoque virga mediana extus in parte superiore pilosa instructa. Stamina inaequilonga, longissimo 11 mm longo; filamenta glabra; antherae sigittatae, apice retusae. Ovarium velutinum, basi disco cupuliformi glabro circumdatum; stylus filiformis, glaber; stigmata etiam filiformia, stylo dimidia parte longiora. Capsula nondum visa. Florens mensi Junio. Typus: Scheibe 1075, Eskisehir (Eskizekir) in Asia Minore (B, sub nomine *C. compactus* Boiss.).

Distribution: known from Turkey only.

This species differs from *C. boissieri* Steud. by the uninervate leaves and the sericeous indumentum, and from *C. konyacus* Sa'ad by the somewhat wider leaves, by the oblong and acuminate instead of oblanceolate cuspidate outer sepals and by the smaller size of the corolla.

58. *C. radicosus* Heldr. et Sart. in Boiss., *Diagn. Pl. Or. Nov.* 2 (3): 124. 1856; Boiss., *Fl. Or. IV*: 99. 1875; Halac., *Consp. Fl. Graec.* II: 305. 1902.

Type: Heldreich s. n., M. Killini Orós (Keyllenes), Greece, June 1848, holotype (B ?), not seen.

Neotype: Heldreich 961, 21 June 1887 (B) seen (collected on type locality).

Isotypes (C, CAIM, E, G, JE, HAL, STU, W).

Plate IX. fig. 31-37.

A cushion-shaped plant. Root ligneous. The young shoots (rarely present) herbaceous, sericeous, only 3-6 cm high. Leaves herbaceous, caespitose, sessile, oblanceolate, 10-15 mm long, 2-3 mm wide, 5 times as long as wide,

obtuse or acute, contracted towards the dilated scarious base, margin entire, glabrous above, sericeous beneath, uninervate. Shoots with a single terminal flower and sometimes in addition with several sessile axillary flowers congested at the top. Bracts like the leaves. Bracteoles also leaflike but smaller, in the congested flowers situated on the same side of the pedicel because there is no place for their development in the normal position. Pedicel short, shorter than the calyx. Sepals unequal, sericeous; the outer ones 6 mm long, oblong, gradually attenuate towards the acute top, with a green upper part and a colourless convex lower one, and between the two a concave part; the middle one with the right and the left half unequal, one half membranous; the inner ones 5 mm long, suborbicular and caudate, with both halves membranous. Corolla blush-red, 12 mm long, twice as long as the calyx. with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the longest one 7 mm; filaments glabrous; anthers oblong and retuse at the top. Ovary hairy, ovoid, with a glabrous cup-shaped disc at the base; style hairy; stigmas filiform, twice as long as the style. Capsule hairy, obovoid, 3 mm long and wide; seeds unripe. Fl. Fr. June.

On mountains, on compact clay soil, in dry pastures, alt. 1660-1800 m.

Distribution: known from Greece only.

Specimens seen:

Hausknecht s.n., M. Kilini Orós (Kyllene) (JE).

Subsectio 9. Pannosi Boiss.

Flowers in large numbers in axillary capitula, rarely solitary or but a few together, shoots rather stout; indumentum usually tomentose to woolly, rarely villous.

59. C. asyrensis Kotschy in Sitzung. Mat. Nat. Wien. Acad. Wiss. 52 (1): 260. 1866.

Type: collector unknown, 102.148, in Mts 'Asīr, Arabia, lectotype (W) seen. Plate IX. fig. 38-47.

A 9 cm perennial herb, with a ligneous base, branched. The branches with congested leaves. Root ligneous. Shoots herbaceous, tomentellous with spreading hairs. Leaves herbaceous, sessile, linear-oblancoolate or spatulate, 10-12 mm long, 2-4 mm wide, 2.5-6 times as long as wide, subacute or obtuse, gradually attenuate to a narrow base, margin undulate. Flowers sessile in a compact axillary cincinnus borne by a peduncle shorter than the subtending bract.

Bracts leafy, sessile, linear-oblongate, ca 10 mm long, ca 2.5 mm wide, 2.5-6 times as long as wide, acute, gradually attenuate to a narrow base. Bracteoles elliptical, acute, shorter than the calyx. Sepals unequal, hirsute; the outer ones oblong, acuminate, 7 mm long, 2 mm wide; the middle one with the right and the left half slightly unequal; the inner ones linear-oblongate, acuminate, 6 mm long, 1 mm wide, with both halves membranous. Corolla of unknown colour, 12 mm long, twice as long as the calyx, with hairy bands on the outside, but the tube quite glabrous. Stamens unequal, the longest one 7 mm; filaments glabrous; anthers sagitate, with retuse top. Ovary ovoid, hairy, with a glabrous cupshaped disc at the base; style and stigmas not seen. Capsule ovoid, hairy in the upper part, 4 mm long, 3 mm wide; seeds reddish brown, puberulous, 3mm long, 1 mm wide. Fl. March-May, Fr. time not known.

In mountains.

Distribution: Arabia.

Specimens seen: Khodeir 107, Riyādh, Arabia (CAI).

60. C. buschiricus Bornm. in Kōie, Beitr. Fl. Südwest-Irans I, Dan. Sci. Invest. Iran, 4:35.1945; Rechinger f., Fl. Iran (Conv.): 15.1963; Rechinger f., Fl. Iraq: 486.1964.

Type: Kōie 272, Būshehr (Bushire), Iran, holotype (C) (not seen).

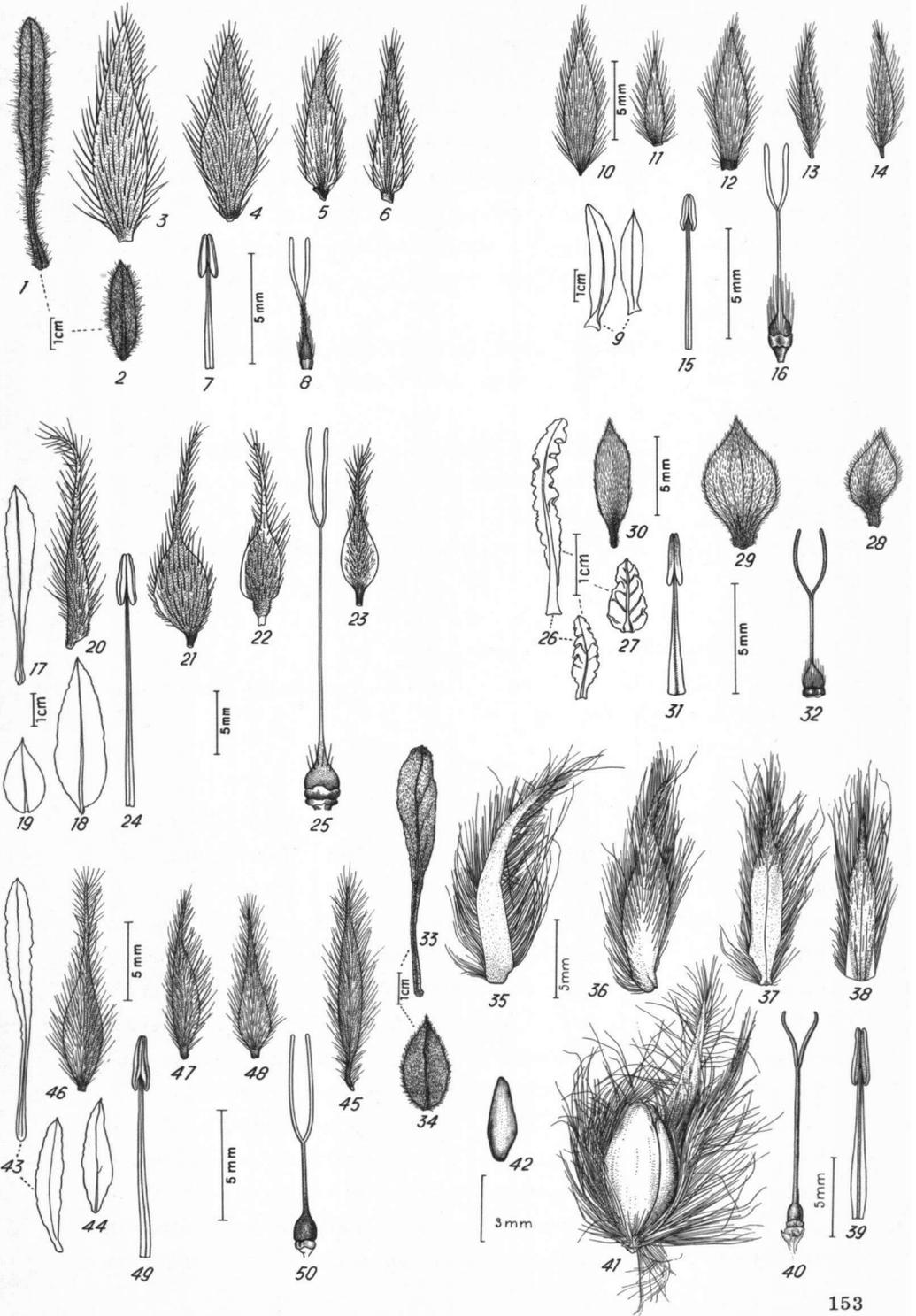
Isotypes (B).

Icon.: Kōie op. c.: 36.

Plate X. fig. 1-8.

A 11-26 cm high herb, strongly branched from the base. Root ligneous. Shoots simple, firmly herbaceous, tomentose with spreading hairs, the latter as long as the diameter of the shoot. Leaves firmly herbaceous, sessile; the radical ones linear-oblongate to linear, (20-) 30-40 mm long, 5-8 mm wide, 4-7 times as long as wide, base gradually attenuate; the cauline ones like the radical ones but smaller in size and with a cuneate base, top acute to subacute, margin entire or undulate, tomentellous with spreading hairs, rugose with \pm prominent nerves. Flowers axillary on peduncles which are as long as or longer or shorter than the subtending bract. Bracts like the stem leaves but smaller. Bracteoles lanceolate, acuminate, not exceeding the calyx. Pedicel wanting. Flowers in compact scorpioid cymes. Sepals unequal, covered with

Plate X. fig. 1-8 *C. buschiricus*; 1,2: leaves; 3: bracteole; 4: outer sepal; 5: middle sepal; 6: inner sepal; 7: stamen; 8: pistil [1,2: Rechinger 8803 (W); 3-8: Kjöie 272 (B)]; fig. 9-16 *C. cateniflorus*; 9: leaves; 10: bract; 11: bracteole; 12: outer sepal; 13: middle sepal; 14: inner sepal; 15: stamen; 16: pistil [9-16: Rechinger 9639 *typus* (W)]; fig. 17-25 *C. cephalophorus*; 17: leaf; 18,19: bracts; 20: bracteole; 21: outer sepal; 22: middle sepal; 23: inner sepal; 24: stamen; 25: pistil [17: Kotschy 138 (W) 18-25: Stutz 906 (W)]; fig. 26-32 *C. cephalopodus*; 26: leaves; 27: bract; 28: bracteole; 29: outer sepal; 30: inner sepal; 31: stamen; 32: pistil; [26,27: Rechinger 3448a (W); 28-32: Rechinger 3448b (W)]; fig. 33-42 *C. euphraticus*; 33: leaf; 34: bract; 35: bracteole; 36: outer sepal; 37: middle sepal; 38: inner sepal; 39: stamen; 40: pistil; 41: capsule; 42: seed; [33-42: Rechinger 9959 (W)]; fig. 43-50 *C. gonocladus*; 43,44: leaves; 45: bracteole; 46: outer sepal; 47: middle sepal; 48: inner sepal; 49: stamen; 50: pistil [43,44: Haussknecht s.n. (W); 45-50: Kotschy 207 (W)].



long sericeous hairs; the outer ones flat, lanceolate and acuminate, with the upper part green; the three inner ones smaller, oblong acuminate, at the base truncate with a narrow membranous rim. Corolla pink, 15-18 mm long, ca. 1.8 times as long as the calyx, the segments with a hairy band on the outside, but the tube quite glabrous. Stamens unequal; the longest one half as long as the corolla; filaments glabrous; anthers oblong, retuse at the top. Ovary ovoid, hairy, at the base surrounded by a glabrous, membranous, cupshaped disc; style stout, hairy; stigmas filiform, twice as long as the style. Capsule not seen. Fl. March-Apr.

In heavy sand, on neutral soil, from sea level to 120 m alt.

Distribution: Iraq, Kuwait, Iran, Saudi Arabia.

Specimens seen:

Iraq: Rechinger 8803, 110 km. SW Basra (W); Rechinger 8812, 105 km SW Basra (W); Guest, Rawi and Rechinger 17242 N. Ghazlani 105 km SW Basra (K).

Kuwait: Dickson 748, 9 miles west of Kuwait (W).

Saudi Arabia: Halm H/108158, 50 km Radius of Dahahran, coastal area of Al-Hasa (K).

61. C. cateniflorus (Rech. f.) Sa'ad stat. nov.

Basionym: *C. oxyphyllus* Boiss. *cateniflorus* Rech. f. in Anz. Math.-Natur Kl. Oesterr. Akad. Wiss.: 23. 1961.

Plate X. fig. 9-16.

Planta suffruticosa, 26-60 cm alta, lanata; pars basalis ramificata, sublignea. Radix perpendicularis lignea, 5 mm diam. Caules rigidi, 2 mm diam., simplices vel ramificati. Folia sessilia, chartacea; folia radicalia lineari-oblancoolata, circ. 15 mm longa et 4 mm lata, acuta; folia caulina oblonga, 17-25 mm longa et 7-9 mm lata, apice spinescentia. Flores sessiles, 3-5 in cymam scorpioideam, in bracteae axilla sessilem congesti; cymae ad apicem caulis et eius ramorum aggregatae. Bracteae cymas suffulcientes foliis caulinis similiores sed minores; bracteae cymae ramificationes suffulcientes lanceolatae et acutae. Bracteolae oblancoolatae, 8 mm longae, acuminatae, sericeae. Sepala inaequalia, omnia tamen acuminatae et longe sericea; sepala exteriora oblancoolata, 8 mm longa; medianum cum dimidio dextro a dimidio sinistro diverso; interiora lanceolata, 6 mm longa. Corolla alba, 12-15 mm longa, segmentorum quinque unoquoque virga mediana extus in parte superiore pilosa instructo. Stamina inaequilonga, longissimo 8 mm

longo; filamenta glabra. antherae oblongae, apice retusae. Ovarium ovoideum, velutinum, basi disco cupuliformi glabro circumdatum; stylus filiformis, pilosus, stigmatibus etiam filiformibus aequilongus. Capsula nondum visa. Florens mensibus Maio et Junio.

Typus: Rechinger 9639, ad flumen Diyala prope Mandali, Mesopotamia (W).

This is also the type of *C. oxyphyllus* Boiss. ssp. *cateniflorus* Rech. f.

Distribution: Iraq and Iran.

Other specimens seen: Koelz 15461, Gaomis (locality given on the label), Bakhtiari, Iran (W).

This species differs from *C. oxyphyllus* Boiss. by its woolly indumentum, by the fact that the shoots and their branches do not go out in a rigid or spiny tip, by the larger size of the leaves, by the length of the bracteoles which is the same as that of the sepals, and by the oblanceolate and acuminate outer sepals.

62. *C. cephalophorus* Boiss., *Diagn. Pl. Or. Nov.* 1 (7): 22. 1846; Boiss., *Fl. Or. IV*: 102. 1875; Rech. f., *Fl. Iran (Conv.)*: 17. 1963.

Type: Kotschy 138, near Dālākī, Iran, holotype (G-Boiss.) seen.

Isotypes (C, E, GOET, L, W, P).

Plate X. fig. 17-25.

A 14-30 cm high, very densely tomentellous herb, branched at the ligneous base and densely leafy. Shoots rigid, simple or, rarely, branched. Leaves chartaceous, sessile; the radical ones linear-spathulate to linear, 25-44 mm long, 4-8 mm wide, 5.5-7 times as long as wide, base attenuate; cauline ones lanceolate or narrowly elliptical, 25-70 mm long, 8-15 mm wide, ca 3-4.4 times as long as wide, base cuneate, top acute, margin entire, densely tomentellous, reticulate. Inflorescence a dense scorpioid cyme, consisting of up to 4 flowers; the cymes inserted in the axils of the leaves on the upper half of the shoot. Bracts longer than the lower peduncles, ovate or suborbicular, up to 30 mm long and 18 mm wide, i. e. 1.2-1.6 times as long as wide, acute and mucronulate. Bracteoles linear, acuminate, tomentellous to long sericeous. Pedicel wanting. Sepals unequal, tomentellous to long sericeous; the outer ones lanceolate, long aristate, 16 mm long, 4 mm wide; the middle one with unequal right and left halves, one half membranous and glabrous; the inner ones convex, lanceolate cuspidate, with

both halves glabrous, membranous, 9 mm long, 3.5 mm wide. Corolla softly pink, the segments with a sericeous hairy band on the outside, 18 mm long, 1.2 times as long as the calyx. Stamens subequal; the longest one 11 mm; filaments glabrous; anthers oblong, retuse at the top. Ovary glabrous, ovoid, surrounded at the base by a fleshy cup-shaped disc with 5 lobes; style glabrous, twice as long as the filiform stigmas. Capsule not seen. Fl. March-May.

In the mountains, alt. 700 m.

Distribution: endemic in Iran.

Specimens seen:

Iran: Haussknecht s.n., between Kāzerūn (Kumaredj or Kamaridj) & Dālākī (JE, W); Stutz 906, Borāzjān (Borojan), (W).

63. C. cephalopodus Boiss., Diagn. Pl.Or.Nov. 1 (7): 24. 1846.

Type: Aucher-Eloy 4949, Makran, Iran, holotype (G-Boiss.) seen.

Isotype (W).

C. sericeus Burm. Fl.Ind.: 47.t.19.f.3.1768, non L.1767; Boiss., Fl.Or. IV: 101.1875; Rechinger f., Fl.Iran (Conv.): 17.1963.

Type: Garzin herb. s.n., Persia, holotype (G) seen. The illustrations and description give the flowers wrongly as solitary.

C. beluchistanensis Biswas in Journ.Bot. Lond. 75: 259. 1937.

Type: Biswas 30, Pasni, Pakistan, holotype (CAL), not seen.

Isotype (K).

C. undulifolius Parsa, Kew, Bull.: 214, 1948.

Type: Parsa 564, Bandar'Abbās, Iran (K), holotype or isotype, seen.

var. *secundus* Parsa l.c.

Type: Parsa 565, Charbar ¹⁾, S.Iran (K) seen? Holotype or isotype.

Plate X. fig. 26-32.

A 14-23 cm high herb, with branched, ligneous base. Root ligneous, ca 4 mm in diameter. Shoots simple, rigid, tomentellous but the short hairs mixed with long spreading ones. Leaves firmly herbaceous, sessile, the radical ones oblong, 10-20 mm long, ca 4 mm wide, 2.5-5 times as long as

* 1) Locality from orig. description

wide, obtuse, base attenuate, cauline ones elliptic, 10-15 mm long, 5-6 mm wide, 2-2.5 times as long as wide, apex recurved, acute, margin plicate-undulate, tomentose, pinnately nerved. Flowers 3-6, in a compact axillary scorpioid cyme. Peduncle as long as the bract. Bracts broadly ovate, ca 10 mm long, ca 7 mm wide. Bracteoles ovate, acute, 7 mm long, 4 mm wide. Sepals unequal, tomentose but also with spreading hairs; the outer ones leafy, greenish, obovate, acute, 7-8 mm long, 4-6 mm wide; the three other ones oblong, acute or acuminate, smaller than the outer ones. Corolla white, 15 mm long, twice as long as the calyx, with hairy bands on the outside, but the tube quite glabrous. Stamens unequal, the longest one 8 mm; filaments glabrous; anthers oblong, with retuse top. Ovary subglobular, hairy at the top, with a fleshy cupshaped disc at the base; style stout, glabrous; stigmas filiform, 1.5 times as long as the style. Capsule ovoid, hairy from the top, 4 mm long, 3 mm wide, bilocular, 4-seeded; seeds black, 2.5 mm long, 1.5 mm wide, covered with stout and short, light-coloured hairs. Fl. Feb. - Apr. Fr. Apr.

In deserts.

Distribution: Iran, Pakistan (the type of *C. beluchistanensis* Biswas).

Specimens seen:

Iran: Rechinger 3448 a, between Genū (Ginau) and Bandar 'Abbās (W); Rechinger 34486 ibid. (W); Sharif 827 E, Chāh Bāhār (Cahabahar), (W), Behboudi 550 (E), Jāsk, Iran (W).

64. *C. euphraticus* Bornm., Beih.Bot. Central. 22 (2): 181. 1906; Rech. f., Fl. Lowl. Iraq: 485. 1964.

Type: Strauss s.n. between Anah & Deir ez Zōr (Deir) Syria-Iraq (herb. not known).

Plate X. fig. 33-42.

A fruticose plant, 20-35 cm high, densely hirsute, tomentose with spreading up to 5 mm long hairs; base ligneous and branched. Root ligneous. Shoots simple or slightly branched, stout, 3-5 mm in diameter. Leaves firmly herbaceous, sessile, linear-oblongate, 42-70 mm long, 6-11 mm wide i.e. 6-7 times as long as wide, obtuse to subacute, base decurrent, margin entire, indumentum tomentose with long spreading hairs. Flowers numerous in axillary up to 4 cm long cincinnus spread along the whole length of the shoot.

Bracts foliaceous, as long as or longer than the peduncle; the lower ones elliptical to lanceolate, the upper ones mostly ovate. Bracteoles linear, acuminate, shorter than the calyx. Sepals unequal; the outer ones lanceolate, acuminate, with a green upper part, 9 mm long, 3 mm wide; the middle ones with slightly unequal halves, one half membranous; the inner ones lanceolate, acuminate, with the two halves narrowly membranous. Corolla pink, 22 mm long, 2.5 times as long as the calyx; the segments with a hairy band on the outside, but the tube quite glabrous. Stamens unequal; filaments glabrous; anthers oblong-sagittate, retuse at the top. Ovary glabrous, conical, at the base surrounded by a cupshaped disc; style glabrous, filiform, 1.5 times as long as the filiform stigmas. Capsule glabrous, ovoid, 5 mm long, 3 mm wide, bilocular and 4-seeded; seeds glabrous, reddish-brown, narrowly ovoid, 4 mm long, 1.5 mm wide. Fl. & Fr. June.

In deserts.

Distribution: Iraq, Syria?

Specimens seen:

Iraq: Rechinger 9797, between Rutbah & Ar Ramādī (W); Rechinger 9859 ibid. (W); Rechinger 9959 ibid. (W).

65. C. gonocladus Boiss., Diagn. Pl. Or. Nov. 1 (7): 22. 1846; Rech. f., Fl. Iran (Conv.): 16. 1963.

C. haussknechtii Boiss., Fl. Or. IV: 102. 1875, p. p. quoad pl. persicam.

C. gonocladus Boiss. ssp. *gonocladus*, Symb. Afghan. 4. in Biol. Skr. Dan. Vid. Selsk. 10(3): 80. 1958.

Type: Kotschy 207, Iran, Dālakī (G-Boiss.) seen.

Isotype (W).

Plate X. fig. 43-50.

A 18-40 cm high herb, ligneous, branched at the base, densely leafy. Shoots simple, firmly herbaceous and covered with long soft hairs, 2-2.5 mm in diameter. Leaves thinly herbaceous, sessile; the radical ones oblong, 25-45 mm long, 5-8 mm wide, 5 times as long as wide, acute, attenuate at base; the cauline ones linear to elliptical, 30-40 mm long, 4-10 mm wide, 5-6 times as long as wide, acute, base cuneate, margin entire, tomentellous with spreading hairs, pinnately nerved. Inflorescence a congested scorpioid cyme, the cymes inserted on the upper half of the shoots, shortly pedunculate. Bracts longer than

the peduncle, spatulate, acute; the lower ones 30 mm long, 8 mm wide; i. e. 3.5 times as long as wide. Bracteoles linear, acuminate, 12 mm long, 2 mm wide, hirtellous. Pedicel wanting, but bracteoles hardly exceeding the calyx. Sepals unequal, with long sericeous hairs; the outer ones lanceolate, 11 mm long, 3.5 mm wide, long acuminate; the middle one with the right and left half unequal, one half hairy, membranous; the inner ones lanceolate, 9 mm long, 3 mm wide, long acuminate, with both halves hairy and membranous. Corolla pink, 2.2 mm long; each segment with a hairy band on the outside, but the tube quite glabrous. Stamens unequal, the longest one 10 mm; filaments glabrous; anthers oblong retuse above. Ovary glabrous, broadly ovoid, at the base surrounded by a cupshaped disc; style glabrous, filiform; stigmas filiform, as long as the style. Capsule not seen. Fl. March-June.

In sunny hills.

Distribution: Iran.

Specimens seen:

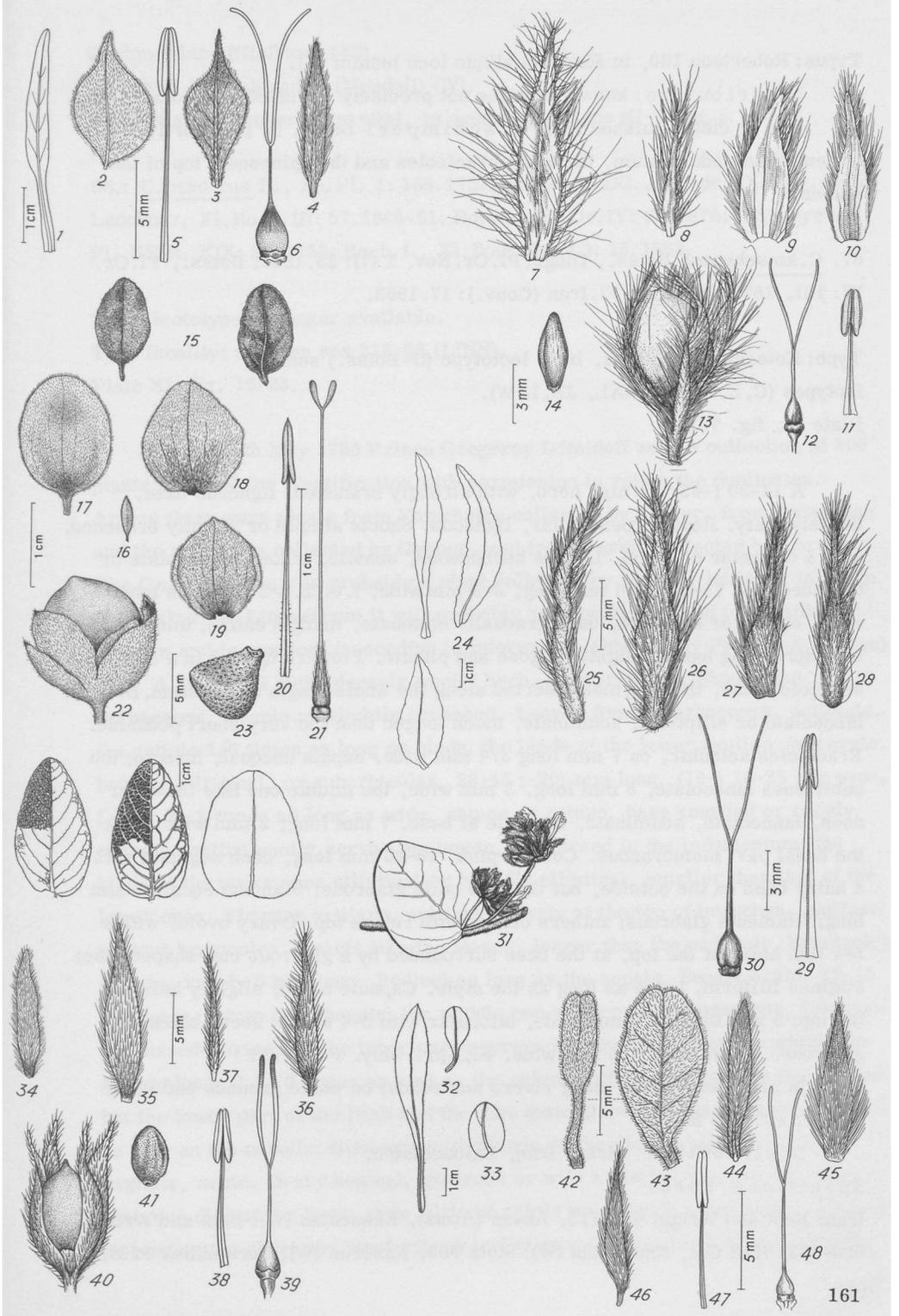
Iran: Haussknecht s.n. between Kāzerūn & Dālākī (W); Stapf 372, Shīrāz (W).

66. *C. jordanensis* Sa'ad nov. spec.

Plate XI. fig. 1-6.

Planta caulibus fastigiatis instructa; pars subterranea nondum nota. Caules subflexuosi, minute tomentilli. Folia sessilia, linearia, 30-40 mm longa et 3-4 mm lata, chartacea, apice acuta et spinescente, basi decolori dilatata et amplexicauli, margine integro, tomentella, costa subtus conspicua, nervis lateralibus impressis et sub indumento absconditis. Flores in cymas helicoideas densas praeter caulem totum dispositas aggregati. Bractee sessiles, lineari-lanceolatae, 5-20 mm longae et 1-4 mm latae, ceterum ut folia sterilia. Pedunculus bractee suffulcianti aequilongus vel ea longior. Bracteolae foliaceae, sessiles, ovatae, circ. 5 mm longae et 3 mm latae, acuminatae et apice spinescente instructae, margine, indumento et nervatura eis foliorum sterilium et bractearum similibus. Sepala inaequalia, exteriora elliptica, 7 mm longa, acuminata, tomentella, tria alia filiformia. Corolla colore ignoto, 20 mm longa, segmentorum quinque unoquoque virga mediana, in parte superiore pilosa instructo. Stamina inaequilonga; filomenta glabra; antherae oblongae, apice retusae. Ovarium ovoideum glabrum, basi disco cupuliformi humili circumdatum; stylus glaber; stigmata glabra, stylo bis longiora. Capsula nondum visa. Florens in verno tempore.

Plate XI. fig. 1-6 *C. jordanensis*; 1: leaf; 2: bracteole; 3: outer sepal; 4: inner sepal; 5: stamen; 6: pistil [1-6: Robertson 120 typus (K)]; fig. 7-14 *C. kotschyanus*; 7: leaf; 8: bracteole; 9: outer sepal; 10: inner sepal; 11: stamen; 12: pistil; 13: capsule; 14: seed [7-14: Bent et Wright 503-103: (W)]; fig. 15-23 *C. persicus*; 15: leaves; 16: bracteole; 17: outer sepal; 18: middle sepal; 19: inner sepal; 20: stamen; 21: pistil; 22: capsule; 23: seed [15: Dubiansky s.n. (W); 16-21: Aznavour s.n. (W); 22,23: Szovitz s.n. (W)]; fig. 24-30 *C. pyrrhotrichus*; 24: leaves; 25: bracteole; 26: outer sepal; 27: middle sepal; 28: inner sepal; 29: stamen; 30: pistil [24-30: Gilli 3087 (W)]; fig. 31-41 *C. reticulatus* var. *reticulatus*; 31: a part of a branch showing the axillary buds; 32, 33: leaves; 34: bracteole; 35: outer sepal; 36: middle sepal; 37: inner sepal; 38: stamen; 39: pistil; 40: capsule; 41: seed [32,33,40,41: Handel Mazzetti 2975 (W); 34-39: Davis 22109 (E)]; fig. 42-48 *C. Schimperi*; 42, 43: leaves; 44: bracteole; 45: outer sepal; 46: inner sepal; 47: stamen; 48: pistil [42-48: Bornmüller 10896 (B)].



Typus: Robertson 120, in Jordania aliquo loco lectum (K).

Distribution: known from the not precisely indicated type locality only.

Can be distinguished from *C. schimperi* Boiss. by the shortly tomentellous indumentum, the ovate bracteoles and the spinescent top of the leaves.

67. *C. kotschyanus* Boiss., *Diagn. Pl. Or. Nov.* 1 (7): 23. 1846; Boiss., *Fl. Or.* IV: 101. 1875; *Rech. f., Fl. Iran (Conv.)*: 17. 1963.

Type: Kotschy 357, Shīrāz, Iran; lectotype (G-Boiss.) seen.

Isotypes (C, E, GOET, HAL, JE, L, W).

Plate XI. fig. 7-14.

A 14-30 (-45) cm high herb, with strongly branched, ligneous base, densely leafy. Root perpendicular, ligneous. Shoots simple or slightly branched, with a diameter of 2 mm. Leaves herbaceous, sessile, oblong, lanceolate or oblanceolate, 15-30 (-50) mm long, 3-9 mm wide, i. e. 2.5-5 times as long as wide, obtuse or subacute, base gradually attenuate, margin entire, tomentellous with spreading hairs, slightly rugose and plicate. Flowers up to 3 in a compact scorpioid cyme, these cymes inserted along the whole length of the stem. Bracts lanceolate or elliptical, acuminate, much longer than the very short peduncle. Bracteoles acicular, ca 7 mm long 3/4 mm wide. Sepals unequal, hirsute; the outer ones lanceolate, 8 mm long, 3 mm wide, the middle one like the inner ones, lanceolate, acuminate, truncate at base, 7 mm long, 2 mm wide, with the basal part membranous. Corolla pink, 15-20 mm long, each segment with a hairy band on the outside, but the tube quite glabrous. Stamens equal, 7 mm long; filaments glabrous; anthers oblong with retuse top. Ovary ovoid, with a few thin hairs at the top, at the base surrounded by a glabrous cup-shaped disc; stigmas filiform, twice as long as the style. Capsule ovoid, slightly hairy at the top; 5 mm long, 3.5 mm wide, bilocular with 3-4 seeds; seeds black, glabrous, 4 mm long, 1.5 mm wide. Fl. Apr.-May. Fr. May.

In arid sandy hills; along rivers and roads; on waste grounds and in the steppe; alt. 700 m.

Distribution : Iran, Iraq, Balouchistan.

Specimens seen:

Iran: Bent and Wright 428-112, Ahvāz (Awaz), Khuzestan (W); Bent and Wright 503-103, Haft Gel, Khuzestan (W); Stutz 900, Kāzerūn (W); Bornmüller 1256,

Qeshm island (Kisihum) (JE).

Iraq: Noë 1177, Mandali (Mendeli) (W).

Balouchistan: Aucher-Eloy 4944, in desert, paratype (G-Boiss.).

68.: C. persicus L., Sp.Pl. 1: 158.1753; Choisy in DC., Prodr. IX: 399.1845; Ledebour, Fl. Ross. III: 87.1846-51; Boiss., Fl. Or. IV: 99.1875; Grigoryev, Fl. USSR. XIX: 27.1953; Rech. f., Fl. Iran (Conv.): 15.1963.

Type: lectotype no longer available.

Type locality: Caspian sea 218. 53 (LINN).

Plate XI. fig. 15-23.

On the 15th May 1750 Prince Gregory D midoff send a collection of 800 plants to Linn  for identification with permission to retain the duplicates. Among them were plants from Kamchatka collected by Steller, from Astrakhan and the river Don collected by Gerber, and from Persia collected by Lerche. The *Convolvulus* is probably a plant collected by Lerche, but as it is not in the Herbarium Linnaeanum it will probably have been returned to D midoff at Moscow and is now lost (according to information obtained by Prof. F. A. Stafleu).

A 15-45 cm high, densely woolly herb. Root ligneous, Shoot stout, herbaceous, simple or slightly branched. Leaves firmly herbaceous, petiolate, the petiole 1/6 times as long as blade; the blade of the lower cauline ones ovate, broadly elliptical, or suborbicular, 28-45 (-20) mm long, (10-) 18-25 mm wide, i. e. 1.2-2 times as long as wide, obtuse or retuse, base rounded or rarely, cuneate, entire woolly, nervation pinnate, immersed in the indumentum; the blade of the upper ones elliptical or broadly elliptical, smaller than that of the lower ones. Flowers axillary, solitary, rarely at the top of branches, and then without bracteoles. Bracts like the leaves, longer than the peduncle. Bracteoles minute, rarely 5 mm long. Pedicel as long as the sepals. Sepals ovate, 12-15 mm long, obtuse or subacute; the middle one with one half tomentose, the other appressed-sericeous; the inner ones appressed-sericeous. Corolla white, 30-45 mm long, 2.5-3 times as long as the calyx, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous, Stamens equal, half as long as the corolla; filaments with glands on the dilated part; anthers sagitate, acute. Ovary conical, glabrous or with a few hairs at the top, with a glabrous disc at the base; style filiform, glabrous or with a few hairs, 5 times as long as the short and stout cylindrical stigmas. Capsule glabrous, broadly

ovoid, 10 mm long, 9 mm wide, unilocular, with 1 or 2 seeds; seeds black, tubercled, 5 mm long, 4 mm wide. Fl. May. Jul. Fr. Jul.

In maritime sandy dunes, rarely in the steppe.

Distribution: Iran, Caucasus, C. Asia ¹⁾: Aral-Casp. Karakum USSR, Romania, Bulgaria ²⁾, Turkey.

Specimens seen:

Romania: Grintescu 10946, Constanta (W).

Turkey: Aznavour 3865, Istanbul (B, E); Aznavour 20, *ibid.* (STU, W).

USSR: Lewandowsky 519, Baku, Lenkoran, Caucasus (W).

Iran: Alexeenko 2, Badar-e-Bahlavī (Enzeli or Enseli) (B); Bornmüller 7643 *ibid.* (B, JE); Rechinger 5629, Bābal Sar (W).

69. *C. pyrrotrichus* Boiss., *Diagn. Pl. Nov. Or.* 2 (3): 122. 1856; Rechinger f., *Fl. Iran (Conv.)*: 16. 1963.

C. haussknechtii Boiss., *Fl. Or. IV*: 102. 1875 p. p. quoad pl. Afghan.

C. gonocladus Boiss., ssp. *pyrrotrichus* (Boiss.) Rech. f., *Symb. Afghan. IV* in *Biol. Skr. Kong. Dan. Viden. Sels.* 10 (3): 80. 1958.

Type: Griffith 5859, Afghanistan, holotype (G-Boiss.) seen.

Boissier cited another specimen of Griffith, viz. 5879 from Kabul, which is not present in herb. Boissier, and as he did not mention any other specimens, it seems that Griffith 5859 (without locality) is to be regarded as the type.

Isotype (GOET).

Plate XI. fig. 24-30.

A 13-28 cm high, robust herb, with a ligneous base, branched. Root ligneous, with a diameter of one cm. Shoots stout, densely tomentose with an admixture of stiff hairs, 3 mm in diameter, simple, leafy from the base. Leaves firmly herbaceous, sessile; the radical ones linear-lanceolate, 33-90 mm long, 6-12 mm wide, ca 5-7 times as long as wide, base attenuate; the cauline ones oblong to lanceolate, 28-60 mm long, 10-15 mm wide (1.4) 3-5 times as long as wide, base cuneate, top acute or acuminate, margin entire, tomentose and with an admixture of stiff hairs, nerves prominent. Flowers 4-6, congested in a scorpid cyme; cymes axillary. Peduncle shorter than the

* 1) Grigoryev l. c.

* 2) Stoyan. et Stef., *Fl. Bulg.*: 910. 1948

subtending bract. Bracts like the cauline leaves but smaller. Pedicel wanting. Bracteoles linear or lanceolate, cuspidate, 17 mm long, not exceeding the calyx. Sepals unequal, tomentellous with an admixture of stiff hairs; the outer ones flat, linear-oblong, 13-14 mm long, 3.5 mm wide, the middle one with the right and the left half unequal, one half membranous; the inner ones convex, as long as the outer ones, oblong, cuspidate, base truncate with both halves glabrous and membranous. Corolla probably white, 22-25 mm long, 1.75 times as long as the calyx, with hairy bands on the outside, but the tube quite glabrous. Stamens unequal, filaments glabrous; anthers oblong with retuse top. Ovary glabrous, ovoid, with a cup-shaped disc at the base; style and stigmas glabrous, filiform; stigmas 1.5 times as long as the style. Capsule not seen. Fl. May-June.

In conglomerate hills; alt. 600-1800 m.

Distribution: Afghanistan.

Specimens seen:

Afghanistan: Gilli 3087, Sarobi (W); Gilli 3086 *ibid.*(W); Rechinger 19346 *ibid.* (W); Volk 1570 *ibid.*(W); Hedge et Wendelbo 4283 *ibid.*(E); Rechinger 16974, between Kabul et Sarobi (W).

70. *C. reticulatus* Choisy in DC., Prodr. IX: 399.1845; Boiss., Fl.Or.IV: 100. 1875; Bouloum, Fl.Liban, Syr. text: 229.1930; Dinsmore in Post, Fl.Syr. Palest. Sin.ed. 2, II: 206.1933; Rech.f., Fl.Iran (Conv.): 16.1963.

Type: Aucher-Eloy 1408, Mesopotamia; lectotype (G-DC) seen.

Plate XI. fig. 31-41.

Perennial, 26-55 cm high. Shoots herbaceous, thick, branched, densely tomentose-villous or woolly. Leaves coriaceous, sessile; the radical ones oblanceolate, 30-40 (-70) mm long, 10-15 (-25) mm wide, i. e. 2.7-3 times as long as wide, attenuate at the base; the cauline ones ovate, ovate-oblong, elliptic, 35-60 (25-70) mm long, 15-30 mm wide, i. e. 1.75 - 2.7 times as long as wide, base truncate, top acute or obtuse, margin entire, indumentum tomentellous, rugose above and reticulate beneath. Flowers in congested simple or double scorpioid cymes, the latter axillary and consisting of up to 6 (-8) flowers. Peduncles thick, as long as the subtending bracts. Bracts ovate-orbicular, 10-43 mm long, 8-30 mm wide, i. e. 1.3 times as long as wide, truncate or slightly cordate at the base. Bracteoles foliaceous, oblong,

acuminate, or elliptic or obovate-elliptic, 8-12 mm long, 2-3 times as long as wide, acute. Sepals covered with long sericeous hairs, unequal; the outer ones variable, oblong but gradually tapering at the tip or elliptical to oblanceolate and acute, 8-13 mm long, 2.5-3.5 times as long as wide; the middle one like the inner ones, linear and acuminate, 8-10 mm long, ca 2 mm wide. Corolla white, 15 mm long, 1.2-2 times as long as the calyx; each segment with a hairy band on the outside, but the lower part of the limb and the tube quite glabrous. Stamens subequal; filaments glabrous; anthers oblong, retuse at the apex. Ovary glabrous, ovoid, surrounded at the base by a cupshaped disc; style filiform; stigmas filiform, twice as long as the style. Capsule glabrous, ovoid, 4 mm long, 3.5 mm wide, unilocular with one seed; seed obovoid 4 mm long, 2.5 mm wide, brown with numerous faintly coloured hairs. Fl. May-Jul. Fr. Aug.

On mountain ridges and fallow fields, also in forests, sunny places, on calcareous soil; alt. 400-600 m.

Distribution: Turkey, Iraq, Iran.

a. ssp. reticulatus

Shoots densely tomentose-villous; bracteoles and outer sepals oblong acuminate, 3-3.5 times as long as wide.

Distribution: Turkey, Iraq.

Specimens seen:

Turkey: Davis, Diyarbakir-Silvan (E); Haussknecht s.n., Harput (Charput) (W); Handel-Mazzetti 1886 Urfa (W).

Iraq: Bornmüller 1525, Arbīl (Erbil) (B, E, GOET, HBG, JE, W); Kotschy 348, Amādiyah (Amadiéh) (W).

b. ssp. waltherioides (Boiss. et Haussk.) Sa'ad nov. stat.

C. waltherioides Boiss. & Haussk. in Boiss., Pl.Or.Nov.dec.1:6.1875.

Type: Haussknecht s.n. Behbehān, Iran, lectotype (G-Boiss.) seen.

Isotypes (JE, W).

Stems thick, densely woolly; bracteoles and outer sepals elliptic to obovate-elliptic, acute, twice as long as wide.

Distribution: Iran.

Specimens seen:

Iran: Haussknecht s.n., Teng Tokab ¹⁾ and Teng Biresa ¹⁾, paratype (G-Boiss., JE); Koelz 18630, Chinar Luristan (W); Koelz 15447, Labisafid ¹⁾, Bakhtiari (W).

71. C. schimperi Boiss., Diagn. Pl. Or. Nov. 1 (11): 81. 1849; Boiss., Fl. Or. IV: 101. 1875; Dinsmore in Post., Fl. Syr. Palest. Sin. ed. 2, II: 206. 1933; Täckholm, Stud. Fl. Eg.: 171. 1956.

Type: Schimper s.n., Arabia Felicis (probably Yemen), holotype (G-Boiss.) seen.

Plate XI. fig. 42-48.

Suffrutescent, branched at the base. Underground parts not seen. Shoots simple or slightly branched, firmly herbaceous, ca 3 mm in diameter, tomentose with long spreading hairs. Lower leaves chartaceous, petiolate; the petiole of the lower ones as long as the blade; blade linear-oblongate, 20-65 mm long, 4-7 mm wide i.e. 5-9 times as long as wide, base gradually attenuate towards the petiole; the upper ones sessile, oblongate to linear, 15-25 mm long, ca 4 mm wide, i.e. 4-6 times as long as wide, base cuneate, top obtuse, margin undulate-plicate, tomentellous with long spreading hairs, nerves rugose-plicate. Inflorescence a scorpioid cyme, consisting of up to 5 congested flowers, the cymes axillary. Peduncle as long as the subtending bract. Bracts like the upper leaves. Bracteoles foliaceous, oblong to oblongate, acute, not exceeding the calyx. Pedicel wanting. Sepals unequal, sericeous; the outer ones elliptical, 7 mm long, 3 mm wide, acute; the middle one with the right and the left half slightly unequal; the inner ones lanceolate, acuminate, 6 mm long, 1.5 mm wide. Corolla of unknown colour, 16 mm long, 2.5 times as long as the calyx; each segment with a hairy band on the outside, but the tube quite glabrous. Stamens unequal, the longest one 7 mm; filaments glabrous; anthers oblong-sagittate, retuse at the apex. Ovary glabrous, at the base surrounded by a cup-shaped disc; style glabrous, filiform, as long as the filiform stigmas. Capsule not seen. Fl. May-Fr. ?

In deserts and on stony ground.

Distribution: Egypt, Arabia (extending to Yemen).

* 1) Locality given on the label.

Specimens seen:

U.A.R. (Egypt): Bornmüller 10836, Wadi-El Tîr (B,JE); Kneucker 188, W. Feirân (B).

72. *C. secundus* Desr. in Lam. Encycl. III: 553.1789; Boiss., Fl.Or.IV: 100. 1875; Dinsmore in Post, Fl.Syr.Pal.Sinai, ed. 2, II: 206.1933.

Type: Specimen without label in herb. de Jussieu (P) seen.

Isotype (Lam-P).

C. secundus Desr. var *latifolius* Post et var. *parvifolius* Post, Fl. Pal. Sinai: 561.1896.

No types cited for the two varieties.

C. salvifolius Sieber ex Link, Enum.Hort.Berol, 1: 203.1841.

Type: Sieber s.n., Palestine, holotype, not seen.

Plate XII. fig. 1-8.

A densely woolly, 19-40 cm high perennial herb; base branched, ligneous. Root ligneous, 5 mm in diameter. Shoots firmly herbaceous, stout, 3-9 mm in diameter, simple or slightly branched, the lower half leafy, the upper one bearing flowers. Leaves chartaceous, sessile; the radical ones linear-oblong or linear-oblongate, 20-35 mm long, 3-10 mm wide, 3.5-6 times as long as wide, base decurrent; the cauline ones oblanceolate, elliptic or linear oblong, (15-) 20-35 mm long, (3-) 5-12 mm wide, 2.3 - 5 (-6) as long as wide, base cuneate, obtuse, top acute or subacute, margins entire, indumentum woolly, surface rugose. Flowers up to 5 in a compact axillary scorpioid cyme. Peduncle shorter than the subtending bract. Bracts like the cauline leaves. Bracteoles sericeous, leafy, ovate to ovate-lanceolate, acute, 8-11 mm long, 3-5 mm wide, not exceeding the calyx. Pedicel wanting. Sepals unequal, long sericeous; the outer ones flat, oblanceolate or oblong, acuminate, 12-15 mm long; the middle one with the right and the left half unequal, one half hairy and membranous. Corolla white, 20-28 mm long, 1.8 times as long as the calyx, with silky hairy bands on the outside, but the tube quite glabrous. Stamens unequal, the longest one 6-8 mm long- filaments glabrous; anthers oblong, with retuse top. Ovary glabrous, subglobose, with a fleshy cupshaped disc at the base; style filiform; stigmas filiform, as long as the style. Capsule glabrous, globose, 5 mm long and wide, hidden in the persistent calyx, unilocular, one-seeded; seed brown, glabrous, 3 mm long, 2.5 mm wide. Fl. Apr. -Jun. Fr. Jun. Jul.

In maritime sand and in sandy pastures; a leading species of the *Ononis stenophylla-Convulvulus secundus* association.

Distribution: Lebanon, Palestine.

Specimens seen:

Lebanon: Blanche 1457, Sidon (Saida) (C,W).

Palestine: Bornmüller 1108, between Yafo (Jaffa) et Ashdod (Asdod) (JE); Meyer and Dinsmore 2272, Yafo (L); Davis 4424, Binyamina-Caesarea (E); Boissier s.n., Gaza (E, L).

73. *C. spicatus* Peter ex Hallier f. in Bot. Jahrb. 18:99.1894; Täckholm, Stud. Fl. Egypt: 171.1956.

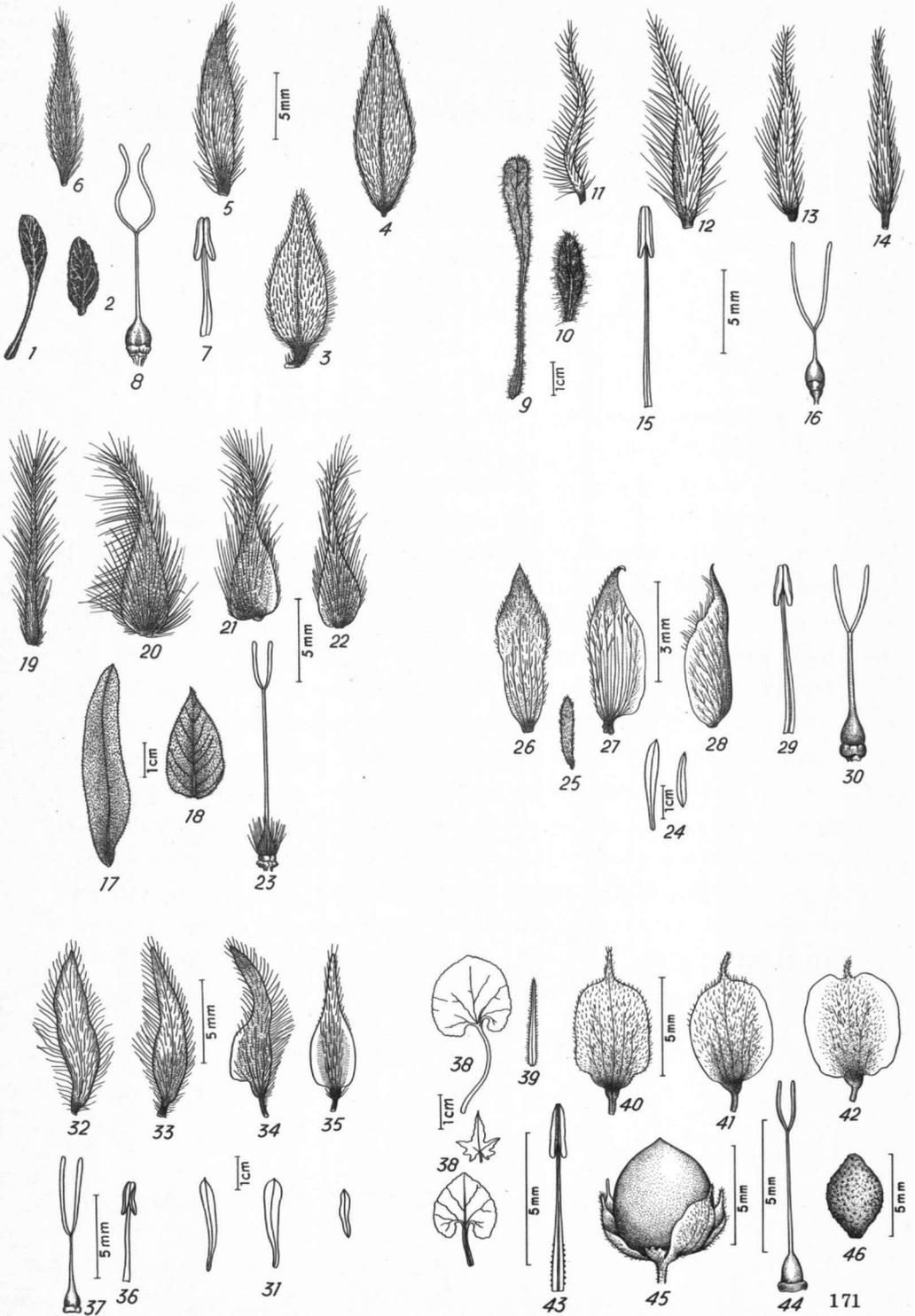
Type: March s.n., W. Feirân, Sinai, U.A.R. (Egypt), 16-18 May 1851; lectotype (GOET) seen.

Plate XII. fig. 9-16.

Suffrutescent, 27 cm high, tomentose with long spreading hairs. Shoots rigid, simple or slightly branched, 2-3 mm in diameter. Leaves fleshy; lower ones petiolate with the petiole as long as the blade; blade oblanceolate, 15-22 mm long, ca 4 mm wide, 4-5.5 times as long as wide, base gradually attenuate into the petiole; cauline ones sessile, but the blade of the same shape and dimensions as that of the lower ones, base cuneate, top obtuse, indumentum tomentose with spreading hairs, rugose-plicate beneath with a prominent midrib. Inflorescence a congested, 3-4 cm long, axillary cincinnus, consisting of several flowers. Peduncle as long as the subtending bract. Bracteoles linear, acuminate, 10-15 mm long, ca 2 mm wide, with spreading hairs. Sepals unequal, 13 mm long, hirsute; the outer ones oblong and gradually tapering to the tip, 3 mm wide; the middle one 2.5 mm wide with the right and the left half slightly unequal, one half hairy and membranous; the inner ones linear acuminate, 1.5 mm wide, with a narrow scarious hairy margin. Corolla probably white, 20 mm long, infundibuliform-tubiform, 1.5 times as long as the calyx; each segment with a hairy band on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the longest one 12 mm; filaments glabrous; anthers oblong, retuse at the apex. Ovary glabrous, ovoid, at the base surrounded by a cup-shaped disc; style glabrous; stigmas filiform, 2.5 times as long as the style. Capsule not seen. Fl. May.

In the desert.

Plate XII. fig. 1-8 *C. secundus*; 1,2: leaves; 3: bracteole; 4: outer sepal; 5: middle sepal; 6: inner sepal; 7: stamen; 8: pistil [1,2: Eig et Grizi 369 (CAIM); 3-8: Täckholm s.n. (CAI)]; fig. 9-16 *C. spicatus*; 9,10: leaves; 11: bracteole; 12: outer sepal; 13: middle sepal; 14: inner sepal; 15: stamen; 16: pistil [9,10: Drar 162 (CAIM); 11-16: March s.n., *typus* (GOET)]; fig. 17-23 *C. stapfii*; 17,18: leaves; 19: bracteole; 20: outer sepal; 21: middle sepal; 22: inner sepal; 23: pistil [17-22: Stapf 374 (W); 23: Stapf 1062 (K)]; fig. 24-30 *C. ammocharis*; 24: leaves; 25: bracteole; 26: outer sepal; 27: middle sepal; 28: inner sepal; 29: stamen; 30: pistil [24-30: Haussknecht s.n., *typus* (W)]; fig. 31-37 *C. austro-aegyptiacus*; 31: leaves; 32: bracteole; 33: outer sepal; 34: middle sepal; 35: inner sepal; 36: stamen; 37: pistil [31-37: Abdallah s.n. 21.3. 1962, *typus* (U)]; fig. 38-46 *C. caelesyriacus*; 38: leaves; 39: bracteole; 40: outer sepal; 41: middle sepal; 42: inner sepal; 43: stamen; 44: pistil; 45: capsule; 46: seed [38: Davis 2979 (E); 39-44: Davis 3033 K (E); 45,46: Mayer et Dinsmore 3619 (L)].



Distribution: endemic in W. Sinai, U.A.R. (Egypt).

Specimens seen:

Drar 162, W. Feirân, Sinai U.A.R. (Egypt) (CAIM), Bové 503, Sinai, paratype (G-DC, G).

74. C. stapfii Rech. f., Ann. Naturk. Mus. Wien 55:5.1947; Rechinger f., Fl. Iran (Conv.): 16.1963.

Type: Stapf 374, Persia, W. Kāzerūn; holotype (W) seen.

Plate XII. fig. 17-23.

A densely tomentose herb; underground parts unknown. Shoots simple, 1.5 - 3 mm in diameter; basal part ligneous and branched. Leaves coriaceous, sessile; lower ones not seen; upper ones oblong-lanceolate, 40-60 mm long, ca 12 mm wide, 3.5 - 5 times as long as wide, top acute, base cuneate, indumentum tomentose, with a soft silky appearance, nerves visible on the upper side, but immersed in the indumentum. Flowers in axillary, sessile condense cymes inserted on the upper half of the stem. Bracts ovate; lower ones 23 mm long, 17 mm wide, 1.5 times as long as wide; upper ones smaller. Bracteoles filiform, ca 10 mm long, with long sericeous-villous hairs. Pedicel wanting. Sepals with long sericeous-villous hairs, slightly unequal; the outer ones and the inner ones 10-11 mm long, ovate to lanceolate, long-aristate; the middle ones with unequal halves, one half membranous; the two inner ones with both halves membranous. Corolla colour not known, 20 mm long, twice as long as the calyx, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, filaments glabrous; anthers oblong with retuse top. Ovary hairy in the upper part, with a glabrous ring at the base; style glabrous, filiform, twice as long as the filiform stigmas. Capsule not seen. Fl. May.

Distribution: known from Iran.

Specimens seen:

Iran: Stapf 1062, Kāzerūn (K).

Subsectio 10. Diffusi.

Annual or perennial herbs; shoots herbaceous, prostrate or ascending, never twining.

75. C. ammocharis Boiss. et Haussk. in Boiss., Pl.Or.Nov.Dec.1.6.1875; Boiss., Fl.Or.IV: 104.1875; Rech.f., Fl.Iran (Conv.): 18.1963.

Type: Haussknecht s.n., S.Iran, in sand near Būshehr (Abuchir), holotype (G-Boiss.).

Isotypes (W).

Icon: Rechinger l.c., t.4.f.1.

Plate XII. fig. 24-30.

A strongly appressed-pilose, 12-30 cm high herb, which is branched from the base. Shoots slender, simple or slightly branched, flowering from the lower half. Leaves thinly herbaceous, sessile; the cauline ones linear-spathulate, 2.5-4 cm long, 3-4 mm wide, i.e. 7-10 times as long as wide, acute, gradually attenuate at the base, margin entire, indumentum appressed-pilose, uninervate. Flowers solitary and axillary or 2 or 3 in an axillary monochasium provided with a slender peduncle which is longer than the subtending bract; the clusters of flower buds at the end of the branches apparently not expanding. Bracts sessile, oblong-linear, acute, 5-20 mm long, 1-2.5 mm wide, 5-8 times as long as wide. Bracteoles small, longer than the very short pedicel. Sepals + appressed-pubescent, ciliate, 5 mm long; the outer ones oblanceolate-oblong, acute, the upper part green, the lower colourless; the middle sepal with the right and the left half unequal, one half membranous and glabrous; the inner sepals suborbicular-oblong, abruptly cuspidate, entirely glabrous and membranous. Corolla described as pink, ca. one cm long, with firm, distinct lobes; each segment with a hairy band on the outside, but the lower part of the limb and the tube quite glabrous. Stamens slightly unequal, the longest one 6 mm long; filaments glabrous; anthers sagittate. Ovary ovoid, glabrous, at the base surrounded by a cupshaped disc; style glabrous. stigmas filiform, twice as long as the style. Capsule not seen.

In sand.

Distribution: Known from Iran the type locality

76. C. austro-aegyptiacus Abdallah et Sa'ad in Act.Bot.Neerland. 15:190.1966.

Type: Abdallah s.n., U.A.R. (Egypt), El Allâqi (Nile Valley), 21.3.1962, holotype (U).

Isotypes (CAI, CAIM, K, WAG).

Plate XII. fig. 31-37.

Procumbent perennial herb, branched from the base, puberulous mixed with spreading hairs. Root woody. Shoots cylindrical, 30-90 (120) cm long, simple or branched in the lower half, flowering in the upper half. Leaves herbaceous, sessile; basal ones oblanceolate, 3-5 cm long, 3-6 mm wide, i. e. 8-10 times as long as wide, acute, base attenuate; the upper leaves linear-spathulate or linear, 1.5-4 cm long, 3-10 mm wide, i. e. 4-8 times as long as wide, acute or subacute, attenuate at the base, margin entire, hirsute, pinnately nerved. Flowers up to 7 in a lax axillary partly dichasial and partly monochasial inflorescence or in a monochasium, rarely solitary by abortion of the lateral flowers. Peduncle much longer than the subtending bract. Bracts like the leaves. Bracteoles oblong or linear, those of the lateral flowers never exceeding the calyx, but if the inflorescence contains more than three flowers, the bracteoles of the terminal one enlarged and exceeding the calyx. Sepals hirsute, slightly unequal, the upper part green, the lower colourless; the outer ones 7-8 mm long, oblong or oblanceolate, long-acuminate; the middle one with unequal halves, one half membranous; the inner ones 6-7 mm long, broadly oblong, long-acuminate, truncate at the base, the colourless part convex, with both halves glabrous and membranous. Corolla with a pink limb and white tube, but the limb turning white when withering, 1.3 - 1.5 cm long, i. e. twice as long as the calyx, without distinct lobes; the segments with a hairy band outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the longest one 7 mm; filaments glabrous; anthers oblong, slightly retuse at the top. Ovary glabrous, ovoid, the base surrounded with a glabrous cupshaped disc; style glabrous, filiform; stigmas filiform, 1.5 times as long as the style. Capsule not seen. Fl. Febr. Fr.....

On cultivated sandy soils and on canal banks.

Distribution: southern U.A.R. (Egypt).

Specimens seen:

U.A.R.; (Egypt); Abdallah s.n., Dakhla Oasis (W.Desert), Budkhulue, 23.4.1961 (CAIM); Abdallah & Mahdy 1667, El-Allâqi (Nile Valley) (CAIM); Sa'ad & Abbas 1670 ibid (CAIM).

77. C. caelesyriacus Boiss., Diagn.Pl.Or.Nov. 1 (11): 85.1849; Boiss., Fl.Or. IV: 109.1875; Dinsmore in Post, Fl.Syr.Pal.Sinai, ed 2, II: 209,1933.

Type: Boissier s.n., between Hasbey & Rāsheiya, Lebanon (G-Boiss.).

C. sintenisii Boiss., Fl.Or.Suppl.: 349.1888.

Type: Sintenis & Rigo 55, *M. Pentadactylos*¹⁾, Kythrea, Cyprus, holotype (G-Boiss.).

Isotypes (B, K, STU, W).

Plate XII. fig. 38-46.

An 7-27 (-35) cm high herb; base branched, herbaceous. Root 2-5 mm in diameter. Shoots herbaceous, simple or slightly branched, 1-2 mm in diameter, sparingly appressed-puberulous, with retrorse hairs. Leaves herbaceous, petiole 1.5 times as long as the blade; the latter reniform-ovate, 20-25 mm long and as wide, obtuse, base cordate, margin crenate, appressed-puberulous, pinnately nerved. Flowers solitary, distributed along the whole length of the shoot, and borne on axillary peduncles which are much shorter than the subtending bract. Most of the bracts like the radical leaves, though with a shorter petiole, but the uppermost bracts triangular and acute, with a biserrate margin or sometimes lobed with the middle lobe longer than the lateral ones. Bracteoles filiform, ca 3 mm long. Pedicel twice as long as the calyx. Sepals unequal, caudate, with spreading hairs; the outer ones obovate, 6 mm long, 3.5 mm wide; the middle one with the right and the left half unequal, one half membranous and glabrous; the inner ones broadly oblong, with retuse apex and auriculate base and with both halves glabrous and membranous. Corolla pink, 15 mm long, 2.5 times as long as the calyx, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the longest one 11 mm; filaments with glands on the dilated part; anthers oblong-sagitate, with retuse apex. Ovary glabrous; style filiform; stigmas cylindrical, half as long as the style. Capsule glabrous, subglobose, 6 mm long and wide; exerted from the persistent calyx, bilocular, 4-seeded; seeds dark brown, tubercled. Fl. Feb.-May. Fr. May.

In sandy river vallies, in dry bushy places on arid, eroded sandstone, on slopes of dunes, on lime-stone soils and in fields; alt. 200-666 m.

Distribution: Lebanon, Cyprus, Palestine.

Specimens seen:

Cyprus: Davis 2912 k, Kythrea (E).

Lebanon: Bornmüller 121377, Beirūt (B); Blanche 957, Tyre (Sūr.) (E).

Palestine: Davis 4214 B, Haifa (E).

* 1) Locality given on the label.

78. *C. cancerianus* Abdallah et Sa'ad nov. spec.

Plate XIII. fig. 1-10.

Herba perennis, 50-60 cm alta, hirsuta. Pars subterranea nondum visa. Caules herbacei, teretes, 2.5 mm diam. Folia radicalia nondum visa; caulina sessilia, herbacea, lineari-oblongata, 12 mm longa et 2 mm lata, basi cuneata, dense sericea. Flores 3-11 in cymam axillarem congesti. Pedunculus bractea suffulciente multo longior. Bracteae sessiles, oblongae, circ. 8 mm longae et 3 mm latae, acutae. Bracteolae lineares, plerumque parvae sed in cymis e floribus plus quam quinque compositis majores quam in cymis e floribus paucioribus consistentibus, numquam tamen super calycem protrudentes. Pedicellus brevissimus. Sepala inaequalia, omnia tamen hirsuta, in parte superiore viridia, in parte inferiore decoloria, apice acuminata; exteriora oblonga, 6 mm longa; medianum cum dimidio dextro a dimidio sinistro diverso, dimidio altero membranaceo; interiora ovata, convexa, tota membranacea. Corolla colore ignoto, 11 mm longa, segmentorum quinque unoquoque virga mediana extus in parte superiore pilosa instructo. Stamina inaequilonga; filamenta glabra; antherae oblongae, apice retusae. Ovarium conicum, glabrum, basi disco cupuliformi circumdatum; stylus filiformis, stigmatibus etiam filiformibus aequilongus. Capsula ovoidea, glabra, a calyce persistente tota tecta, bilocularis et biseminalis; semina 2 mm longa et 1.5 mm diam., nigra et puberula. Florens mense Marti.

Typus: Abdallah 1648, ad pagum El Seyala in Nili Valle, Aegyptia (U, holotype; isotypes CAIM, WAG).

Distribution: Egypt, Arabia.

Other specimens seen: Behāe El Deīn 28, W. Elleith, S.Gedda, Arabia (CAIM); id. 17, ibid. (CAIM).

This species is a near ally of *C. austro-aegyriacus* Abdallah et Sa'ad, *C. pilosellifolius* Desr. and *C. prostratus* Forsk. From *C. austro-aegyriacus* and *C. pilosellifolius* it differs by the compact cymes, and from *C. prostratus* by the length of the lower peduncles, which are much longer than the subtending bract, by the oblong bracts, by the larger number of flowers in the cymes (3-11) and by the larger diameter of the shoots.

79. *C. deserti* Hochst. et Steud. in Herb. Un. Itin. 1837; Baker et Rendle in Thiselt. -Dyer, Fl. Trop. Afr. IV (2): 92. 1905; Andrews, Fl. Pl. Sud. III: 106. 1956;

Täckholm, Stud. Fl. Egyp.: 172. 1956.

Type: Schimper 783, near Jidda (Dscheddam), Arabia (not traced).

Isotypes (GOET, HAL, HBG, L, STU, W).

C. bornmülleri: Hausskn. in Mitth. Thur. Bot. Ver. N. Folge 6:56. 1894.

Type: Bornmüller 467, Qeshm (Kishm) Iran, lectotype (B).

C. microphyllus Sieb. ex Spreng. var. *longipes* Maire in Bull. Mus. Nat. Hist. Natur. 2(3):535. 1931.

Type: Mauod 312, Tassili-n-Advar ¹⁾, Qued-en Nefis, Sahara-Central (AL), not seen.

Isotype (P).

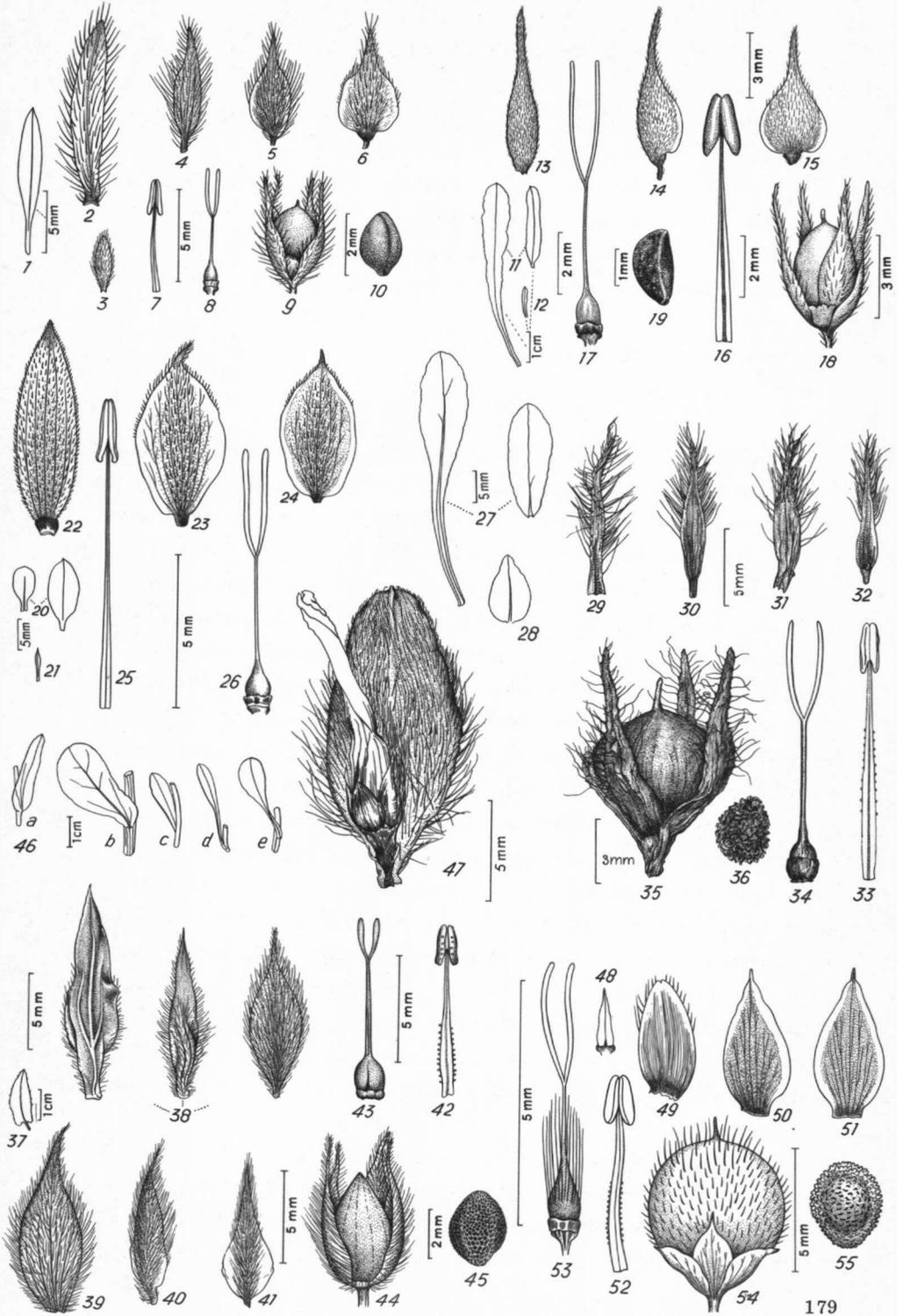
Plate XIII. fig. 11-19.

A 50-70 cm high perennial herb; base branched, subligneous. Root ligneous, perpendicular, 3 mm in diameter. Shoots slender, 1-1.5 mm in diameter, appressed-pilose with a more or less important admixture of spreading hairs. Leaves herbaceous, sessile, radical ones linear-oblongate, 30-60 mm long, 5-9 mm wide, 6 times as long as wide, obtuse; cauline leaves linear to oblongate, 20-25 mm long, ca 3 (-5) mm wide, ca 7 times as long as wide, obtuse or subacute, base attenuate; margin entire, appressed pilose, pinnately nerved. Flowers up to 12, in an axillary, unequally dichasial or monochasial inflorescence, rarely solitary. Peduncle longer than or rarely as long as the bract. Bracteoles linear, leafy, longer than the pedicel. Pedicel as long as or shorter than the calyx. Sepals with appressed pilose hairs mixed with spreading ones, with the upper part green and the lower colourless, 8 mm long; the outer ones convex, lanceolate, acuminate; the middle one with the right and the left half unequal, one half hairy and membranous; the inner ones ovate, acuminate, with both halves hairy membranous. Corolla pallid but with darker midpetaline hairy strips, 15 mm long, twice as long as the calyx. Stamens unequal, the longest one 8 mm; filaments glabrous; anthers oblong, with retuse apex. Ovary glabrous, ovoid, with a cup-shaped disc at the base; style filiform; stigmas filiform, as long as the style. Capsule glabrous, subglobose, 2.5 mm long and wide, bilocular, 2- to 4-seeded; seeds black, puberulous. Fl. & Fr. the whole year.

In sandy deserts.

* 1) The localities of Maire l.c. could not be found on the maps; they may be either in Libya, Algeria, Tunisia or Morocco.

Plate XIII. fig. 1-10 *C. cancerianus*; 1,2: leaves; 3. bracteole; 4: outer sepal; 5: middle sepal; 6: inner sepal; 7: stamen; 8. pistil; 9: capsule; 10: seed [1-10: Abdallah 1648 typus (U)]; fig. 11-19 *C. desserti*; 11: leaves; 12. bracteole; 13: outer sepal; 14: middle sepal; 15: inner sepal; 16: stamen; 17: pistil; 18: capsule; 19: seed [11-17: Kruijt 140 (L); 18,19: Kruijt 137 (L)]; fig. 20-26 *C. georgicus*; 20: leaves; 21: bracteole; 22: outer sepal; 23: middle sepal; 24: inner sepal; 25: stamen; 26: pistil [Hohenacher s.n., typus (W)]; fig. 27-36 *C. gharbensis*; 27: leaves; 28: bract; 29: bracteole; 30: outer sepal; 31: middle sepal; 32: inner sepal; 33: stamen; 34: pistil; 35: capsule; 36: seed [27-34: Sammelsson 7188 (B); 35,36: pitard s.n. (E)]; fig. 37-45 *C. glomeratus*; 37: leaf; 38: bracteole; 39: outer sepal; 40: middle sepal; 41: inner sepal; 42: stamen; 43: pistil; 44: capsule; 45: seed [37: Schimper 784 (W); 38-43: Täckholm et al 786 (CAI); 44-45: Täckholm et al 944 (CAI)]; 46-55 *C. humilis*; 46 a-e: leaves; 47: flower; 48: bracteole; 49: outer sepal; 50: middle sepal; 51: inner sepal; 52: stamen; 53: pistil; 54: capsule; 55: seed [46 a,b,d,e, : Bicknell s.n. (W); 46c: Todaro 920 (W); 47: Faure s.n. (CAIM); 48-53: Choulette f. 164 (W); 54,55: E. et A. Huet du Pavillon s.n. (G)].



Distribution: Arabia, Nubia (N. Sudan, S. Egypt), Sahara, SW. Iran.

Specimens seen:

Arabia: Fischer 22, Jidda (Geddae) (L, W); Alleizette s.n. ibid. (L); Kruijt 140 ibid, (L).

U. A. R. (Egypt): Drar 41/33 near Mera Kewan, Halaib (CAIM); Shabetai z 2442, W. Meisah, between Abrag & Elba (CAIM).

Sudan: Kassas s.n., Prov. Khartoem, W. Omdurman (CAI)

Iran: Bornmüller 468, Bander Abbas (B, G).

80. C. georgicus Sa'ad nov. spec.

Plate XIII. fig. 20-26.

Herba circ. 8 cm alta, appresse puberula, in parte basali ramificata et hic sublignea. Parts subterranea non visa. Caules herbacei, in dimidia parte inferiore ramificati, in dimidia parte superiore florifera. Folia herbacea; radicalia sessilia, obovata, circ. 4 mm longa et 2 mm lata, apice acuta, basin versus attenuata; folia caulina petiolo circ. 1 mm longo instructa, lamina suborbiculari vel elliptica, 5-10 mm longa et 4-5 mm lata, apice acuta, basi truncata. Flores in axillis bractearum solitarii. Pedunculus bracteeae aequilongus vel ea longior. Bracteeae foliis caulinis similiores. Bracteolae filiformes, pedicello aequilongae. Pedicellus calyci aequilongus. Sepala inaequalia, omnia tamen elliptica, 6 mm longa et 3 mm lata; exteriora appresse puberula, parte superiore viridia, apice acuta; medianum cum dimidio dextro a dimidio sinistro diverso; interiora tota glabra et membranacea, apice cuspidata, basi truncata. Corolla colore ignoto, 15 mm longa, segmentorum quinque extus virgam medianam in parte superiore pilosam exhibente. Stamina inaequilonga; filamenta in parte dilatata glandulis sessilibus vestita; antherae basi sagittatae, apice retusae. Ovarium ovoideum, glabrum, basi disco cupuliformi circumdatum; stylus glaber; stigmata filiformia, stylo aequilonga. Capsula nondum visa. Florens mensibus Julio et Augusto.

Typus: Hohenacker s.n., circum pagos Tatuni et Ambudora in monte Swant, Georgia, Caucasus (W, sub nomine *Euphorbia scovitzii* Fisch. et Meyer).

Distribution: known from Georgia only.

This species differs from *C. supinus* Coss. et Kralik by the filiform bracteoles which are as long as the pedicel, by the length of the pedicel which is equal to that of the calyx, by the 6 mm long, appressed-puberulous outer sepals and by the 15 mm long corolla, and from *C. sabatius* Viv. by the

4-5 mm wide, at the top acute cauline leaves and by the smaller size of the corolla.

81. C. gharbensis Battand. et Pitard in Pitard, Explor. Sc. Maroc. : 74.1913; Sauvage & Vindt, Fl. Maroc. II: 46.1954.

Type: Pitard 1806, Schaula (Chaoula) Khmisset¹⁾, Morocco, lectotype (AL), not seen.

Isotypes (K, P).

Plate XIII. fig. 27-36.

An erect, 16-30 cm high annual herb, base branched. Root slender perpendicular. Shoots herbaceous, shortly appressed puberulous; simple or slightly branched. Leaves herbaceous, sessile, radical ones oblanceolate, 40-75 mm long, 10-25 (-30) mm wide, 3-4 times as long as wide, obtuse, decurrent; the lower cauline leaves like the radical ones; the upper leaves obovate to oblanceolate, 28-40 (-65) mm long, 12-15 (-30) mm wide, 2-3 times as long as wide, acute, subacute or obtuse, base half clasping; margin entire, glabrous or with a ciliate margin, pinnately nerved. Flowers in a capitulum at the top of the shoot. Bracts of the outer flowers leafy, acute, glabrous beneath but pubescent above. Bracteoles and the bracts of the inner flowers too linear and on both sides glabrous. Pedicel short. Sepals subequal, 9 mm long, membranous and glabrous, but at the top ciliate; acuminate; outer ones oblong, middle one like the outer ones; the inner ones lanceolate or ovate. Corolla dark blue-violet but the base yellow, 20 mm long, twice as long as the calyx, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal; filaments with glands on the dilated part; anthers oblong, with a retuse top. Ovary glabrous, with a cup-shaped disc at the base; style glabrous, filiform; stigmas filiform, as long as the style. Capsule globose, glabrous, membranous, bilocular, 4-seeded; seeds brown, 3 mm long, 2 mm wide, alveolate. Fl. March-Jun. Fr. Jun.

In fields, on clay and on humid soils, alt. 400-600 m.

Distribution: known from Morocco only.

Specimens seen:

Morocco: Sauvage 1358, Fès (RAB, W); Samuelsson 7188, Taza (B); Jahandiez

* 1) Localities from the labels.

19, Zaĕr ¹⁾ (E); Wall s.n., Meknēs (E); Pitard 1809, Sellal ¹⁾ à Guicer, paratype (P); Pitard 1808, Dar Oulad ¹⁾ Attafi, paratype (K,P); Pitard 1807, Oued Tamdrost ¹⁾, paratype (K,P).

82. *C. glomeratus* Choisy in DC., Prodr. IX: 401.1845; Boiss., Fl.Or.IV: 102.1875; Dinsmore in Post, Fl.Syr.Pal. Sinal ed. 2, II: 206.1933; Andrews, Fl.Pl.Sud. III: 106.1956; Täckholm, Stud. Fl.Egypt: 172.1956; Rechinger f., Fl. Iran (Conv.): 18.1963.

Type: Schimper 784, Jiddah (Dscheddan) Arabia, lectotype (G-DC).

Isotype (GOET, W).

C. glomeratus var. *sericeous* Dinsm. in Post, l.c.

Type: Dinsmore s.n., 'Egyn Gedi, Palestine (GH), not seen.

Ipomoea auricoma Richard, A., Tentamen, Fl.Abyss. II: 65.1851.

Type: Dillon s.n., in Prov.Chono ¹⁾, between Red Sea and Abyssinia (P).

Plate XIII. fig. 37-45.

A 35-50 cm high herb; base subligneous, branched. Root ligneous, 3-7 mm in diameter. Shoots simple or slightly branched, 1-1.5 mm in diameter, sparingly pubescent or appressed-puberulous. Leaves herbaceous; petiole half as long as the blade; blade oblong-lanceolate to linear-lanceolate, 10-45 mm long, 4-18 mm wide, 1.6-5.5 times as long as wide, base in the radical ones cuneate, in the cauline ones auriculate, top acute, margin entire, shortly sericeous with an admixture of spreading hairs, pinnately nerved. Flowers 4-10, in a compact one- or two-armed scorpioid cyme provided with a long peduncle. Bracts like the leaves, as long as, shorter or, rarely, longer than the peduncle. Bracteoles of the older flowers lanceolate acuminate, but those of the younger ones narrower. Pedicel wanting. Sepals unequal, covered with long sericeous hairs; the outer ones 9 mm long, 4 mm wide, elliptical, acuminate; the middle one with the right and the left half unequal, one half membranous; the inner ones lanceolate, acuminate, both halves membranous. Corolla white, small, 12 (-15) mm long, 1.25 times as long as the calyx, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens subequal, the longest one 8.5 mm long; filaments with sessile glands on the dilated part; anthers oblong, with retuse top. Ovary glabrous, subglobose, with

* 1) Locality from the label

a cup-shaped disc at the base; style glabrous, 3 times as long as the short cylindrical stigmas. Capsule glabrous, ovoid, 5 mm long, 4 mm wide, uni- or bilocular, 2- to 4-seeded; seeds nearly black, distinctly or indistinctly tubercled, the distinctly tubercled ones 2.5 mm long, 2 mm wide. Fl. and Fr. Decemb.-Aug.

In fields, on sandy saline or not saline soils, rarely in gravel.

Distribution: Egypt, N.Sudan, Palestine, Arabia, Iran, (Abyssinia, W.Pakistan ²).

a. var. glomeratus.

Shoots sparingly pubescent; peduncles longer than or as long as the subtending bract; capsule unilocular, 2-seeded; seeds distinctly tubercled.

Specimens seen:

U.A.R. (Egypt): Drar 275/32 Geb. Elba (CAIM); Täckholm et al. 786, *ibid.* (CAI); Schimper 731, Nowbe (Arabea Petrea ³), paratype (G-DC, W).

Sudan: Kassas 226, Port Sudan (CAI).

Palestine: Dinsmore 1189, 'Eyn Gedi (Ain Jidi) (E).

Arabia: Kruijt 95, Jiddah (L); Fischer 21, *ibid.* (W).

Iran: Bornmüller 469, Qeshm island (Kischum) (B,JE).

b. var. gymnospermus Sa'ad nov. var. caulibus appresse-puberulis, pedunculo quam bractea suffulcens brevior, capsula biloculari, interdum uniseminali, seminibus indistincte tuberculatis a typo distinguenda.

Densely appressed-puberulous; peduncle shorter than the subtending bract; capsule bi-locular, 1-or 2-seeded; seeds indistinctly tubercled.

Holotypus: Sa'ad 1398, W.Ise El Allagi, U.A.R. (Egypt) (CAIM).

In gravel.

Distribution: known from U.A.R. (S.W. Egypt, Wadi Ise) only.

C. glomeratus var. abbreviatus Terrace in *Ann. Bot. Instit. Roma*, v.105 (the description of this variety could not be found in this volume).

83. C. humilis Jacq., *Coll. IV*: 209. t. 32. 1790; Arcangeli, *Fl. Ital. ed. 2*, 373. 1894; Dinsmore in *Post, Fl. Syr. Palest, Sin. ed. 2, II*: 210. 1933; *Sauv. et Vindt, Fl. Maroc. II*: 47. 1954.

* 2) Rechinger l.c.

* 3) *Arabea petrea*, eng. Rocky Arabia, is the N.W. part including the Sinai peninsula. The locality "Nowbe" given on the label.

Type: a specimen grown from seed of unknown origin ($W \pm ?$), not seen.

C. undulatus Cav., Ic.III: 39.t.277.1794; Choisy in DC., Prodr.IX: 405. 1845; Boiss., Fl.Or.IV: 110.1875; Täckholm, Stud.Fl.Egypt; 174.1956.

Type: specimen of unknown origin, herb Cavanilles, holotype (MA).

C. ciliatus Roth, Collect.Bot. 1:39.1797.

Type: a specimen grown from seed obtained under the name *C. pentapetaloides* (BREM), not seen.

C. evolvuloides Desf., Fl.Atlant. 1:176.t.49.1798.

Type: Desfontaines s.n., betw. Algiers and Tripoli, near Sbiba (Algeria, Tunisia or Libya) (P).

C. strictus Lehm.Ind.Sem.Hort.Hamb. 17:1828.

Type: cult.plant in Hamburg. Bot. Garden (not seen).

Plate XIII. fig. 46-55.

An 8-30 cm high herb, branched from the base. Root slender, perpendicular, 2-3 mm in diameter. Shoots simple or slightly branched, appressed puberulous, 1.5-2 mm in diameter. Leaves herbaceous, sessile; radical ones spatulate, ca 30 mm long and 7 mm wide, 4 times as long as wide, attenuate at the base; the cauline leaves like the radical ones or oblanceolate to linear-oblanceolate, (15-) 20-35 (-40) mm long, 5-11 (-15) mm wide, (2.5-) 3-4.5 times as long as wide, base half-clasping; top acute to obtuse, margin entire or slightly wavy, indumentum appressed pubescent, pinnately nerved. Flowers solitary, axillary, congested at the top of the shoots, usually hidden by the bract, Peduncle wanting. Bracts like the cauline leaves; bracteoles minute, membranous. Pedicel shorter than the calyx. Sepals unequal, scarious, slightly hairy; the outer ones oblong, subacute, mucronulate, 2 mm long, 1.25 mm wide; the middle one 3 mm long, with the right and the left half unequal, one half glabrous and membranous; the inner ones 3 mm long, convex ovate, shortly acuminate, with both halves glabrous and membranous. Corolla with a violet limb, 7 mm long, 3.2 times as long as the outer sepals, with 5 distinct lobes and with hairy bands on the outside, but the tube quite glabrous. Stamens unequal, the longest one 4 mm long; filaments with glands on the dilated part; anthers oblong-elliptic with retuse apex. Ovary ovoid, covered with long velutinous hairs and with a shallow membranous cupshaped disc at the base; style stout and short, as long as the cylindrical stigmas. Capsule hairy, subglobose, 6 mm long and wide, protruding from the persistent calyx; bilocular, 4-seeded; seeds brown, covered with sharp tubercles, 3 mm long, 2 mm wide. Fl. March-May;

Fr. Apr. June.

Cultivated and fallow fields; calcareous and clay soils, limestone slopes, mountains and vallies. Alt. 350-1600 m.

Distribution: Portugal, Spain, Morocco, Algeria, Egypt ¹⁾, Palestine, Cyprus, Sicily, Italy ²⁾, Tunisia.

Specimens seen:

Portugal: Rothmaler 15353, Alto Alentejo, Elvas (G, LISE).

Spain: Huter, Porta and Rigo 340, Granada, Malaga (G, STU).

Morocco: Balansa 357, Saida (E, GOET, W).

Algeria: Choulette f. 164. Constantine, Sidi-Mecid (W)

Libya: Simpson 39423, Cyrenica, Derna (BM).

Sicily: Todaro 920, Villafrate ³⁾ (JE, U, W).

Cyprus: Sintenis and Rigo 57, Hagrios Georgios ³⁾ (LE).

Palestine: Meyers and Dinsmore M 1721, Wadi Salihi.

84. *C. meonanthus* Hoffm. et Link, Fl. Port.: 369. t. 69. 1809; Ibiza, Compend.

Fl. Espan. II: 688. 1898; Coutinho, Fl. Port.: 489. 1913.

C. tricolor var. Brot., Fl. Lus. I: 149. 1804.

C. tricolor var. *meonanthus* (Hoffm. et Link), Choisy in DC., Prodr.

IX: 405. 1845; Arcangeli, Comp. Fl. Ital. ed. 2.: 373. 1894.

C. tricolor ssp. *meonanthus* (Hoffm. et Link) Maire in Jehoud. et Maire,

Cat. Pl. Maroc. III: n. 1589. 1934; Sauv. et Vindt, Fl. Maroc. II: 50. 1954.

Type: Brotero s.n., around Coimbra (LISU), not seen.

Plate XIV. fig. 1-10.

A 9-40 cm high annual herb; strongly branched from the base. Root perpendicular. Shoots simple or slightly branched, appressed puberulous, with an admixture of long spreading hairs. Leaves herbaceous, sessile; radical ones spatulate or linear-oblongate, 35-45 mm long, 7-10 mm wide, 4-5 times as long as wide, acute, subacute or obtuse, base decurrent; the cauline leaves linear-lanceolate to linear or, rarely, oblongate, 15-35 mm long, 2-8 mm wide, 4-7 times as long as wide, top acute or subacute, base half-clasping; margin entire, indumentum appressed pubescent, pinnately nerved. Flowers

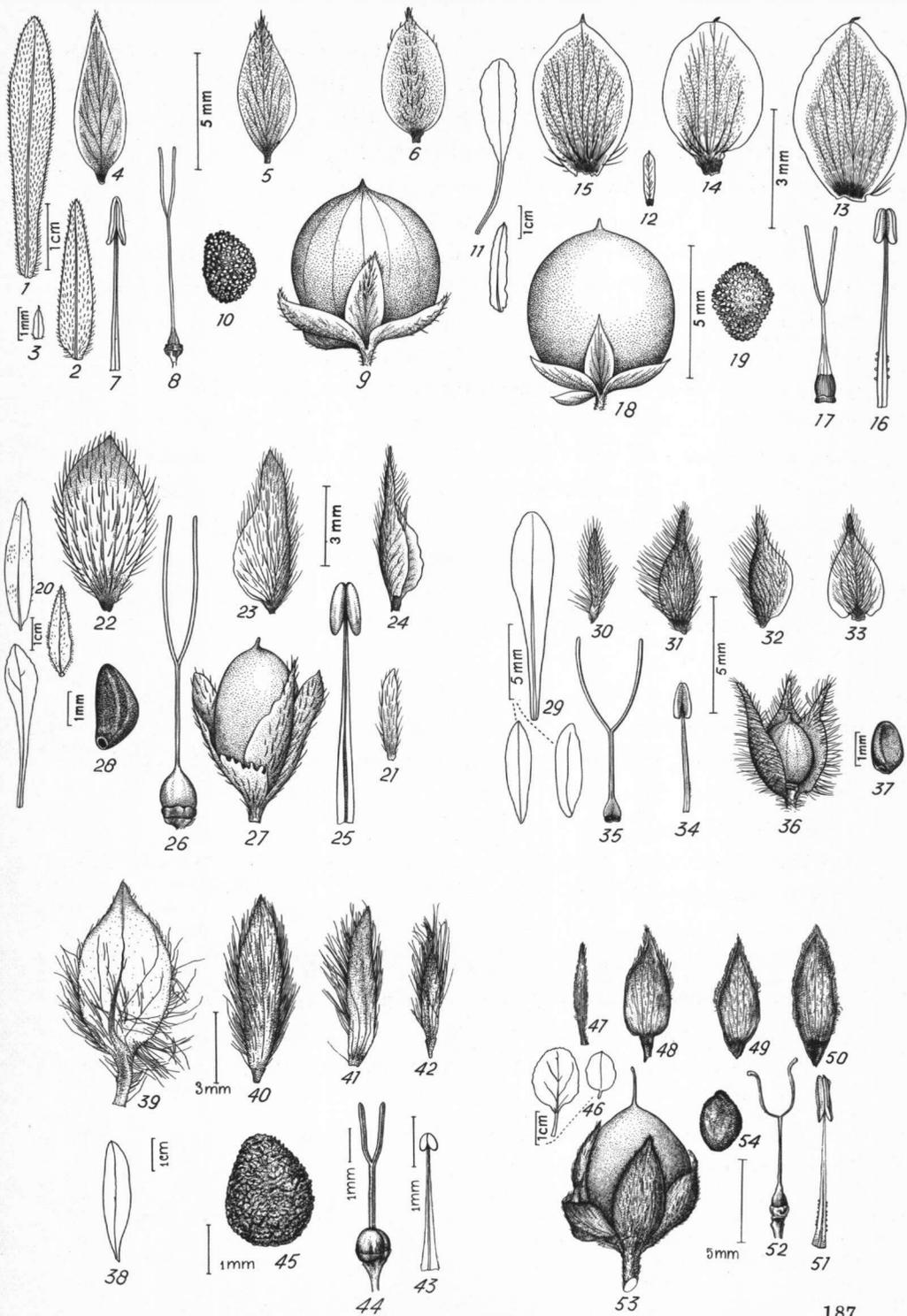
* 1) Tackholm l.c.

* 2) Arcangeli l.c.

* 3) Locality from the label

Plate XIV. fig. 1-10 *C. meonanthus*; 1: leaf; 2: bract; 3: bracteole; 4: outer sepal; 5: middle sepal; 6: inner sepal; 7: stamen; 8: pistil; 9: capsule; 10: seed [1-8: Ferreira 1955 (W); 9,10: Heriques s.n. (W)]; fig. 11-19 *C. pentapetaloides*; 11: leaves; 12: bracteole; 13: outer sepal; 14: middle sepal; 15: inner sepal; 16: stamen; 17: pistil; 18: capsule; 19: seed [11: Silva, Fontes et Meyre 1890 (G); 12-17: Davis 2506 (E); 18, 19: Huter, Porta et Rigo 341 (C)]; fig. 20-28 *C. pilosellifolius*; 20: leaves; 21: bracteole; 22: outer sepal; 23: middle sepal; 24: inner sepal; 25: stamen; 26: pistil; 27: capsule; 28: seed [20: Bornmüller 1530 (STU); 21-26: Bornmüller 1531 (W); 27,28: Sintenis 516 (B)]; fig. 29-37 *C. prostratus*; 29: leaves; 30: bracteole; 31: outer sepal; 32: middle sepal; 33: inner sepal; 34: stamen; 35: pistil; 36: capsule; 37: seed [29-35: Sieber s.n. (L); 36,37: Letourneaux 280 (W)]; fig. 38-45 *C. rhyniospermus*; 38: leaf; 39: bracteole; 40: outer sepal; 41: middle sepal; 42: inner sepal; 43: stamen; 44: pistil; 45: seed [38-45: Kotschy 235 (W)]; fig. 46-54 *C. sabatius*; 46: leaves; 47: bracteole; 48: outer sepal; 49: middle sepal; 50: inner sepal; 51: stamen; 52: pistil; 53: capsule; 54: seed [46-54: Jahandiez 308 (E)].

PLATE XIV



axillary, solitary, on a slender peduncle, which is as long as, shorter or longer than the subtending bract. Bracts sessile, linear-lanceolate, acute or acuminate, 11-38 mm long, 3-11 mm wide, 3.5-6 times as long as wide. Bracteoles very small, filiform, shorter than the pedicel. Pedicel as long as, or shorter or longer than the calyx. Sepals membranous, subequal, convex with a few appressed hairs, lanceolate, mucronate, 5 mm long; the outer ones broader than the inner ones, and the inner ones with a wider transparent margin than the outer ones. Corolla with three colours, the upper part blue, the middle one white, and the lower one yellow, 18-22 mm long, 3.5-4.5 times as long as the calyx, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the longest one 9 mm; filaments with sessile glands on the dilated part; anthers oblong-sagittate, retuse at the top. Ovary glabrous, conical, with a cupshaped disc at the base; style glabrous; filiform, 1.5 times as long as the filiform stigmas. Capsule glabrous, subglobose, protruding from the calyx, 6-8 mm long and wide, bilocular, 4-seeded; seeds brown or nearly black, 3 mm long, 3.5 mm wide, tuberculate. Fl. & Fr. Mar.-Jun.

On mountains, cliffs, grassy clay slopes, in cultivated and fallow fields, on calcareous soil, alt. ca. 200 m.

Distribution: Spain, Portugal, Sicily, Morocco ¹⁾.

Specimens seen:

Sicily: Todaro 922, Villafrate ²⁾ (JE, U, W); Huet du Pavillon 458 ibid. (E, G, W); Ross 168, Palermo (E, G, HBG, JE, U).

Spain: Ball 751, Ronda M El Hacho ²⁾ (E).

Portugal: Silva, Fontes, Myre and Rainha 1871, Algarve (G, L, LISE, W); Ferreira 1655, Coimbra (W).

85. C. pentapetaloides Linn., Syst. Nat. ed. 12 (3): 229.1766-68; Choisy in DC., Prodr. IX: 406.1845; Willkomm, Prodr. Fl. Hisp. II: 518.1870; Boiss., Fl. Or. IV: 110. 1875; Arcangeli, Compend. Fl. Ital. ed. 2: 373.1894; Dinsmore in Post, Fl. Syr. Palest. et Sinai ed 2, II: 210.1933; Palhinha, Fl. Port. ed. 2: 581.1939.

Type: in herb. Linn. 218.41, Latourette, lectotype (LINN).

C. arcuatus Presl., Fl. Sic.: 33.1826.

* 1) Sauv. et Vindt, Fl. Maroc II: 90.1954.

* 2) Locality from the label.

Type: no specimen mentioned as type.

Plate XIV. fig. 11-19.

An annual, (5-) 12-30 cm high herb, branched from the base. Root slender, perpendicular, 3 mm in diameter. Shoots simple, rarely branched, 2 mm in diameter, more or less densely appressed-puberulous. Leaves herbaceous, sessile; radical and cauline leaves oblanceolate, spatulate or elliptical, 25-35 mm long, 5-10 mm wide, 3.5 - 5 times as long as wide, top obtuse to acute, base attenuate or truncate, margin entire, appressed-pubescent, pinnately nerved. Flowers axillary, solitary, on peduncles which are much shorter than the subtending bract. Lower bracts like the cauline leaves; upper bracts usually with a half-clasping base, linear-lanceolate or linear-oblanceolate to linear, 15-40 mm long, 4-7 times as long as wide, acute, margin plicate. Bracteoles minute, scarious. Pedicel as long as the sepals. Sepals equal, scarious, convex, glabrous, with a narrow membranous margin, 4 mm long, 3 mm wide, ovate-oblong, obtuse, mucronulate. Corolla 9 mm long, with a blue limb and a yellow tube, distinctly lobed and with hairy bands on the outside, but the lower part of the limb and tube quite glabrous, twice as long as the calyx. Stamens unequal, the longest one 5 mm; filaments with glands on the dilated part; anthers quadrate-sagitate, with retuse top. Ovary glabrous, conical, with a ring-shaped disc at the base; style stout, small; stigmas cylindrical, 2.5 times as long as the style. Capsule glabrous, subglobose, 5 mm long and wide, bilocular and 4-seeded; seeds brown, 2 mm long and wide, tuberculate. Fl. March-May, Fr. April-May.

Mountains, hills, fallow fields and edges of fields, maritime and inland clay plains, dry eroded sand, rivers banks, lime stones, calcareous cliffs, at 160-600 m alt.

Distribution: Turkey, Syria, Palestine, Greece, Cyprus, Sicily, Malta, Italy, Sardinia, Balearic Isles, Spain, Portugal, Morocco?

Specimens seen:

Palestine: Kotschy 515, between Gazza et Deirmlak ¹⁾ (W); Dinsmore 4632, Jerusalem (E).

Syria: Haradjian 4123, bet. Homs et Hama (E, W).

Turkey: Bornmüller 3441, Divriq (Divriki) (JE).

Cyprus: Davis 2973 K, Larnaca (E).

* 1) Locality from the label

Greece: Sartori 1464, Paros I, Astros hills ¹⁾ (G).

Italy: Todaro 923, Sicily, Palermo (JE); Müller 43, Sardinia, Cagliari (W).

Balearic Isles: White s.n., Saller Mallorca (E).

Spain: Huter, Porta and Rigo s.n., Malaga, Pizzara (W).

Portugal: Silva, Fontes and Meyre 1890, Algarve (G, LISE).

86. C. pilosellifolius Desr. in Lam., Encycl. III: 551.1789; Choisy in DC., Prodr. IX: 406.1845; Boiss. Fl. Or. IV: 103.1875; Dinsmore in Post, Fl. Syr. Pal. Sin. ed. 2, II: 207.1933; Grigoryev, Fl. USSR XIX: 22.1953; Täckholm, Stud. Fl. Egypt: 172.1956; Rechinger, Fl. Iran (Conv.): 17.1963.

Type: in the Orient, herb. de Jussieu (P).

Plate XIV. fig. 20-28.

A 30-70 cm high perennial herb; base ligneous, branched. Shoots herbaceous, simple or slightly branched, 1.5-2 mm in diameter, appressed-pilose but also covered to a varying degree with spreading hairs. Leaves herbaceous, sessile; radical ones linear-ob lanceolate, 15-40 mm long, 2-9 mm wide, 3.5-7 times as long as wide, acute, base attenuate; the cauline leaves linear-lanceolate, rarely linear-oblong to linear, 20-45 mm long, 3-10 mm wide, 4.5-8 times as long as wide, acute to acuminate, base cuneate, margin entire or, sometimes, repand, indumentum appressed-pilose with or without spreading hairs, pinnately nerved. Flowers either solitary or up to 5 (-8) in an unequal-sided partly dichasial and partly monochasial inflorescence or in a monochasial one. Bracts like the cauline leaves. Bracteoles linear, as long as or shorter than the pedicel, but not exceeding the calyx. Pedicel shorter than the calyx. Sepals unequal, in the lower part hirsute or, rarely, glabrous; the upper part green and always hirsute; the outer ones obovate or oblong acute, 6-7 mm long; the middle one with the right and the left half unequal, one half glabrous and membranous; the inner ones ovate, acuminate, with both halves glabrous and membranous. Corolla pink, 14 mm long, 2-2.5 times as long as the calyx, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the longest one 9 mm; filaments glabrous; anthers broadly oblong-sagittate, with retuse top. Ovary glabrous, ovoid, with a cup-shaped disc at the base; style glabrous, filiform; stigmas

* 1) Locality from the label.

filiform, 1.25 times as long as the style. Capsule glabrous, oblong, 5 mm long, 3.5 mm wide, uni- or bilocular, 3- to 4-seeded; seeds black, 3 mm long, 1.5 mm wide, densely covered with short light-coloured hairs. Fl. Apr. -June. Fr. Jun.

On mountains, in gardens, on calcareous and sandy soils, along riversides and in the steppes; alt. 500-2200 m.

Distribution: Afghanistan; Iran; Turkmeniya USSR; Iraq; Turkey, Syria, Palestine, Transjordan, Egypt, Balkan¹⁾.

a. var. pilosellifolius.

C. sogianus Bung. in Mem. Acad. Impr. Scien. VII: 395.1854.

Type: Lehman s.n., Buchara, USSR lectotype (LE) not seen.

Dietrich, Synop. Plant. Enum. Syst. I: 677.1839 (lapsu: piloselloides).

Leaves linear-lanceolate, 5-10 mm wide, 4.5-6 times as long as wide.

Specimens seen:

Afghanistan: Kerstan 309, between Kandahar and Kushki-Nohod (W).

USSR: Sintenis 1123, Kizye Arvat (Kisil Arwat). Turkmeniya (HBG, L);

Litwinow 1631, Ashkhabad Turkmeniya (W).

Iran: Bornmüller 3880, Shirāz (B).

Iraq: Rechinger 12804, Rutbah (W); Haussknecht 654, Singār-Mosul (W).

Turkey: Sintenis 1051, Mardin (E, GOET, JE, STU, W).

Syria: Barkoudah 1507, Damascus-Dar'aa 'U).

Palestine: Dinsmore 3148, Jordan river (E, L).

U. A. R. (Egypt): Täckholm et al. 117, Sadd Raufa (Isthmic desert, Sinai) (CAI).

b. var. linearifolius Sa'ad nov. var., foliis linearibus a var. typica recedens.

Leaves linear, 3-4 mm wide, 6-8 times as long as wide.

Type: Kóie 268, Būshehr (Bushire), Iran (B).

Specimens seen:

Iraq: Rechinger 9353, As-Salman (W).

U. A. R. (Egypt): Shabetai z 1079, Ain Elgederat, Sinai (CAIM).

c. var. leicalycinus Sa'ad nov. var., sepalis exterioribus in parte basali glabriis, apicem versus appresse pilosis a var. typica et a var. linearifolio

* 1) Grigoryev, l.c. p.23

recedens. Usually, apart from a few short spreading hairs, appressed-pilose; outer sepals oblong, acute, glabrous, but the upper green part appressed-pilose. Type: Haussknecht s.n., Nusiybin (Nisib), Turkey (JE).

Distribution: Turkey.

Specimens seen:

Turkey: Haussknecht s.n., Gazintep (Antib) (P).

87. C. prostratus Forsk., Fl. Aegypt. Arab.: 203.1775.

Type: Forskål herb. 438, Yemen (Arabia Felix) Môr, lectotype (C).

C. microphyllus Sieb. ex Spreng., Syst. Veg. I: 611.1825; Choisy in DC., Prodr. IX: 402.1845; Boiss., Fl. Or. IV: 103.1875; Clarke in Hook f., Fl. Brit. Ind. IV: 218.1883; Baker et Rendle in Thiselton-Dyer, Fl. Trop. Afr. IV, 2: 91.1905; Andrews, Fl. Pl. Sudan III: 106.1956; Täckholm, Stud. Fl. Eryp.: 171.1956.

Type: Sieber s.n., near Achmin U.A.R. Egypt, holotype (LE).

Isotype (L).

C. pluricaulis Choisy, Conv. Or. in Mem. Soc. Phys. Hist. Nat. Genève, 6: 477.1833¹⁾.

Type: Wallick s.n., middle India, (G-DC) seen

Ipomoea microphylla Roth. Nov. Sp. 112.1821.

C. parviflorus Spreng. Syst. 1:611.1825.

Type: Heyne s.n., in east India, holotype (not seen).

Plate XIV. fig. 29-37.

A 14-30 cm high perennial herb, with an indumentum, consisting of hairs pubescent or appressed puberulous mixed with a more or less considerable number of spreading ones. Root subligneous. Shoots prostrate, branched at the base, simple above. Leaves herbaceous, sessile, linear-oblongate, ca 15-20 mm long, 3-5 mm wide, 5 times as long as wide subacute, base attenuate, margin entire, indumentum appressed, but the appressed hairs mixed with spreading ones, uninervate. Flowers axillary, sessile or subsessile, 1-3 together. Bracts linear to linear oblongate, acute, usually longer than the

* 1) It is not known how this volume was published. It may be that Choisy's article was contained in a part issued in 1834, but in the absence of proof it must (according to Prof. F.A. Stafleu) be cited as published in 1833. The date 1834 on p. 606 is no proof that Choisy's paper was published in that year.

short peduncle. Bracteoles small, filiform. Pedicel wanting. Calyx pubescent, longer than the bracteoles. Sepals with an upper green part and a lower colourless one, 4-7 mm long; the outer ones lanceolate to oblong-acuminate; the middle one with the right and the left half unequal, one half hairy and membranous; the inner ones ovate acuminate, with both halves hairy and membranous. Corolla of unknown colour, 6-8 mm long, with hairy bands on the outside, but the tube quite glabrous, twice as long as the calyx. Stamens unequal, the longest one 4 mm; filaments glabrous; anthers sagittate, with retuse apex. Ovary glabrous, with a cupshaped disc at the base; style glabrous, filiform; stigmas filiform, 3 times as long as the style. Capsule subglobose, glabrous, hidden in the calyx, 3 mm long and wide, bilocular, 4-seeded; seeds blackish, with a few short hairs. Fl. Jan. -Apr. Fr. Apr.

In sandy soil.

Distribution: a Saharo-Sindian species.

Specimens seen:

Sudan: Kotschy 354, Haschim, Berber (GOET, HAL, HBG, L, STU, W); Kassas s.n., near Omdurman, 6.3.1954 (CAI).

U. A. R. (Egypt): Kralik s.n., Aswan, 251.1848 (L); Eliot 3461, ibid (E); Abdallah, Sa'ad et Mahdi 1187, W. Allaqi Umm Qureiyat (CAIM, U, WAG).

Arabia: Kruijt 151 b, Jidda (L).

Until now *C. prostratus* was treated as a synonym of *C. pentapetaloides* Linn., as it was wrongly identified with the latter by Vahl.²⁾ When Christensen³⁾ (1922) tried to solve the problems raised by the types of Forskål, he suggested that *C. prostratus* is to be regarded as conspecific with *C. pentapetaloides*. By examining the type of Forskål the present author found that *C. prostratus* is distinct from *C. pentapetaloides*, but that is identical with the species known as *C. microphyllus* Sieb. ex Spreng.

C. pentapetaloides is a Mediterranean species, while *C. prostratus* is a Saharo-Sindian one.

The present author agrees with Heine (1962)⁴⁾ that it is impossible to separate *C. microphyllus* from *C. pluricaulis*.

* 2) Vahl, Symb. II: 36.179

* 3) In Dansk. Bot. Art. 4(3): 1922

* 4) In Kew Bull. 16, 2: 205-206. 1962

88. *C. rhyniospermus* Hochst. ex Choisy in DC., Prodr. IX: 405.1845; Baker et Rendle in Thiselton-Dyer, Fl. Trop. Afr. IV (2): 93.1905; Andrews, Fl. Sud. III: 106.1956; Täckholm, Stud. Fl. Eg.: 172.1956

Type: Kotschy 235, M. Kohn ¹⁾, Nubia, N. Sudan, holotype (G-DC).

Isotypes (GOET, HBG, HAL, L, STU, W).

Icon: Andrews l. c. p. 105, the pistil not correctly drawn.

Plate XIV. fig. 38-45.

A 9-25 cm high annual herb. Root perpendicular, slender. Shoots herbaceous, simple or branched, appressed-pubescent. Leaves herbaceous; petiole 1/10 times as long as the blade; blade of the radical ones linear-oblongate, 15-45 mm long, 3-6 mm wide, ca 5-7 times as long as wide, acute, or obtuse; that of the cauline leaves oblongate or oblong to linear, (15-) 20-45 mm long, (3-) 5-14 mm wide, ca 3-4 times as long as wide, top acute, base cuneate or truncate; margin entire and ciliate, indumentum long appressed-pubescent, pinnately nerved. Flowers up to 6 in an axillary one-armed or two-armed scorpioid cyme; the cymes distributed all along the stem. Peduncle much shorter than the subtending bract. Bracts like the cauline leaves. Bracteoles variable; those of the outer flowers ovate and acute, but these of the inner flowers oblong or lanceolate and situated beside each other in front of the flower, because there is no place for their development in the normal position. Sepals unequal, green, sericeous; the outer ones oblong or lanceolate, acute, 7 mm long; the middle one with the right and the left half slightly unequal; the inner ones 5 mm long, lanceolate, ovate, acuminate, with both halves slightly membranous. Corolla of unknown colour, 5 mm long, hidden in the calyx, glabrous on the outside. Stamens unequal, the longest one 3 mm; filaments with sessile glands on the dilated part; anthers oblong-sagittate, with retuse top. Ovary glabrous, ovoid, with a cup-shaped disc at the base; style glabrous, filiform, as long as the filiform stigmas. Capsule globose, membranous, 4 mm long and wide, bilocular, 2- to 4-seeded; seeds brownish, 2 mm long, 1.5 mm wide, tuberculated or almost smooth. Fl. Jan-Nov. Fr. March-Nov.

In arid spots and plains.

Distribution: Africa; S. Egypt, Sudan, Ethiopia ²⁾, Somaliland ²⁾ and Mossambik ²⁾; Asia: Arabia and north-west India ²⁾.

* 1) Locality from the label.

* 2) Schwartz, Fl. trop. Arab. 202. 1939.

a. var. rhyniospermus

Leaves 30-45 mm long, seeds tuberculated.

Specimens seen:

U.A.R. (Egypt): Khattab 6346, Wady Kanisiröb S. Jeb. Elba (CAIM); Täckholm et al. 26, Wady Idib (CAIM).

Arabia: Khattab 144, Arafaat, Mecca (Hedjaz) (CAIM).

b. var. laevis Sa'ad nov. var. , foliis plerumque minoribus , seminibus subglabris a var. typica recedens.

Typus: Kruijt 191, Jiddah (Djeddah) Arabia (L).

Leaves usually small, 15-20 mm long; seeds almost smooth.

Distribution: known from Arabia only.

89. C. rottlerianus Choisy, Conv. Or. in Mem. Soc. Phys. 6: 477.1833; Choisy in DC., Prodr. IX: 403.1845; Clarke in Hooker, Fl. Brit. India IV (10); 219.1883; Rechinger f., Fl. Iran (Conv.): 21.1963.

Type: Rottler s.n., India Madras (Madura), holotype (G-DC) seen

An appressed-pilose, 25-45 cm high herb. Root perpendicular. Shoots branching. Leaves herbaceous, sessile, linear-oblong to linear, 15-20 mm long, ca 3 mm wide, ca 5-7 times as long as wide, acute, base attenuate, margin entire, indumentum sericeous, pinnately nerved. Flowers along the whole length of the shoot, axillary, solitary or in pairs, on peduncles which may be longer or shorter than the subtending bract. Lower bracts like the leaves; upper ones linear, acuminate. Bracteoles small, as long as the pedicel. Pedicel shorter than the calyx. Sepals unequal, with an appressed-pilose margin; the outer ones ciliate, obovate acuminate, 5 mm long; the middle one with the right and the left half unequal, one half glabrous and membranous; the inner ones obovate-caudate, 4 mm long, with both halves glabrous and membranous. Corolla of unknown colour, 1.5 times as long as the calyx, with distinct lobes and with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the longest one 5 mm; filaments glabrous; anthers oblong and retuse. Ovary glabrous or with a few hairs at the top; style glabrous, filiform, twice as long as the filiform stigmas. Capsule subglobose, 5 mm long, 4 mm wide, bilocular, 4-seeded; seeds black, 2 mm

long, 1.5 mm wide, covered with short stout hairs; sepals slightly accrescent round the fruit.

Distribution: Afghanistan ¹⁾, Pakistan ¹⁾, India ¹⁾.

Specimens seen from India, not from Afghanistan, but according to Rechinger l.c. this species occurs in Afghanistan too.

90. *C. sabatius* Viv., Fl. Lib. Spec.: 67.1824; Arcangeli, Fl. Ital. ed. 2: 374.1894; Sauv. et Vindt, Fl. Maroc. II: 40.1954.

Type: Viviani s.n., Italy, W. Liguria, Capodi Noli ²⁾ near Vada Sabatia, holotype (GE), not seen.

Isotype: (G-DC).

Incorrectly referred to *C. pseudosiculus* Cav. var. *multiflorus* Choisy by Choisy in DC., Prodr. IX: 407.1845.

Plate XIV. fig. 46-54.

Perennial, 15-30 cm high herb. Root ligneous, 5 mm in diameter. Stem base ligneous, branched. Shoots simple, herbaceous, 1.5 mm in diameter, appressed-puberulous or appressed-pubescent to villous. Leaves herbaceous; petiole ca 1/3 - 1/6 times as long as the blade; the blade ovate or suborbicular, 12-22 mm long, 8-21 mm wide, ca 1-1.2 times as long as wide, obtuse, base cuneate, margin entire, on both sides pubescent or sometimes glabrescent above, pinnately nerved. Flowers either axillary or up to 3 in axillary monochasia. Bracts like the leaves, as long as or shorter than the peduncle. Bracteoles filiform, shorter than the pedicel, but when the number of flowers is 2 or 3, the bracteoles are longer than the pedicel, though not exceeding the calyx. Sepals unequal, appressed-pubescent or villous; the outer ones 7-8 mm long, elliptical, acute, with a green upper part and a colourless lower part; the middle one with unequal halves, one half glabrous and membranous; the inner ones 6 mm long, lanceolate-oblong, or lanceolate, acuminate, with 2 auricles at the base, both halves glabrous and membranous. Corolla pink or violet, 20 mm long, 2.5 times as long as the calyx, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the

* 1) Rechinger l.c.

* 2) Locality given on the label.

longest one 8 mm; filaments with sessile glands on the dilated part; anthers sagittate, with retuse apex. Ovary glabrous, broadly ovoid, with a glabrous cup-shaped disc at the base; style glabrous, filiform, as long as the filiform stigmas. Capsule glabrous, subglobose, 6 mm long and wide, bilocular, with 3 or 4 seeds; seeds brown, tuberculated, 3.5 mm long, 2.5 mm wide. Fl. March-Jul. Fr. June-Jul.

Mountains, hills, calcareous rocks, bare gravel, maritime basalt and cultivated fields, alt. 276-2600 m.

Distribution: Italy, Morocco, Algeria.

a. var. sabatius.

Plant slightly appressed-puberulous; upper side of the leaves glabrous.

Specimens seen:

Italy: Fiori, Béguinot et Pampanini 328, W. Liguria, di Noli (E).

Morocco: Spence 5.84, Grand Atlas, near Asif Arons (E).

b. var. mauritanicus (Boiss.) Sa'ad nov. status.

ssp. mauritanicus (Boiss.) Murbeck, Contr. Fl. Maroc. II: 19.1923.

Basionym: C. mauritanicus Boiss., Voy. Esp.: 418.t.122.1839-45.

Type: Séjourné s.n., Constantine, Algeria, holotype (G-Boiss.).

Plant densely appressed-pubescent to villous, leaves on both sides hairy.

Specimens seen:

Algeria: Choulette 364, Constantine (W).

Morocco: Lindberg 3277, Grand Atlas near Asni (W); Sauvage 2423, Ayachi (RAB).

91. C. sículus Linn., Sp.pl.1: 156.1753; Desr., in Lam., Encycl. III: 540.1789; Desf., Fl. Atl. I: 174.1789; Choisy in DC., Prodr. IX: 407.1845, Willkomm, Fl. Hisp. II: 518.1870; Boiss., Fl. Or. IV: 109.1875, Halacsy, Consp. Fl. Gr. II: 307.1902; Cost., Fl. Franc. II: 569.1903; Dinsmore in Post, Fl. Syr. Palest. Sin. ed. 2, II: 210.1933; Sauvage et Vindt, Fl. Maroc. II: 32.1954, Täckholm, Stud. Fl. Eg.: 174. 1956.

Type: in herb. Linn. 218.40, lectotype (LINN).

Icon.: Bot. Reg. VI. t. 445. 1820.

C. ovatus Moench, Meth.: 450.1794 (nom. illegit.).

C. parviflorus, Salisb., Prodr.: 125.1796 (nom. illegit.).

Plate XV. fig. 1-8.

A (4) 10-35 (60) cm high herb, branched from the base. Root thin, perpendicular. Shoots thinly herbaceous, simple, elongate, flexuous, hirsute. Leaves thinly herbaceous; petiole ca $1/3$ - $1/6$ times as long as the blade; the blade ovate or lanceolate, 26-60 mm long, (4-) 15-25 mm wide, ca 1.2-2 times as long as wide, acute or acuminate, base cuneate, truncate or slightly cordate, margin entire, ciliate, indumentum appressed pubescent, pinnately nerved. Flowers distributed along the whole length of the shoot, solitary or in pairs in the axil of the bracts. Bracts like the leaves. Peduncle shorter or, rarely, longer than the subtending bract. Bracteoles either small and then usually shorter than the pedicel, or leaflike and then always longer than the pedicel. Pedicel either absent or short or exceeding the calyx. Sepals unequal, with an upper green part and a lower colourless one; the outer ones 6-7 mm long, obovate, acute, the upper green part with a ciliate margin, the lower part partly membranous; the middle one similar to the inner ones, 6 mm long, 2 mm wide, with both halves glabrous and membranous. Corolla blue, 8-9 mm long, with distinct lobes and with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous, 1.5 times as long as the calyx. Stamens unequal; filaments with sessile glands on the dilated part; anthers sagittate, with a retuse apex. Ovary glabrous, subglobose, with a cupshaped disc at the base; style glabrous; stigmas filiform, twice as long as the style. Capsule subglobose, 5 mm long and wide, glabrous, membranous, bilocular and 4-seeded; seeds nearly black, tuberculate, 3 mm long, 2 mm wide. Fl. Fr. March-May, but in hot parts Fl. Jan-Febr. Fr. Febr.

In fields, on stream banks, in sandy places, on the foot of mountains, on calcareous soils; alt. 250-400 rarely 900 m.

Distribution: Canary Isl., Madeira, Morocco, Algeria, Libya, Egypt (up to G. Elba), Palestine, Syria, Hedjaz, Italy, S. France, Spain, Portugal, Corsica, Sardinia, Malta, Isl. Euboea, Balearic Isl.

a. ssp. siculus.

var. major Choisy in DC., Prodr. IX: 407.1845.

Type: herb. Mart. 441, without locality, holotype (G. DC).

ssp. eu-siculus Maire, Cat. Pl. Maroc. III: 590.1934 (nom. illegit.).

var. typicus Fiori, vide Sauvage et Vindt l.c. (nom. illegit.).

C. flexuosus (Pomel) Battandier, Fl. Alger. II: 545.1888.

Type: Pomel s.n., Garrouban, Algeria, holotype (AL) not seen.

Pedicels shorter than the calyx, sometimes absent. Bracteoles lanceolate to linear-lanceolate. Leaves ovate.

Specimens seen:

Egypt: Elliot 3711, near Lake Mariut, Alexandria (E).

Libya: Taubert 159, Derna (JE).

Portugal: Rothmaler 13485, Prov. Estramadura, Arrabida, Portinho (G).

Canary Isl.: Bornmüller 268, La Palma Cáldera (HBG, W).

Madeira Isl.: Mandon s.n., Ribero (P).

Sicily: Rigo 136, Prov. Syracuse, Avola (HBG).

France: Huet 102, Var., Toulon (G, L, W).

Jordan : Simpson 53099, River Zarga, Deir Atta (BM)

Palestine: Meyers et Dinsmore 5488, Deir Aban (E).

b. ssp. agrestis (Hochst. ex Schweinf.). Verdcourt in Kew Bull. 2: 344.1957, emend Sa'ad.

C. agrestis (Hochst. ex Schweinf.) Hallier f. in Bot. Jahrb. 18:101.1894, non (Martex) Choisy, 1845.

Evolvulus agrestis Hochst. ex Schweinf., Beitr. Fl. Aethiop.: 92.1867, vide Hallier f. l.c.

Bracteoles small. Pedicel long, much longer than the calyx. Leaves usually more distinctly oblong-ovate, 2-2.5 times as long as wide. Plants robust.

c. var. agrestis.

Plant robust, perennial. Leaves elongate. Invades tropical and subtropical regions.

Distribution: Trop. Africa, Arabia.

Specimens seen:

Arabia: Khattab s.n., Wady Deli, Abha (CAIM).

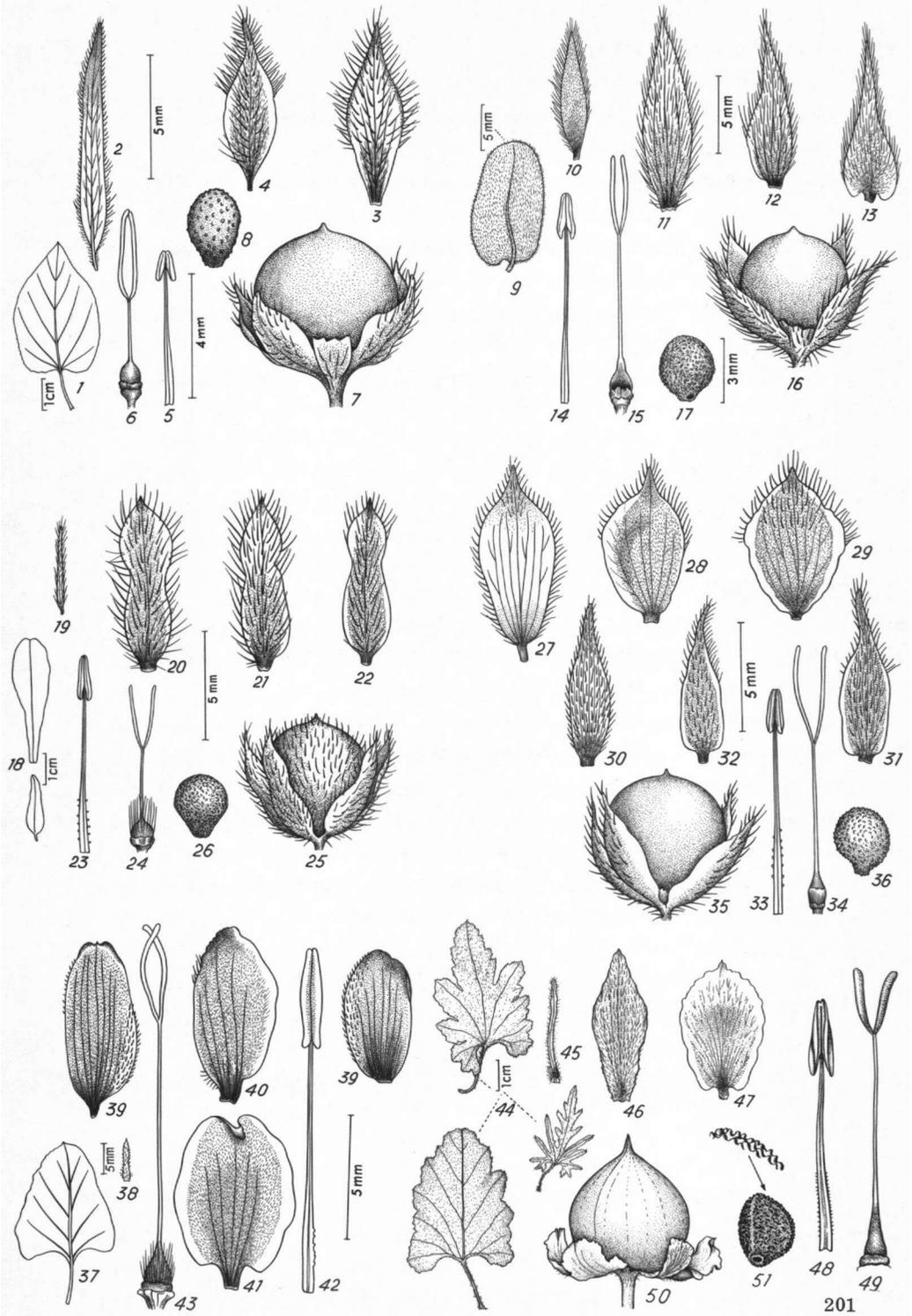
Ethiopia: Pappi 1757, Deca-Meré (W).

d. var. elongatus (Willd.) Battandier, Fl. Alg. II: 595.1888.

C. elongatus Willd., Enum. Hort. Berol.: 205.1809.

Type: a cultivated specimen in Hort. Berol., supposed to be introduced from the

Plate XV. fig. 1-8 *G. siculus* var. *siculus*; 1: leaf; 2: bracteole; 3: outer sepal; 4: inner sepal; 5: stamen; 6: pistil; 7: capsule; 8: seed [1-18: Sharobiem et Shalaby 942 (CAIM)]; fig. 9-17 *C. supinus*; 9: leaf; 10: bracteole; 11: outer sepal; 12: middle sepal; 13: inner sepal; 14: stamen; 15: pistil; 16: capsule; 17: seed [9: Raymond 13 k (RAB); 10-15: Letourneaux 2 (C); 16, 17: Kralik 68 (C)]; fig. 18-26 *C. tricolor* var. *tricolor*; 18: leaves; 19: bracteole; 20: outer sepal; 21: middle sepal; 22: inner sepal; 23: stamen; 24: pistil; 25: capsule; 26: seed [18-24: Roes 168 (L); 25, 26: Faure s.n. (U)]; fig. 27-36 *C. valentinus*; 27-29 var. *valentinus*; 27: outer sepal; 28: middle sepal; 29: inner sepal; 3-32 var. *suffruticosus*; 30: outer sepal; 31: middle sepal; 32: inner sepal; 33: stamen; 34: pistil; 35: capsule; 36: seed [27-29; Pav 2470 (W); 30-34: Balansa 358 (W); 35, 36: Bourgeon 80 (GOET)]; fig. 37-43 *C. aleppensis*; 37: leaf; 38: bracteole; 39: outer sepals; 40: middle sepal; 41: inner sepal; 42: stamen; 43: pistil [37-43: Kotschy 232 typus (P)]; fig. 44-51 *C. althaeoides* var. *althaeoides*; 44: leaves; 45: bracteole; 46: outer sepal; 47: inner sepal; 48: stamen; 49: pistil; 50: capsule; 51: seed [44-49: van Soest 131 (L); 50, 51: Bolous s.n. (CAIM)].



Canary Isl. (B + ?), not seen.

C. pseudosiculus Cav., Desc.: 97.1802.

Type: Cavanilles s.n., a cult. specimen (MA ± ?), not seen.

C. refractus Pomel, Nouv. Mat. Fl. Atl. I: 84.1874.

Type: Pomel s.n., Garrouban, Mersel-Kebir, Algeria, holotype (AL), not seen.

Plant annual, slender, much smaller than the variety *agrestis*. Root slender. Leaves lanceolate.

Distribution: probably the same as that of the var. *siculus*

Specimens seen:

Egypt: Drar a 323/33, G. Elba (CAIM); Täckholm and al. 427, Gebel Shallal (CAI).

Morocco: Balansa 359, near Oran (E).

92. *C. supinus* Coss. et Kral. in Bull. Soc. Bot. Fr. IV: 400.1857; Battandier, Fl. Alg. II: 593.1888; Sauvage et Vindt, Fl. Maroc. II: 41.1954; Quezel et Santa, Nouv. Fl. Alger, Reg. Desert. Merid. II: 757.1963.

Type: Bourgeau 60, Ain Sefra, S.W. prov. Oran, Algeria, lectotype (P).

Isotypes (C, E, GOET, W).

C. brevipes Pomel, Nouv. Mat. Fl. Atlant. I: 86.1874.

Type: Pomel s.n., Oasis sahariene, Al Abiod Sidi Cheikh ¹⁾, Algeria, holotype (AL), not seen.

Isotype (MPU).

C. leucotrichus Pomel l.c. p. 87.

Type: Pomel s.n., sables saharienses, Matliti ¹⁾, Algeria, holotype (AL), not seen.

Isotype (P).

C. supinus var. *sulphurescens* Maire et Wilczek, Contr. Etud. Fl. Afr. Nord 22 in Bull. Soc. Hist. Nat. Afr. Nord, 25: 311.1934.

f. *sulphurescens* (Maire et Wilczek) Sauv. et Vindt l.c.

Type: Maire et Wilczek s.n., Tazzougert, S.E. Morocco, holotype (AL), not seen.

Isotype (RAB).

Plate XV. fig. 9-17.

* 1) Locality given on the label.

A 10-35 cm high perennial herb; base ligneous, strongly branched. Root ligneous, ca 4 mm in diameter. Shoots herbaceous, simple or slightly branched, hollow, 1-1.5 mm in diameter, villous-tomentellous, flowering in the upper half. Leaves herbaceous; petiole $1/6$ - $1/10$ times as long as the blade; the blade ovate or lanceolate, 10-15 mm long, 7-8 mm wide, ca 1.4 - 2 times as long as wide, acute, subacute or obtuse, sometimes mucronulate, base subcordate, margin entire, villous, (less hairy above and sometimes but sparsely hairy), pinnately nerved. Flowers 1-3 in axillary monochasia. Peduncle as long as or shorter or longer than the subtending bract. Bracts like the leaves. Bracteoles linear, acute, longer than the pedicel, but not exceeding the calyx. Pedicel half as long as the calyx. Sepals 8-11 mm long, unequal; the outer ones densely-villous, elliptical, acute or acuminate, usually green with a colourless base, 3 mm wide; the middle one with the right and the left half unequal, one half membranous; the inner ones with long sericeous hairs, convex, ovate-lanceolate, acuminate, with both halves membranous. Corolla white, 20-27 mm long, ca. 2.5 times as long as the calyx, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens subequal; filaments with sessile glands on the dilated part; anthers oblong, with obtuse apex. Ovary ovoid, glabrous or with a few hairs at the top; style glabrous, 1.5 times as long as the filiform stigmas. Capsule subglobose, 5 mm long and wide, glabrous or with few hairs at the top, bilocular and 3- to 4-seeded; seeds black, 3 mm long, 2 mm wide, tuberculated. Fl. April-Jun. Fr. May-Jun.

In sandy soils and aggregate mobile sand, alluvial sandy gravels, calcareous rocks, in uncultivated parts as well as in fields, alt. 1800 m.

Distribution: Morocco, Algeria, Tunisia, Libya.

Specimens seen:

Algeria: Chevallier 224, Metlili (HBG, JE, STU); Battandier et Trabut 466, Ain Sefra (GOET, L); Dosseler 5082 *ibid.* (STU).

Tunisia: Kralik 398, Gabés, paratype (HAL, STU, W); Pitard 442, Matmata ¹⁾ (E, L).

Libya: Letourneaux 2, Oasis Tripolitania, sine locality (C); Sandwith 2087 et Simpson 39043, Wadi Zemzem ¹⁾, 40 km E. Bâirat (BM); Keith 556, Wadi Ghirza ¹⁾, S. Beni Ulid (K).

* 1) Locality given on the label.

93. *C. tricolor* Linn., Sp. Pl. 1: 158.1753; Choisy in DC., Prodr. IX: 405.1845; Willkomm, Prodr. Fl. Hisp. II: 517.1870; Boiss., Fl. Or. IV: 93.1875; Arcangeli, Compend. Fl. Ital. ed. 2: 373.1894; Halacsy, Conspect. Fl. Graec. II: 306.1902; Coste, Fl. Franc. II: 569.1903; Borg, Descript. Fl. Maltes. Isl.: 451.1927; Sauvage et Vindt, Fl. Maroc. II: 48.1954.

Type: in Hortus Siccus Cliffortianus (BM).

C. versicolor Salisb., Prodr.: 125.1796 (nom. illegit.)

Plate XV. fig. 18-26.

An (-10) 18-60 cm high herb, branched from the base. Root perpendicular. Shoots simple or slightly branched, 1-2.5 mm in diameter, appressed-puberulous with an admixture of long spreading hairs. Leaves herbaceous, sessile; radical ones obovate or spatulate to oblanceolate, 20-70 mm long, 6-17 mm wide, ca 2.7 - 4 times as long as wide, obtuse or subacute, base attenuate; cauline leaves like the radical ones, (15-) 22-70 mm long, 8-30 mm wide, ca 2.5-5 times as long as wide, base half-clasping; margin entire, ciliate, indumentum appressed-pubescent, pinnately nerved. Flowers axillary, on a slender peduncle. Peduncle as long as or shorter or longer than the subtending bract. Bracts acute or obtuse, variable, oblanceolate or oblong, with a broad base, 10-38 mm long, 4-8 mm wide, 2.5-4 times as long as wide. Bracteoles small, filiform, shorter than the pedicel. Pedicel as long as the calyx or longer. Sepals unequal, 5-9 mm long, consisting of a lower convex and colourless part, and an upper green, acute or acuminate one, which may be shorter or longer than the colourless one; the outer sepals either oblong and acute, or elliptic and acuminate, hirsute; the middle one with the right and the left half unequal, one half glabrous and membranous; the inner ones with both halves glabrous and membranous. Corolla three-coloured, the upper part blue, the middle one white, the lower yellow, 20-30 mm long, 2.5-3 times as long as the calyx, with hairy bands on the outside, but the tube quite glabrous. Stamens unequal, half as long as the corolla; filaments with sessile glands on the dilated part; anthers oblong-sagitate, with retuse top. Ovary ovoid, densely hirsute, with a glabrous cupshaped disc at the base; style glabrous, as long as the filiform stigmas. Capsule hairy, globose, 5-7 mm long and wide, as long as or shorter than the calyx, bilocular, 4-seeded; seeds dark brown, trigonous, 3 mm long, 2 mm wide, tuberculate. Fl. & Fr. May-July.

In tilled fields, on limestone soil, in clay pastures, at the base of mountains; alt. up to 900 m.

Distribution: Algeria, Spain, Portugal, S. France, Italy, Greece.

a. var. tricolor.

C. pseudotricolor Bert., Fl. Italic. II: 450.1835.

Type: Bertoloni s.n. near Genova (Genoa), holotype (BOLO), not seen.

var. *pseudotricolor* (Bert.) Fiori, vide Sauvage et Vindt l.c.

f. *tetrachrous* Maire et Wilcz., Contr. 1886 in Bull. Soc. Hist. Nat. Afr. Nord 25: 311.1934.

Type: Maire et Wilczek s.n., Mont Zalagh near Fès (AL), not seen.

var. *hortensis* Batt., Fl. Alger. II: 594.1888.

ssp. *hortensis* (Batt.) Maire, Contr. 415 in Bull. Soc. Hist. Nat. Afr. Nord 19: 61.1928.

Type: Icon, Reichenbach f., Icon. Fl. German. Helvet. in Fl. German. Excur. XVIII: t. 137 f. I, II, 1-10.1858.

C. maroccanus Batt. in Bull. Soc. Bot. France 58: 187.1911.

Type: Gentil s.n., Casablanca, holotype (AL), not seen.

Flowers up to 4 cm long; the green upper part of the sepals acute, smaller than the lower colourless part.

Specimens seen:

Greece: Despréaux 1385, Pelopónnese (Morea), M. Daryos (G).

France: Hanry 3434, Var, Luc (JE).

Portugal: Cunha 1435, Lisboa (LISE); Fontes, Meyre, Rainha et Silva 1390, Estramadura, Malveira (LISE).

Spain: Stud. Biol. Rheno-Trai. 1181/1962, Tarifa (U); Huter, Porta et Rigo 342, Malagan (E, STU, W).

Algeria: Gandoger 969, Algiers (C, STU).

b. var. cupenianus Sa'ad nov. var., sepalis acuminatis, parte superiore viridi bis usque ad ter longiore quam pars inferior decolor a var. typica et a var. heterocalyce recedens.

C. cupenianus Todaro in Bull. Sc. Nat. Ser. IV (20):304.1863 (nom. nud.)

ssp. *cupenianus* (Tod.) Maire Contr. 415 in Bull. Soc. Hist. Nat. Afr. Nord. 19: 61.1928 (invalid, sine descr.); Sauv. et Vindt l.c. p. 50 (invalid, sine descr. lat.).

ssp. cupenianus var. *guttatus* Batt. et Maire Contr. 415. l.c.

no specimen mentioned as type.

var. *quadricolor* Batt. et Maire, Contr. 415. l.c.

no specimen mentioned as type.

Flowers relatively small; the green upper part of the sepals acuminate, 2-3 times as long as the lower colourless part.

Specimens seen:

Sicily: Ross 168, Palermo (B, E, G, J. E. W); Todaro 11, *ibid.* (W).

Algeria: Bams 52, Koddara W. N. W. of Palestro (L); Dosseler D 5082, Oran, Djebel Tessala (STU).

c. var. *heterocalyx* Maire, Contr. 2310 in Bull. Soc. Hist. Nat. Afr. Nord. 28: 369. 1937.

Type: Maire s.n., between Asfreville Miliana, Algeria (AL), not seen.

Isotype (P).

Sepals with the lower part but slightly lighter in colour, the upper part green, 11-12 mm long, while the lower part is 2-3 mm long.

Specimens seen:

Algeria: Choulette 163, Moissons, S. Constantine (W).

94. *C. valentinus* Cav., Ic. II: 65. t. 180. f. 2. 1793 or 1794; Choisy in DC., Prodr. IX: 402. 1845; Willkomm, Prodr. Fl. Hisp. II: 515. 1870; Sauvage & Vindt, Fl. Maroc. II: 42. 1954.

Type: Cavanilles s.n., Benitachell, Spain, holotype (MA).

Plate XV. fig. 27-36.

A 20-40 (-10) cm high perennial herb, strongly branched from the base, with a more or less dense indumentum consisting either of appressed hairs only or of appressed hairs with a more or less important admixture of spreading ones. Root perpendicular, ca 3 mm in diameter. Shoots herbaceous, hollow, simple, rarely branched, flowering in the upper half. Leaves herbaceous, petiole ca 1/10 the length of the blade; the blade linear-lanceolate or linear, 12-43 mm long, 2-8 (-12) mm wide, ca. 3.5-10 times as long as wide, acute, subacute or acuminate, mucronulate, base truncate, margin entire, ciliate,

indumentum appressed-pubescent, pinnately nerved. Flowers solitary or 2-3 in an axillary monochasium. Peduncle as long as or longer or shorter than the subtending bract. Bracts like the leaves, but acute or acuminate and with a shorter petiole. Bracteoles usually filiform, longer than the pedicel but not exceeding the calyx; if the number of flowers is more than one, the bracteoles of the one or two lower flowers become linear. Sepals 1-1.5 times as long as the pedicel, either with long spreading hairs or with short appressed ones; the outer sepals 5-10 mm long, oblong, acuminate or elliptical, 1.7-3.5 times as long as wide; the shape of the middle and inner ones depends upon that of the outer ones; the middle one always with the right and the left half unequal; the inner ones with both halves membranous, either as long as the outer ones, oblong, acuminate and at the base, with two small auricles or longer than the outer ones and then obovate, acuminate and with a rounded base. Corolla varying in colour, pale-pink, violet-red or rarely yellow, 20-25 mm long, 2.5 times as long as the calyx, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the longest one 12 mm; filaments with sessile glands on the dilated part; anthers oblong, slightly retuse at the apex. Ovary glabrous, ovoid, with a toothed cupshaped disc at the base; style glabrous; stigmas filiform, as long as the style. Capsule glabrous, subglobose, 5 mm long and wide, bilocular, 3- or 4-seeded; seeds black, tubercled, 3 mm wide and long. Fl. Apr.-Jul. Fr. May-Jul.

In tilled and fallow fields, on arid and calcareous hills, on slopes, on stony soils.

Distribution: Spain, Morocco, Algeria.

a. var. valentinus

ssp. eu-valentinus Maire in Maire & Jehandiz, Catal. Pl. Maroc. III. 588. 1934 (nom. illegit).

var. typicus Maire l.c. (nom. illegit).

var. transfretanus Pau & Font-Quer ex Sauv. et Vindt, Fl. Maroc. II: 43. 1954 (nom. invalid, sine descr. lat.).

Leaves 6-10 times as long as wide; plant slightly hairy, most of the hairs appressed but a few spreading; outer sepals broadly elliptical with short + appressed hairs.

Specimens seen:

Spain: Pau 2470, Valencia, Benitachell (W); Porta & Rigo 67, Almeria, Barrando

de Caballer (B, E, W).

Algeria: Battandier et Trabaut 555, Oran (GOET, L).

Morocco: Sennen & Mauricio 7642; Sidi-Auriach, Grurugū (RAB, W); Font Quer 356, near Hassi Berkan (Ulad Setut) (RAB).

b. var. suffruticosus (Desf.) Pau & Font Quer, vide Sauvage et Vindt l. c.
C. suffruticosus Desf., Fl. Atlant. I: 175. t. 48. 1798.

Type: Desfontaine s. n., Tlemcen, Algeria, holotype (P).

var. oranensis Pomel, Nouv. Mat. Fl. Atlant. I: 86. 1874.

Type: Pomel s. n., Bou-Tlélis, Prov. Oran, Algeria (AL), not seen.

var. melliflorus Pau, Una visita bot. Rif. in Ann. Scient & Acad. polyt.

Porto VI: 99. 1911 vide Sauvage et Vindt l. c.

var. melilensis Pau l. c. vide Sauvage et Vindt l. c.

f. sulfureus Battandier, Fl. Atl.: 61. 1919, vide Sauvage et Vindt l. c.

var. transiens Maire et Wilczek, Contr. etud. Fl. Afr. Nord. fase 22, in Bull. Soc. Hist. Nat. Afr. Nord. 25: 311. 1934.

Type: Maire et Wilczek s. n., Tazzaugert S. E. Morocco (AL), not seen.

var. adpressipilis Maire et Wilczek l. c. 1934.

Type: Maire et Wilczek s. n., NE d'Erfoud, Morocco (AL), not seen.

Isotype (RAB).

var. simulans Maire, Contr. etud. Fl. Afr. Nord Fasc. 24 in Bull. Soc. Hist. Nat. Afr. Nord. 27: 250. 1936.

Type: Nain s. n., Midett, lectotype, not seen.

var. embergeri Sauv. et Vindt l. c. 1954, nomen invalid (sine descr. lat.).

var. eu-suffruticosus Maire l. c. 1934, nom. illegit.

Leaves 4 times as long as wide, usually densely hirsute beneath and the upper side of the leaves more or less hairy. Outer sepals oblong, long acuminate, densely hirsute.

Occurring together with the typical form, except in Benitachell, Spain, where only the variety valentinus has been found.

Specimens seen:

Spain: Hueter, Porta & Rigo 338, Bárusto del Caballer near Almeria (C, E, G, W).

Morocco: Sennen & Mauricio 9470, M. Kebdana ¹⁾ (RAB, W).

* 1) Locality given on the label.

Algeria: Balansa 358, Miserghen ¹⁾ (E, GOET, W).

I do not agree with Sauvage & Vindt l.c. 1954 who divide the species into a large number of infraspecific taxa; in my opinion it can be divided only into two varieties, viz. var. *valentinus* and var. *suffruticosus*.

Sectio C. Convolvulus.

Shoots and branches or at least the branches twining; herbs or subshrubs.

Subsectio 11. Convolvulus

Annual or perennial herbs (but the shoots always annual).

95. C. aleppensis Sa'ad nov. spec.

Plate XV. fig. 37-43.

Herba. Pars basalis caulis primarii et plantae pars subterranea ignotae; Caules graciles, 2 mm diam., non vel parce ramificati, quadrangulares, sparse puberuli, sinistrorse (helicticale) volubiles. Folia petiolo laminae aequilongo instructa; lamina rigide herbacea, ovata, circ. 25 mm longa et 20 mm lata, basi hastata, apice acuta vel subacuta, utrimque sparse puberula, margine integra, nervis principalibus tribus subtus prominentibus, nervis ordinis secundae pinnatis. Flores solitarii vel bini in axillis bractearum inserti, pedunculo longo et gracili elati. Bractee plerumque foliis sterilibus similiores, raro apice obtusae, pedunculo multo breviores. Bracteolae filiformes, pedicello multo breviores. Pedicellus quam sepala interiora bis longior. Sepala inaequalia, duo exteriora etiam inaequalia, quam interiora multo breviora, oblonga, 4-5 mm longa, apice retusa et mucrone recurvato instructa, parce puberula, cum dimidio dextro a dimidio sinistro diverso, dimidio altero apice ciliato, altero apice glabro; sepalum medianum 6 mm longum, cum dimidio dextro a dimidio sinistro diverso, dimidio altero glabro et membranaceo; interiora elliptico-oblonga, 7 mm longa, apice retusa et mucronulata, basi truncata, in parte mediana parce pilosa, ceterum glabra et membranacea. Corolla colore ignoto, 25 mm longa, segmentorum quinque unoquoque extus virga mediana saturatiore, extus apicem versus parce pilosa instructo. Stamina inaequilonga; filamenta ad basin dilatata glandulis sessilibus vestita; antherae oblongae, apice acutae. Ovarium dense velutinum, basi disco annulari glabro circumdatum; stylus parce pilosus, quam stigmata teretia ter longior. Capsula nondum visa. Florens mensi Maio.

* 2) Locality given on the label.

Typus: Kotschy 232, in agro prope Aleppo, Syria (P).

Distribution: known from Syria only.

This species differs from *C. arvensis* L. in the puberulous indumentum by which nearly all its parts are covered, in its pedicels, which are twice as long as the outer sepals, and in the densely velutinous ovary which at its base is surrounded by an annular disc, from *C. betonicifolius* Müll. because it is less hairy and because its outer sepals are shorter than the inner ones and obtuse and mucronulate, and from *C. longipedicellatus* Sa'ad in its narrower, acute or subacute leaves, its filiform bracteoles and its but slightly hairy sepals, of which the outer ones, moreover, are much shorter than the inner ones.

96. *C. althaeoides* L., Sp.Pl. 1: 156.1753; Choisy in DC., Prodr. IX: 409.1845; Willk. Prodr. Fl. Hisp. II: 519.1870; Boiss., Fl. Or. IV: 106.1875; Lowe, Mann. Fl. Mad. II, 1: 58.1898; Halacsy, Consp. Fl. Graec. II: 308.1902; Cost., Fl. Franc. II: 570.1903; Borg, Descrip. Fl. Malt. Isl.: 452.1927; Bouloum, Fl. Lib. Syr. text: 229.1930; Sauvage & Vindt, Fl. Maroc. II: 23.1954; Täckholm, Stud. Fl. Egypt: 172.1956.

Type: in Linn. herb. 218.26 (LINN), seen; the description of the species in Linn. l. c. agrees with the specimen chosen as the type.

Plate XV. fig. 44-51.

A 15-35 cm high herb; strongly branched from the base. Root ligneous or slender. Shoots herbaceous, hollow, simple, 1-3 mm in diameter, usually with the upper part twining, indumentum variable, sometimes consisting of long and spreading to more or less appressed hairs and sometimes shortly sericeous. Leaves herbaceous; petiole as long as or sometimes longer than the blade; the blade of the radical ones cordate-ovate or ovate-elliptic, 20-32 mm long, 10-20 mm wide, 1.6-2 times as long as wide, obtuse or subacute, base cordate, margin crenate or sometimes crenate-plicate; the blade of the cauline leaves like that of the radical ones, 20-70 mm long, 15-45 mm wide, 1.3-2 times as long as wide, sometimes irregularly serrate, densely velutinous or sometimes sericeous, pinnately nerved. Flowers confined to the upper part of the stem, axillary on a peduncle as long as or longer or shorter than the subtending bract. Bracts 15-60 mm long, 10-45 mm wide, 1.25-1.5 times as long as wide, with

a petiole $\frac{1}{3}$ the length of the blade; the bracts resembling the leaves in the variability of their indumentum, and they are also very variable in shape; they may, moreover, be pedate or three-lobed with the middle lobe longer and serrate, that of the upper ones being usually more deeply divided than that of the lower ones; it is occasionally very deeply serrate. Flowers solitary or in a monochasium; in the case of the solitary flowers the bracteoles are awl-shaped, but if the flowers occur in groups of three, the bracteoles become linear and as long as the pedicel. The pedicel is 1-1.5 times as long as the calyx. The sepals are equal in length, 8 mm long; the outer ones pubescent or glabrescent, either obovate, obtuse and mucronulate or broadly elliptical and acute, but in both cases with an undulate scarious margin; the middle one usually with the right and the left half unequal, with one half membranous; the inner ones obovate, obtuse and mucronulate, convex, with both halves membranous and with a small auricle at the base; rarely the three inner sepals identical. Corolla pink, rarely white, 25-40 mm long, 4-5 times as long as the calyx, funnel-shaped, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the longest one 15 mm; filaments with sessile glands on the dilated part; anthers oblong, slightly retuse at the top. Ovary glabrous or slightly hairy, conical, with a shallow fleshy cupshaped disc at the base; style glabrous, stout, twice as long as the cylindrical stigmas. Capsule glabrous, subglobose, 7 mm long and wide, dehiscence regularly from above, bilocular, 4-seeded; seeds brown, tubercled, 5 mm long, 2.5 mm wide, Fl. March-June, Fr. April-Jul.

Sandy calcareous fields, garigue, maritime sands, on mountains, dry hills, slopes, in olive grooves, thickets and hedges, calcareous rocks, bare fields, Alt. 50 - 1150 m.

Uses: picked and fed to cattle when green.

Distribution: Madeira, Canary Isl., Mediterranean region.

a. var. althaeoides.

nom. illeg. *C. gracilis* Salisb. 124.1796.

C. bryoniaefolius Sims, Bot. Mag. t. 943.1806.

Type: Icon l.c.

As this species occurs only in the Mediterranean region, so the seeds could not have been sent from China, as stated by Sims.

C. hirsutus Tenore, Fl. Nap. I: 60. t. 15. 1811-15.

Type: Tenore s.n., Capri, lectotype (NAP), not seen.

C. argyreus DC., Fl. Franc. Suppl.: 423.1815.
 var. *argyreus* Choisy l.c.
 Type: Breslau s.n., Calabria, Italy (G-DC).
C. italicus Roem et Schult., Syst. IV: 266.1819.
 Type: no specimen mentioned as type.
C. alceaefolius Chaub., Fl. Pélop. 14.1832.
 Type: Chaubard s.n., Módon, Greece, lectotype (P).
C. althaeoides var. *nanus* Choisy l.c.
 var. *hirsutus* Choisy l.c.
 var. *ferrugineus* Choisy l.c.
 var. *sericeus* Choisy l.c.
 of none of these varieties a type was indicated.
 var. *typicus* Fiori public. not known; vide Sauv. et Vindt l.c. nom. illeg.
 var. *repandus* Faure et Maire in Maire, Contr. 1293 in Bull. Soc. Hist. Nat. Afr. Nord, 23: 200.1932.
 Type: Faure s.n., Oran, Santa-Cruz, Algeria (AL), not seen.
 var. *dissectus* Faure et Maire, Contr. 1293 l.c.
 Type: Faure s.n., Lamoricière, Algeria (AL), not seen.
 ssp. *dernitanus* Maire et Weiller in Maire, Contr. 2798 Etud. Fl. Libya in Bull. Soc. Hist. Nat. Afr. Nord. 30: 293.1939.
 Type: Maire et Weiller 1117, Wadi Derna, Libya (AL), holotype, not seen.
 Isotype (P).
 var. *jolyi* Sauv. et Vindt l.c. p 25 (nom. inval. sin. descr. lat.).
 Hairs variable, spreading to more or less but not fully appressed; all parts shortly villous to hirsute, never sericeous.
 Specimens seen:
 Canary Isl.: Fleischer & Fleischer-Haighton 266, Fuertaventura near Oliva (U).
 Morocco: Joli 162, S. Mazagan (RAB).
 Algeria: Gandoger 887, Alger (STU).
 Libya: Ruhmer 231, Benghazi (STU).
 Egypt: Sa'ad 112, Burg El Arab (CAIM); 'Abbas 705, Fuka (CAIM).
 Palestine: Dinsmore 2620, Jerusalem (L).
 Syria: Barkoudah 412, Kasab N. Syria (U).
 Kriti: Reverchon 110, L'Akrateri (STU).
 Jugoslavia: Welden 1547, Zadar (Zara) (L).
 Italy: Kramer & Westra 3555/1962, Elba Isl. S. Pracchio (U);
 Stud. Biol. Rheno-Trai. 80/1965, Sinuscala (U).

Corsica: Stud. Biol. Rheno-Trai. 61/1947, Bonifacio (U).

France: van Heerdt & Kramer 133/1950, Banyuls- sur mer (Pyr. Or.)(U).

Hekking 137, Hérault, S. of Montarnaud, Lodive-Montpellier (U).

Spain: Stud. Biol. Rheno-Trai. 128/1951, Valbona, SW of Barcelona.

Portugal: Fernandes, Matos & Santos 5810, Abrantes (U); Kostermans & Kruyt, 542, Faro (U); Stud. Biol. Rheno-Trai. 426/1959, Algarve (U).

b. var. pedatus Choisy l. c.

Type: no specimen mentioned.

C. althaeoides var. B. Linn., Sp. Pl. 1: 157.1753.

Type: in herb. Linn. 218.27 (LINN).

This specimen agrees with the description of the var. mentioned by Linnaeus l. c.

C. elegantissimus Mill., Gard. Dict. ed. VIII. n. 22.1768.

Type: Miller's authentic specimen (BM).

C. sericeus Forsk. FL. Aeg. Arab. Cent. 8:204.1775.

Type: Forskål s. n., Marmarica (Marmorae), coastal region in Libya and Egypt, between Derna and El Alamein (C), not seen.

C. tenuissimus Smith in Sibthorp et Smith, Fl. Graec. Prodr. I: 133.1806.

Type: Icon. Fl. Graec. II: 77. t. 193.1816.

The whole plant shortly sericeous; usually slender.

Distribution: East Mediterranean Region, North Africa, S. Europe with the exception of Spain and Portugal.

Specimens seen:

France: Bruyas 5283, Dept. Bouches-du Rhône, near an ancient city 20 mile N. of Marseille (FI); Bruyas 2247 ibid. (JE).

Italy: Bornmüller 195, Calabria, San Giovanni in Fiore (B).

Jugoslavia: St. Lager s. n., San Palnina (Scandus) (G).

Greece: Bornmüller 1119, Kefallinía Isl. (Kephallonia) (B); Orphanides 482, Athínai (HAL).

Turkey: Schwarz 888, Izmir (Smyrna) (B).

U. A. R. (Egypt): Nož s. n. Egypt (Aegyptus) without a locality.

Libya: Bornmüller 807, N. W. Libya (Tripolitania), Gharyon (Garian) (B).

97. *C. arvensis* L. Sp. Pl. 1: 153.1753; Choisy in DC. Prodr. IX: 406.1845; Willkomm, Prodr. Fl. Hisp. II: 518.1870; Boissier, Fl. Or. IV: 108.1875; Arcangeli, Compend. Fl. Ital. ed. 2: 373.1894; Battandier, Fl. Alger. II: 592.1888; De Halacsy, Consp. Fl. Graec. II: 307.1902; Cost, Fl. Franc. II: 571.1903; Borg, Descript. Fl. Malt. Isl.: 453.1927; Palhinha, Fl. Portugal ed. 2: 582.1939; Dinsmore in Post, Fl. Syr. Palest. Sinai, ed. 2, II: 209.1933; Grigoryev, Fl. USSR XIX: 29.1953; Sauvage et Vindt, Fl. Maroc. II: 28.1954; Täckholm, Stud. Fl. Egypt: 171.1956; Andrews, Fl. Pl. Sudan III: 107.1956; Rechinger f. Fl. Iran (Conv.): 20.1963; Rechinger f. Lowl., Iraq: 487.1964.

Type: in herb. Linn. 218.1, lectotype (LINN).

Plate XVI. fig. 1-9.

A prostrate perennial, the shoots (-20) 40-100 cm. The subterranean part^s subligneous. Shoots prostrate, antihelictically (dextrorsely) quadrangular, strongly branching at the base, but the shoots unbranched, glabrous or sparingly hairy, rarely with densely appressed hairs. Leaves herbaceous; petiole $1/3-1/2$ the length of the blade; the latter ovate to oblong-ovate, 10-50 mm long, 6-40 mm wide, 1.5-3 times as long as wide, obtuse to acute, mucronulate, base hastate to sagitate (that of the radical ones with an attenuate or, rarely, hastate or sagitate base), margin usually entire, rarely undulate, glabrous or sparingly hairy, the margin sometimes ciliate, lower surface reticulate with three prominent nerves. Flowers axillary, solitary or up to 3 on filiform peduncles which are shorter or as long as or longer than the subtending bract. Bracts like the leaves, but narrower and smaller. Bracteoles filiform, rarely linear-oblongate, much shorter than the pedicel. Pedicel long, ca 5 times as long as the bracteoles and 4 times as long as the calyx. Sepals scarious, glabrous or sparingly hairy with ciliate margin, unequal; the outer ones usually shorter than the others, ca 4 mm long, obovate to broadly oblong, retuse, mucronulate, with a narrowly membranous margin; the middle one longer and wider, with the right and the left half unequal, one half with a wide membranous margin; the inner ones ovate, retuse, mucronulate, the two halves with a wide membranous margin. Corolla white or pink with dark reddish stripes, 15-25 mm long, 4-5 times as long as the calyx, the 5 dark stripes only in their upper part on the outside slightly hairy. Stamens unequal, the longest 12 mm; filaments with glands on the dilated part, those in the middle stalked while those on the two ends are sessile. Ovary ovoid glabrous, rarely, with few hairs, with a

glabrous cup-shaped disc at the base; style glabrous, filiform, 2.5 times as long as the cylindrical stigmas. Capsule glabrous, subglobose, exserted from the calyx, 7 mm long and wide, bilocular, 3- or 4-seeded; seeds dark brown, surface tuberculate, 4 mm long, 3 mm wide. Flowering and fruiting the whole year.

On cultivated and fallow fields, along roads, on waste places, in gardens, on naked slopes. A very common weed.

Distribution; A widespread species in the temperate and subtropical regions of the whole world except Australia.

a. var. arvensis.

C. hastatus Forsk. Fl. Aegypt. Arab., Cent. VIII: 203.1775.

Type: Forskål in herb. Forsk., Cairo, holotype (C) not seen.

C. hastifolius Poir., Encyc. suppl. III: 467.1813 (lapsu *hastatus* Forsk. l.c.).

C. sepium Pall. Reise III: 270.1776, non L. 1753.

No type mentioned.

C. auriculatus Desr. in Lam. Encyc. III: 540.1789.

C. arvensis L. var. *auriculatus* Choisy l.c.

Type: a cultivated specimen, Jardin du Roi (P-LA).

C. prostratus Schmidt, Fl. Boëm II: 93.1793.

Type: Icon. l.c. t. 237.

C. sagittifolius Salisb. Prodr. 123.1796. (nom. illeg.)

C. chinensis, Ker-Gawl in Bot. Reg. 5:322.1818.

Type: Icon. t. 322. l.c.

C. corsicus Roem. et Schult. Syst. IV: 256.1819.

Type: in Corsica (collector unknown).

C. cherleri, Agardh ex Roem. et Schult. Syst. IV: 261.1819.

Type: Agardh s.n., near Malgon, holotype (B ± ?), not seen.

C. bicuspidatus Fisch. ex Link, Enum. Hort. Berol I: 201.1821.

Type: Fischer s.n., region S.E. Sibiria (Dauria), holotype (B ± ?), not seen.

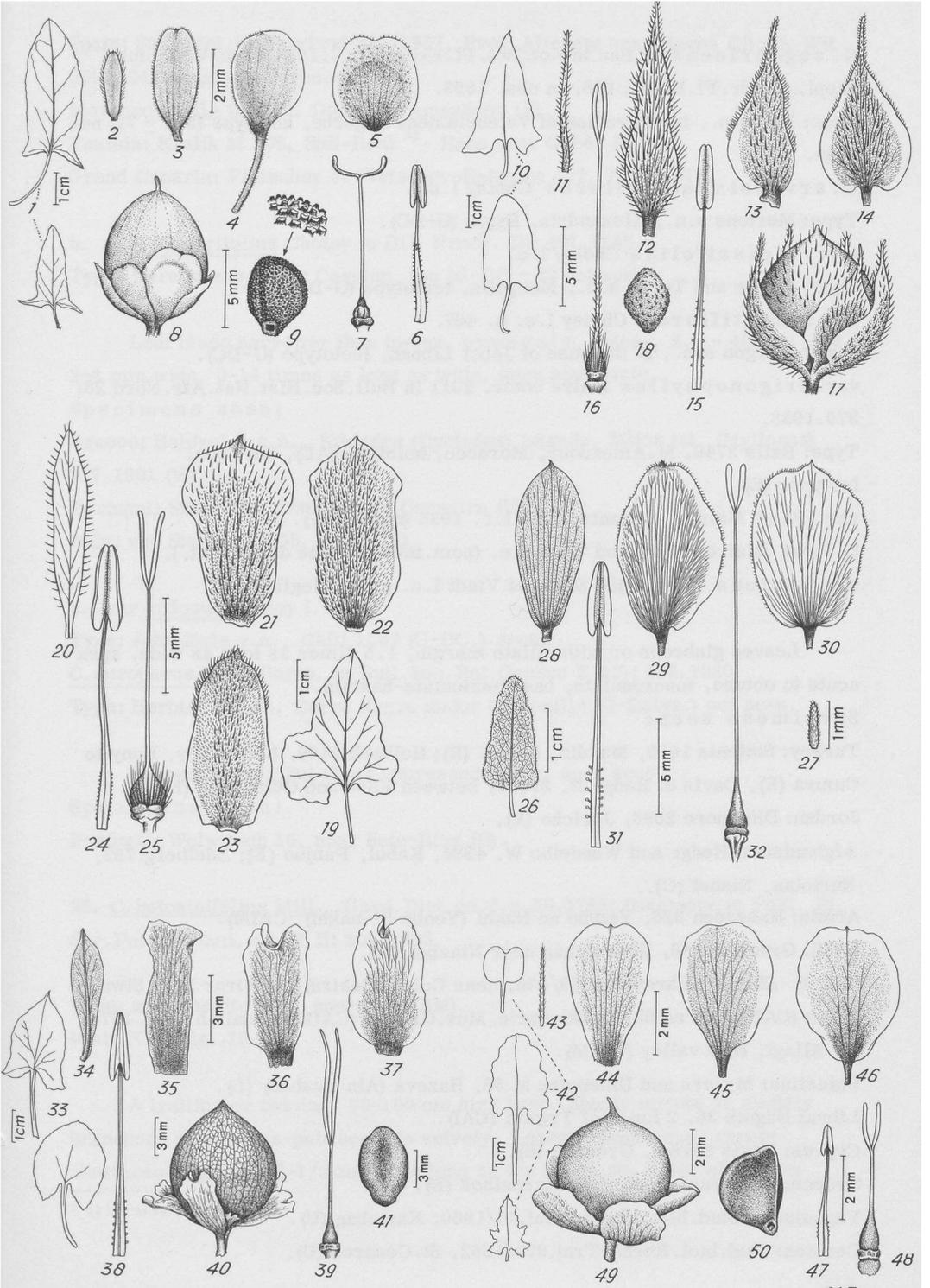
C. malcolmi Roxburgh, Hortus Bengal. 14 (1814) nom. nudum. Roxb. Fl. Indica II: 55.1824, ed. 2, 1: 474.1832.

Type: authentic Roxburgh coloured drawing of *C. malcolmi* in plate collection in Dept. Bot. Brit. Mus. (N.11) (BM) seen

C. quinquelobus Lindem in Bull. Soc. Nat. Mosc. 23(2): 508.1850.

Type: Lindem s.n., Hainowka, Jul. (not seen).

Plate XVI. fig. 1-9 *C. arvensis*; 1: leaves; 2: bracteole; 3: outer sepal; 4: middle sepal; 5: inner sepal; 6: stamen; 7: pistil; 8: capsule; 9: seed [1-7: Abdallah et al. 1725 (CAIM); 8,9: id. 1671 (CAIM)]; fig. 10-18 *C. betonicifolius* var. *betonicifolius*; 10: leaves; 11: bracteole; 12: outer sepal; 13: middle sepal; 14: inner sepal; 15: stamen; 16: pistil; 17: capsule; 18: seed; [10-16 Stribny s.n. (G); 17-18: Tumta 1554 (W)]; fig. 19-25 *C. cassius*; 19: leaf; 20: bracteole; 21: outer sepal; 22: middle sepal; 23: inner sepal; 24: stamen; 25: pistil [19-25: Dinsmore 10127 typus (K)]; fig. 26-32: *C. dryadum*; 26: leaf; 27: bracteole; 28: outer sepal; 29: middle sepal; 30: inner sepal; 31: stamen; 32: pistil [26-32: Sennen et Mauricio 9471 (W)]; fig. 33-41 *C. durandoi*; 33: leaves; 34: bracteole; 35: outer sepal; 36: middle sepal; 37: inner sepal; 38: stamen; 39: pistil; 40: capsule; 37: inner sepal; 38: stamen; 39: pistil; 40: capsule; 41: seed [33,40: Battandier et Trabut 9 (GOET)]; 35-39: Gay 2792 (W)]; fig. 42-50 *C. fatmensis*; 42: leaves; 43: bracteole; 44: outer sepal; 45: middle sepal; 46: inner sepal; 47: stamen; 48: pistil; 49: capsule; 50: seed [42-48: Schimper 839 (L); 49,50: Shalaby et Sharobiem 1637 (CAIM)].



C. segobricensis Pau in Not. Bot. Fl. Espan. I: 7.1887, vide Willkomm, suppl. Prodr. Fl. Hisp.: 168, in obs. 1893.

Type: Pau s.n., in the region of Valencia near Segorbe, holotype (MA + ?), not seen.

C. arvensis var. *biflorus* Choisy l.c.

Type: Mertens s.n., Alexandria, Egypt (G-DC).

var. *crassifolius* Choisy l.c.

Type: Meyer and Turcz s.n., Mongolia, lectotype (G-DC).

var. *multiflorus* Choisy l.c. p. 407.

Type: Mergon s.n., at the base of Jebel Libnan, lectotype (G-DC).

var. *trigonophyllus* Maire contr. 2311 in Bull. Soc. Hist. Nat. Afr. Nord 28: 370.1938.

Type: Balls 2740, M. Amezdour, Morocco, holotype (AL), not seen.

Isotypes (E).

var. *Paui* Maire l.c. contr. 2311 l.c. 1938 (nom. nud.).

f. *Paui* (Maire) Sauv. and Vindt l.c. (nom. invalid. sine descr. lat.).

var. *typicus* Fiori, vide Sauv. et Vindt l.c. (nom. illegit.).

Leaves glabrous or with ciliate margin, 1.5 times as long as wide, apex acute to obtuse, mucronulate, base auriculate-hastate.

Specimens seen:

Turkey: Sintenis 1489, Mardin, Kasmi (E); Helbeek 2489, Küçük Köy, Kony to Cumra (E), Davis et Hedge D. 31966, between Köse and Gümüşsane (E).

Jordan: Dinsmore 2088, Jericho (E),

Afghanistan: Hedge and Wendelbo W. 4984, Kabul, Panjao (E); Edelberg 792, Nuristan, Nishef (C).

Arabia: Hassanen 326, Yambu an Nakhil (Yenbo El-nakhil) (CAIM).

USSR: Granitov 286, Tian-Schan near Niazbek (C).

U. A. R. (Egypt): Ehrenberg 59/406, near Cairo (Cahira) (L); Drar 117, Siwa Oasis (CAIM); Sa'ad 53, Dokki Agric. Mus. Garden (CAIM) Abdallah et Al 1671, El' Allagi, Nile valley (CAIM).

Palestine: Meyers and Dinsmore M 88, Hazeva (Ain Hesban) (L).

Libya: Naguib 36, 2 km E of Tripoli (CAI).

Cyprus: Davis 3276 k, Gronsha (E).

Greece: Gathorne-Hardy 449, Karpathos (E)

Yugoslavia: Stud. biol. Rheno-Trai. 40/1960, Karlobag (U).

Corsica: Stud. biol. Rheno-Trai. 973/1962, St. Cesareo (U).

Spain: Stud. biol. Rheno-Trai. 375/1957, Prov. Alicante near Havea (U); De Wit 5061, Mazemata E. Pyrenees (L).

Morocco: Balls B 2740, Djebel ¹⁾ Amezdonr (E).

Tunisia: Kralik M 109, Sidi-Boul ¹⁾ - Baba near Gabès (E).

Grand Canaria: Fleischer et Fleischer-Haighton 477, Tejeda (U).

b. var. linearifolius Choisy in DC. Prodr. IX: 407. 1845.

Type: Karelin s.n. near Caspian sea (G-DC ± ?) not seen.

Leaf blade narrower than in var. *arvensis*, linear, 2.8 - 40 mm long, 2-4 mm wide, 8-14 times as long as wide, apex acuminate.

Specimens seen:

Greece: Heldreich s.n., Kiklades (Cyclades) islands, Mîlos isl. (Myrtillos) 3.7.1901 (W).

Portugal: Silva 274, Concelho de Cerveira (U).

Italy: van Steenis 13055, Rome (L).

c. var. villosus Choisy l.c.

Type: John Style s.n., Chili 1839 (G-DC.) seen.

C. europaeus Barb. Gamp. in Bull. Soc. Bot. Geneve 2 (12): 236. 1920.

Type: Herbar Pavon, Cerro Negro under *C. humilis* (G-Boiss.) not seen.

Leaves densely but short appressed-hairy, apex acute.

Specimens seen:

Portugal: Welwitsch 16, near Sete-Rios (G).

98. C. betonicifolius Mill., Gard. Dict. ed. 8. n. 20. 1768; Dinsmore in Post. Fl. Syr. Palest. Sinai, ed. 2, II: 207. 1933.

Type: an authentic cult. specimen (BM).

Plate XVI. fig. 10-18.

A trailing or twining, 60-100 cm high herb. Shoots simple or slightly branched, puberulous-pubescent to velvety. Leaves herbaceous, rarely chartaceous; petiole $\frac{1}{2}$ - $\frac{1}{3}$ times as long as the blade; the latter elliptic to

* 1) Locality on the label

oblong, 35-80 mm long and 20-35 mm wide, i. e. 1.2-2.5 times as long as wide, acute or acuminate, base sagitate to hastate or cordate, margin entire (auricles entire or dentate), indumentum varying from puberulous-pubescent to velvety, pinnately nerved. Flowers up to 7 (-12) in axillary, partly dichasial and partly monochasial or entirely monochasial inflorescences. Bracts similar to the leaves, as long as or much shorter than the peduncles. Bracteoles filiform, but when the number of flowers is more than 3, they may assume a linear form. Pedicel longer than the bracteoles, but as long as the calyx. Sepals in the lower part densely pubescent, but the green upper part pubescent with a ciliate margin; the outer ones oblong, acuminate, 8-15 mm long; the middle one with unequal halves, one half hairy and membranous; the inner ones ovate, acuminate, with both halves hairy and membranous. Corolla softly pink, 28-40 mm long, i. e. 2.5-3 times as long as calyx, each segment with a hairy band on the outside, but the lower part of the limb and tube quite glabrous. Stamens unequal; filaments with glands at the dilated part; anthers oblong, retuse at the apex. Ovary hairy, at the base surrounded by a small glabrous disc; style hairy; stigmas filiform. Capsule ovoid, 10 mm long, 8 mm wide, hairy, the calyx slightly accrescent in the fruit, 2-locular, with 3- or 4-seeds; seeds brown, 4 mm long and 3 mm wide, tuberculated; Fl. Apr.-June, Fr. Jul. - Aug.

In fields, on acid and stony soils, alt. 360-1300 m.

Distribution: Caucasus & Krym (Crimea) USSR, Balkan, E. Medit., Greece, Albania, Italy, S. France, Turkey, Syria, Iraq.

a. var. betonicifolius.

C. pubescens Russ., Aleppo, ed. 2, II: 246.1794.

Type: Russel s.n., near Aleppo, Syria (BM).

C. sagittifolius Smith in Sibth. & Smith, Fl. Graec. Prod. 1: 133.1806.

Type: Icon. Fl. Graec. II: 77. t. 193.1816.

C. hirsutus Bieb., Fl. Taur. Cauc. I: 422.1808; Boiss. Fl. Or. IV: 105.1875;

Arcangeli, Compend. Fl. Ital. ed. 2, 373.1894; Halacsy, Consp. Fl. Graec. II:

307.1902; Bouloumoy, Fl. Liban. Syr. text.: 230.1930; Grigoryev, Fl. USSR XIX: 28.1953.

Type: Steven s.n., Gurzuf, Krym (Crimea) (Tauria) USSR (not seen).

Isotype (LE).

C. atriplicifolius Poir. in Lam. Encycl. Suppl. III: 467.1813.

Type: de Labillardière s.n., Syria, holotype (FI), not seen.

C. sibthorpii Roem. et Schult, Syst. IV: 285.1819.

Type: without collector in Sāmīus Isl. (not seen).

C. amoenus C. Koch in *Linnaea*, 19:19.1847.

Type: Thirke s.n., Black Sea (pontus Euxinus) Turkey (Asia Minor), holotype (B ± ?), not seen.

Isotype: a photo of the isotype in (K) from (LE)

C. hirsutus Bieb. var. *virescens* Boiss., *Fl.Or.* l.c.

Type: Heldreich s.n., Egridir, Turkey (G-Boiss.) seen.

Leaves and stems puberulous; leaves herbaceous; inflorescences with up to 4 flowers. Leaves wider than in var. *armenus*, 1.5 times as long as wide, top acute.

Specimens seen:

Bulgaria: Střibrny s.n., near Nova Mahala ¹⁾ (E, G. GOET, HBG, JE, W).

France: Requier s.n., Toulon (G).

Greece: Rechinger f. 8992, Thessaloniki (W).

Syria: Barkoudah 409, round Damascus (U).

Palestine: Amdrusky 154, Kiriath-Anavim near Jerusalem (C, CAIM, E, FI, L, LISE, RAB, U, W).

Italy: Fiori & Beguinot 2509, Prov. Pisa, Orciano (G).

b. var. armenus (Boiss.) Sa'ad nov. stat.

C. armenus Boiss., *Fl.Or.* IV: 105.1875. p.p.

Type: Kotschy 373, near Guschkar, probable Turkey, lectotype (G-Boiss.)

Indumentum and inflorescence the same as in var. *betonicifolius* but leaves narrower, 3 times as long as wide, top acuminate and mucronulate.

Specimens seen:

Lebanon: Bornmüller 12135, Lebanon, Jebel Mts. (B).

c. var. tomentosus Boiss. l.c.

C. lanuginosus Vahl. *Symb.Bot.* III: 23.1794, non Desr. 1789.

C. tomentosus Choisy in *DC. Prodr.* IX: 413.1845.

Type: Habitat in the Orient, collector unknown (C). seen

C. peduncularis Boiss., *Diagn.Pl.Or.nov.* 1 (11): 84.1849.

Type: Kotschy 58, between Orfa and Sierek, probable Turkey (G-Boiss.).

C. pedunculatus Walp., *Ann.* III: 112.1852-53 (*lapsu peduncularis* Boiss.).

* 1) Locality given on the label

C. armenus Boiss., Fl. Or. l. c. p. p.

Type: Haussknecht s. n., near Gaziantep (Aintab), Turkey, lectotype (G-Boiss.).

Shoots and leaves pubescent to velvety. Leaves chartaceous. Peduncles very long. Inflorescences with up to 7 flowers.

Specimens seen:

Iraq: Rechinger 11510, Distr. Mosul near Basingera (W).

Turkey: Balls 1170, Gaziantep (E); Davis 22101, prov. Diyarbakir: Diyarbakir-Silvan (E); Frödin 206, Gevas (Vastan) (W).

This species is very variable in the shape of its leaves and in its indumentum, a feature which is not uncommon in species which are usually growing as weeds; in order to find the factors to which this variability is due, studies in the genetics and in the ecology of this species will have to be carried out. It is not improbable that the specimens collected in Italy and in S. France are to be regarded as introduced.

99. *C. cassius* Samuelsson ex Rechinger f., in Arkiv. Bot. Stockh. 1 (5): 314. 1950.

Type: Dinsmore 10127, 30 km S. Antakya (Antioch, probable Turkey or Syria) holotype (S), not seen.

Isotype (K).

Plate XVI. fig. 19-25.

A perennial herb. Underground parts not seen. Shoots glabrous, quadrangular, antihelictically (dextrorsely) twining. Leaves chartaceous; petiole $\frac{3}{5}$ the length of the blade; the blade of the radical ones not seen; that of the cauline leaves suborbicular to ovate, ca 40 mm long and 25 mm wide, 1.6 times as long as wide, obtuse or subacute, sparingly hairy beneath, margin ciliate, pinnately nerved. Flowers solitary or up to 3 in axillary monochasia. Peduncle quadrangular, up to 14 cm long, much longer than the subtending bract. Bracts like the leaves. Bracteoles linear-oblongate, mucronulate, as long as or longer than the pedicel, but not exceeding the calyx. Calyx puberulous. Sepals unequal, 9 mm long, with a green, reticulate, acute, mucronulate upper part and a colourless lower one, the two parts separated from each other by a constriction, the outer sepals with a ciliate margin; the middle one with the right and the left half unequal, one half glabrous and membranous; the inner ones with both halves glabrous and membranous. Corolla yellow, 32 mm long,

3.5 times as long as the calyx, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal; filaments with stalked glands on the dilated part; anthers oblong, retuse at the apex, with a row of sessile glands on each side of the slit. Ovary ovoid, velutinous, with a glabrous cupshaped disc at the base; style hairy, 3 times as long as the cylindrical stigmas. Capsule not seen. Fl. Jun.

In thickets.

Distribution: uncertain, probably either Turkey or Syria.

This species can be distinguished from *C. betonicifolius* Mill. by the glabrous leaves and shoots, the irregularly crenate leaf margin, the linear-ob lanceolate bracteoles, which are mucronulate and as long as or longer than the pedicel, the puberulous calyx and the yellow corolla.

The epithet "Cassius" was used wrongly by Boissier in stead of "Casius" for plants growing on Djebel Aksa in Syria, which in Greek was called Kasion and in Latin Casius (cf. Baecker, Verklarend Woordenboek: 107.1936). It is possible that Samuelsson called the species *C. cassius* according to its locality. It is not clear whether the locality of the type is in Syria or in Turkey.

100. *C. dryadum* Maire in Bull. Soc. Bot. France 60: 253.1913; Sauvage et Vindt, Fl. Maroc. II: 30.1954.

Type: Maire s.n., M. Babor, Algeria, holotype (AL), not seen.

Isotypes (MPU, P).

C. dryadum var. *tazekensis* Sauv. et Vindt, l.c. (nom. invalid. sine descr. lat.).

Icon: Sauv. et Vindt, l.c. f. 11, 2415.

Plate XVI. fig. 26-32.

A 25-30 cm high herb, more or less densely appressed puberulous. Shoots herbaceous, branched, 1.5-2 mm in diameter. Leaves herbaceous; petiole 1/4 the length of the blade; blade triangular (that of the lower leaves rarely ovate), 18-45 mm long, 12-28 mm wide, i.e. 1.5-1.7 times as long as wide, acute, base truncate, margin sinuate to crenate, appressed-pubescent, pinnately nerved. Flowers axillary and solitary, on peduncles which are much longer than the subtending bract. Bracts like the leaves. Bracteoles filiform. Pedicel twice as long as the calyx. Sepals unequal, 9 mm long, shortly appressed pubescent; the outer ones oblanceolate, acute, mucronulate, 4 mm wide; the middle one with

unequal right and left halves, one half hairy, membranous; the inner ones broadly ovate, subacute, mucronulate, 6 mm wide, both halves hairy and membranous, auriculate at the base. Corolla white or faintly pink, 20-30 mm long, glabrous outside. Stamens subequal, 15 mm long; filaments with sessile glands on the dilated part; anthers oblong sagitate, apex subacute, with a row of sessile glands along the slit. Ovary glabrous, conical, at the base surrounded by a shallow, fleshy, cup-shaped disc; style filiform, 6 times as long as the cylindrical stigmas. Capsule not seen. Fl. Jun. -Jul.

Mountains, forests, slopes, alt. 1600-2000 m.

Distribution: Algeria, Spanish Morocco.

Specimens seen:

Spanish Morocco: Sennen & Mauricio 9471, Riffien, Spanish Morocco (W), Emberger s.n., G. Tizeren¹⁾ 18.6.1928 ibid. (RAB).

101. C. durandoi Pomel, Nouv. Mat. Fl. Atl.: 85.1874; Batt. & Trabut, Fl. Alger; 592.1888.

Type: Durando s.n., Algeria, Maison Carrée (MPU).

Isotype (P).

Plate XVI. fig. 33-41.

A glabrous herb, 19-40 cm. Root ligneous, 10 mm in diameter. Shoots herbaceous, angular, simple or slightly branched, flowering from the upper half. Leaves herbaceous; petiole as long as to half as long as the blade; lower leaves unknown; the upper cauline ones suborbicular, 12-25 mm long, 10-22 mm wide, 1.2 times as long as wide, top obtuse, base sagitate, margin entire, glabrous with a reticulate venation. Flowers solitary in the axil of the bracts. Peduncle shorter than the subtending bract. Lower bracts like the leaves, but the upper ones broad oblong-sagitate, acute or subacute, twice as long as wide; blade 2.3 times as long as the petiole. Bracteoles linear to oblanceolate. Pedicel far exceeding the subtending bract. Sepals glabrous, unequal; the outer ones 5 mm long, oblong, with an apiculate-plicate apex, mucronulate, with a narrow membranous margin; the middle one with the right and the left half unequal, one half with a broad membranous margin; the inner ones 6 mm long, oblong-elliptic, apex retuse, mucronulate. Corolla pink, 20 mm long, 4 times

* 1) Locality given on the label.

as long as the calyx; the segments with a glabrous dark purple band on the outside. Stamens slightly unequal; the longest one 12 mm; filaments with sessile glands on the dilated part; anthers sagitate, the margin of the two cells darker with light dots, apex obtuse. Ovary glabrous, conical, at the base surrounded by a cup-shaped disc; style glabrous, filiform, as long as the filiform stigmas. Capsule large, glabrous, ovoid, 13 mm long, 10 mm wide, bilocular with 4 seeds; seeds blackish, surface but slightly rugulose, 6 mm long, 5 mm wide. Fl. Jan.-Apr. Fr. March-Apr.

In slightly humid places, forests, waste land, alt. 50 m.

Distribution: Algeria, Morocco?

Specimens seen:

Algeria: Gay 2792, Corso- Tehatani ¹⁾ (JE, W); Maire 5944, le Réghafa (B); Battandier 3832, ibid (FI); Battandier & Trabut 9, ibid. (GOET, L, W).
Morocco or part of Algeria (Mauritania), without locality: Bové 219 (FI, W),

102. C. farinosus Linn., Mant. II: 203.1771; Palhinha, Fl. Portug. ed. 2, 582. 1939.

Type: in herb. Linn. 218.6 (ex Hort. Upsal.) (LINN).

A puberulous herb, in the upper part twining. Leaves herbaceous; petiole ca half as long as the blade; the latter ovate to lanceolate, 40-60 mm long, ca 20 mm wide, 2-3 times as long as wide, acuminate, base sagitate, margin crenate, glabrescent, but the margin ciliate, pinnately nerved. Flowers up to three, in axillary monochasia. Bracts like the leaves, but with a shorter petiole. Peduncle shorter than the bract. Bracteoles minute. Pedicel puberulous, as long as the calyx. Sepals membranous, mucronulate; the outer ones elliptic, 6 mm long, 3 mm wide; the middle one with the right and the left half slightly unequal; the inner ones obovate as long as the outer ones but wider, with both halves transparent. Corolla 10 mm long, 1.7 times as long as the calyx, glabrous at the outside, with distinct lobes. Stamens unequal, the longest one 6 mm; filaments with sessile glands on the dilated part; anthers sagitate. Ovary glabrous, ovoid, with a cupshaped disc at the base; style glabrous, filiform, 5 times as long as the cylindrical stigmas. Capsule glabrous, subglobose, 6 mm long and wide, bilocular, 4-seeded; seeds nearly black, scabridulous, 2.5 mm

* 1) Locality given on the label.

long, 2 mm wide.

A tropical African plant naturalized in Portugal.

103. *C. fatmensis* Kunze in Fl. Alleg. Bot. Zeit. 23(1): 172. 1840; Choisy in DC., Prodr. IX: 411.1845; Boiss., Fl. Or. IV: 109, 1875; Baker & Rendle in Thistelton-Dyer, Fl. Trop. Afr. IV (2): 98.1905; Sauvage & Vindt, Fl. Maroc. II: 31.1954; Täckholm, Stud. Fl. Eg.: 174.1956; Andrews, Fl. Pl. Sud. III: 108. 1956; Rechinger f., Fl. Iran (Conv.): 20.1963.

Type: Schimper 839, Wadi Fâtima, Hedjâz; lectotype (LZ), not seen.

Isotypes (GOET, HBG, JE, L, P, W).

Plate XVI. fig. 42-50.

Herbaceous, 15-50 cm high, branched at the base. Root slender and ± ligneous. Shoots slender, simple or slightly branched, glabrescent or puberulous. Leaves thinly herbaceous; petiole 1-2 times as long as the blade, the blade of the lower ones ovate-oblong, 15-40 mm long, 10-20 mm wide, 1.6-2 times as long as wide, obtuse or subacute, base cordate, margin crenate; the upper leaves like the lower ones but with a shorter petiole, glabrous or appressed puberulous, pinnately nerved. Flowers solitary or up to 3 on a thin peduncle, which is shorter than the subtending bract. Bracts triangular, ± lobed, auriculate-cordate at the base, acute or subacute. Bracteoles filiform. Pedicel with appressed hairs, as long as the calyx. Sepals more or less densely appressed-puberulous, unequal; the outer ones obovate, 4 mm long, 3 mm wide, retuse, mucronulate, with a narrow membranous border; middle one with unequal halves, one half with a broad membranous margin; inner ones broadly obovate, obtuse, with 2 small auricles at the base and with both halves glabrous and membranous. Corolla pink, 8-10 mm long, clavate, with five distinct lobes; each segment in the upper part with a hairy band. Stamens unequal; filaments with sessile glands on the dilated part; anthers oblong-sagitate, retuse at the top. Ovary ovoid, at the base surrounded by a cup-shaped disc; style glabrous, 1.5 times as long as the cylindrical stigmas. Capsule glabrous, exerted from the calyx, subglobose, 6 mm long and wide, bilocular and 4-seeded; seeds brown, rugulose, 4 mm long, 3 mm wide. Fl.-Fr. Jan. Apr.

In sandy fields, on the banks of drainage canals.

Distribution: U.A.R. (Egypt); Arabia, Lebanon, Iran, Algeria ¹⁾, N. Sudan ²⁾.

Specimens seen:

Lebanon: Bornmüller 121346, Ba'albek (Syria Antilebanon)

Arabia: Fischer 20, Wadi Fâtima, Hedjâz, paratype (L,W); Khattab 179, Kanbu (Janbo 'El.Nakhl) (CAIM).

Iran: Bornmüller 466 Qeshm island (Kis'hum) (B).

U.A.R. (Egypt): Drar 856D, Dakhla Oasis (CAIM).

104. *C. galaticus* Rost. ex Choisy in DC., Prodr. IX: 408.1845; Boiss., Fl. Or. IV: 104.1875; Bouloumoy, Fl. Liban. Syr. text. 230.1930; Dinsmore in Post, Fl. Syr. Palest. Sinai ed. 2, II: 207.1933; Rechinger f., Fl. Iran (Conv.): 19.1963. Type: Rostan s.n., Ankara (Ancyre), Turkey, lectotype (G-DC) seen.

C. agrophilos Koch. in Linnaea 22: 745.1849.

Type: Koch s.n., Tschorukthale, probably Turkey (B ± ?), not seen.

Plate XVII. fig. 1-7.

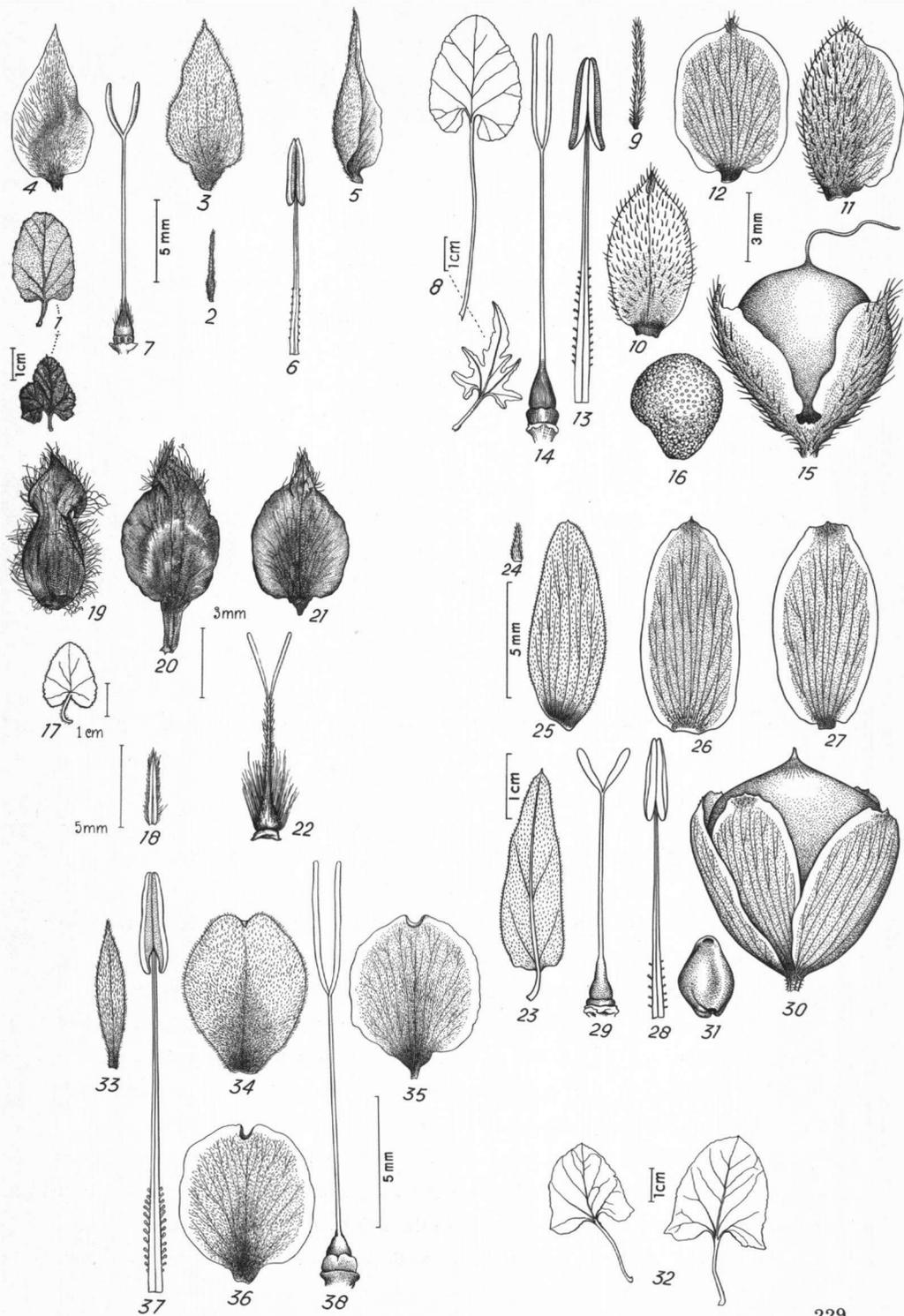
A 21-40 cm high herb. Shoots simple, tomentellous, 2 mm in diameter, with flowers along their whole length. Leaves firmly herbaceous, petiole half as long as the blade, the radical ones not seen, the cauline leaves ovate-broad-oblong, 20-32 mm long, 12-28 mm wide, 1.2-1.6 times as long as wide, obtuse, subacute or sometimes mucronulate, base cordate, margin sinuate but not lobed, tomentellous, pinnately nerved. Flowers solitary or in pairs (-3 in an axillary dichasium); the peduncle stout, as long as the bract or shorter. Bracts ovate, cordate, ± plicate, with prominent nerves and five shallow lobes, the middle one acute or subacute, and the other ones obtuse, shortly sericeous. Bracteoles hairy, filiform. Pedicel longer than the calyx. Sepals unequal, tomentellous, convex, acute, broadly ovate, 10 mm long; the outer ones ca 7 mm wide, the middle one with the right and the left half unequal, one half glabrous and membranous; the inner ones 5 mm wide, with both halves glabrous and membranous. Corolla purple, 25-29 mm long, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the longest one 12 mm; filaments with glands on the dilated

* 1) Sauv. et Vindt l.c.

* 2) Andrews l.c.

Plate XVII. fig. 1-7 *C. galaticus*; 1: leaves; 2: bracteole; 3: outer sepal; 4: middle sepal; 5: inner sepal; 6: stamen; 7: pistil [1: Siehe 182 (W); 2-7: Bourgeau 171 (W)]; fig. 8-16 *C. glaucorum*; 8: leaves; 9: bracteole; 10: outer sepal; 11: middle sepal; 12: inner sepal; 13: stamen; 14: pistil; 15: capsule; 16: seed [8-16: Sauvage et Vindt 2412 (RAB)]; fig. 17-22 *C. germanicae*; 17: leaf; 18: bracteole; 19: outer sepal; 20: middle sepal; 21: inner sepal; 22: pistil [17-22: Haussknecht s.n. (W)]; fig. 23-31 *C. lanjouwii*; 23: leaf; 24: bracteole; 25: outer sepal; 26: middle sepal; 27: inner sepal; 28: stamen; 29: pistil; 30: capsule; 31: seed [23-31: Griffith 678 typus (K)]; fig. 32-38 *C. longipedicellatus*; 32: leaves; 33: bracteole; 34: outer sepal; 35: middle sepal; 36: inner sepal; 37: stamen; 38: pistil [32-38: Manisadjan s.n. typus (W)].

PLATE XVII



part; anthers oblong with retuse top. Ovary hairy at the top or sometimes entirely glabrous, broadly ovoid; style filiform, hairy or glabrous, 3 times as long as the cylindrical stigmas. Capsule not seen. Fl. May-Aug.

On the edge of fallow and cultivated fields, in Pinus woods, in rocky steppes; alt. 900-2136 m.

Distribution: endemic in Turkey.

Specimens seen:

Turkey: Sintenis 6078, Gümüşane (Gümmüşkhane) (B, E, HBG, JE, L, STU, W); Sintenis 2609, Kemalye (Egin) (E, B); Siehe 182, between Ala Dag and Nigde (Cappadocia, Thyamitis) (HBG, W); Dudley D 35345, Denizli-Tavas, (E); Davis & Polunin 22198 A, Tatvan (E); Bornmüller 1720, Corum (Tschorum) (B, JE); Aucher 1406, near Ankara (Ancyre), paratype (G-DC); Kotschy 73, Súerek, Mesopotamia (W).

The exact distribution of *C. galaticus* is difficult to define, as the localities Tschorukthale of Koch and Suerek, Mesopotamia of Kotschy are unknown to me.

105. *C. germaniciae* Boiss. et Haussk. in Boiss., Fl.Or.IV: 104.1875.

C. galaticus Rost. var. *albiflorus* Post, Fl.Syr.Palest. Sin.: 562.1896.

Type: Haussknecht s.n. near Maraç (Marasch), Turkey, holotype (G-Boiss.).

Isotypes (JE, W).

Plate XVII. fig. 17-22.

A 40 cm high perennial herb, with a branching base. Shoots simple, 2.5 mm in diameter, softly villous-puberulous. Leaves coriaceous with a petiole half as long as the blade; radical leaves not seen; cauline leaves blade orbicular, ca 20 mm long, 18 mm wide, almost as long as wide, subacute, base cordate, margin sinuate, pubescent beneath, sericeous above, coriaceous, nerves prominent beneath. Flowers axillary, solitary or in pairs on a filiform villous peduncle. Bracts like the leaves, as long as or shorter than the peduncle. Bracteoles filiform, shorter than the pedicel, glabrous above, hirsute beneath. Pedicel filiform, as long as the calyx. Sepals unequal, 6-7 mm long, with a small green upper part which is separated by a constriction from the colourless lower part; the outer ones acute, with a more or less distinct constriction in the middle, the middle one with the right and the left half slightly unequal; the inner ones suborbicular, obtuse, mucronulate, with a subauriculate base both halves

membranous. Corolla white, 20 mm long, 2.5 times as long as the calyx, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the longest one 12 mm; filaments with sessile glands on the dilated part; anthers oblong, with retuse apex. Ovary ovoid, velutinous, with a glabrous disc at the base; style hairy, filiform, 2.5 times as long as the filiform stigmas. Capsule not seen. Fl. Jul.

In fields.

Distribution: known from Turkey only.

106. C. glauorum Braun-Blanq. et Maire in Bull. Soc. Hist. Nat. Afriq. Nor. 3: 18.1922.

C. pitardii var. *glauorum* (Br. Bl. et Maire) Sauvage et Vindt, Fl. Maroc. III: 28.1954.

Type: Maire s.n., Morocco, Demnate (AL), not seen.

Isotypes: (P, RAB).

Plate XVII. fig. 8-16.

A 12-30 cm high perennial herb; base branched, subligneous. Root subligneous, 3 mm in diameter. Shoots puberulous, simple, herbaceous, angular, 2.5 mm in diameter. Radical leaves not seen; the other ones petiolate; the petiole 1.25-2.25 times as long as the blade; blade herbaceous; all these leaves with flowers in the axil and therefore to be regarded as bracts; blade of the lower ones ovate, 20-40 mm long, 15-30 mm wide, 1.3-1.5 times as long as wide, top obtuse, subacute or acute, cordate, margin crenate; that of the upper ones divided, 15-30 mm long, 10-20 mm wide, ca. 1.5 times as long as wide, top acuminate, base auriculate, indumentum shortly appressed-pubescent, pinnately nerved. Peduncle much shorter than the bract or absent. Bracteoles filiform, shorter than the pedicel. Pedicel 20-60 mm long. Sepals unequal, with appressed hairs, 7 mm long; the outer ones oblong or oblanceolate, acute, mucronulate; the middle one with the right and the left half unequal, one half glabrous and membranous; the inner ones convex, obovate, obtuse, mucronulate, membranous, slightly hairy in the middle. Corolla pink, 25-32 mm long, with hairy bands on the outside, but the lower half of the limb and the tube quite glabrous. Stamens unequal, the longest one 15 mm; filaments with stalked glands on the dilated part; anthers sagitate, with retuse apex. Ovary glabrous, conical, with a cup-shaped disc at the base; style glabrous, filiform, 1.5 times

as long as the filiform stigmas. Capsule glabrous, obovoid, unilocular and one-seeded; seed pear-shaped, nearly black, obovoid, tuberculated, 4 mm long, 3 mm wide. Fl. March-May. Fr. May.

In calcareous rocks, on the edges of fields, alt. 1200-1400 m.

Distribution: known from Morocco only.

Specimens seen:

Morocco: Sauvage & Vindt 2412, M.Goun (RAB).

107. C. lanjouwii Sa'ad nov. spec.

Plate XVII. fig. 23-31.

Herba puberula. Pars subterranea nondum nota. Caules quadrangulares, parce ramificati, antihelicticale (dextrorse) volubiles. Folia basalia nondum nota; alia petiolo longitudine laminae quartam partem aequante instructa, lanceolata, circ. 27 mm longa et 9 mm lata, apice acuta et mucronulata, basi truncata vel auriculis duobus parvis munita, margine integro, dense puberula, nervis pinnatis instructa. Flores solitarii vel bini ad apicem pedunculorum axillarium bractee suffulcienti aequilongorum vel ea breviorum inserti. Bractee foliis sterilibus similes. Bracteolae minutae. Pedicellus calyce multo brevior. Sepala 10 mm longa, puberula, omnia obtusa et mucronulata, exteriora elliptica, medianum cum dimidio dextro a dimidio sinistro paulum inaequali, interiora oblanceolata, margine membranaceo lato instructa. Corolla colore ignoto, 25 mm longa. segmentorum quinque unoquoque virga mediana fusca, apice, solum pilosa instructo. Stamina subaequilonga, longitudine dimidiam partem corollae aequantia; filamenta in parte dilatata glandulis sessilibus obtecta; antherae oblongo-sagittatae, apice obtusae. Ovarium ovoideum, glabrum, basi disco carnosio glabro circumdatum; stylus filiformis, glaber, quam stigmata cylindrica quater longior. Capsula obovoidea, 9 mm longa et 8 mm diam., calyci persistenti aequilonga, glabra; semina 4 mm longa et 3 mm diam., pilis minutis paucis obtecta.

Typus: Griffith 678, in loco Seh Baba dicto in terra Afghanorum in monticulo arenoso lectum, in herbario Societatis Mercatorum Indiae Orientalis sub numero 5872 insertum (K).

Distribution: known from the type locality only.

It seems that the label with the number 678 is the original one written by the collector during his expedition, and that the other label with the number 5872 was added later.

This species can be distinguished from *C. arvensis* L. by the puberulous indumentum, the lanceolate leaves with their subacute and mucronulate apex and truncate base, the pedicel which is but half as long as the calyx, and the sepals which are all 10 mm long, and from *C. scammonia* L. by the never sagittate or hastate base of the blade, by its mucronulate apex, by the puberulous indumentum, by the puberulous, not scarious sepals which are all provided with an obtuse and mucronulate apex, while in the middle sepal the right and the left halves are slightly unequal, and by the obtuse anthers.

108. *C. longipedicellatus* Sa'ad nov. spec.

Plate XVII. fig. 32-38.

Herba dense puberula. Caulis primarii pars basalis et plantae pars subterranea nondum notae. Caules angulares, 2.5 mm diam., dense puberuli. Folia radicalia nondum visa; caulina petiolo laminae aequilongo instructa; lamina late ovato-sagittata, circ. 25 mm longa et 20 mm lata, apice obtusa et mucronulata, appresse puberula. Flores solitarii vel bini in axilla bractearum. Bractee foliis caulinis similiore, paulo longiores tamen. Pedunculus bractea brevior, circ. 25 mm longus. Bracteolae subulatae, parvae. Pedicellus pedunculo aequilongus. Sepala inaequalia, omnia tamen apice retusa et mucronulata; exteriora oblanceolata, 5 mm longa, dense puberula; medianum cum dimidio dextro a dimidio sinistro diverso, dimidio altero glabro et membranaceo; interiora suborbicularia, tota glabra et membranacea. Corolla colore ignoto, 25 mm longa, segmentorum quinque unoquoque virga mediana extus in parte superiore pilosa instructo. Stamina inaequilonga; filamenta in parte dilatata pilis glandulosis vestita; antherae oblongae, apice retusae. Ovarium late ovoideum, glabrum, basi disco circumdatum; stylus filiformis, stigmatibus cylindraceutis bis longior. Capsula nondum visa. Florens mensi Majo. Typus: Manisadjan s.n., Merzivan (Merivan), Asia Minore (W, sub nomine *C. hirsutus* Stev. var. *virescens* Boiss.).

Distribution: known from Turkey only.

This species differs from *C. arvensis* L. by the densely puberulous shoots and leaves, the broadly ovate-sagittate obtuse leaves (in *C. arvensis* the latter are but exceptionally obtuse), provided with a petiole which is as long as the blade, the pedicel as long as the peduncle and four to six times as long as the calyx, the densely puberulous outer sepals which are not provided with a membranous border, and the presence of a disc at the base of the ovary. From

C. betonicifolius Mill. it differs by the smaller size of the corolla, which moreover is five times as long as the calyx, by the colourless, retuse and mucronulate sepals and by the glabrous ovary.

109. *C. maireanus* Pampan. in *Archiv. Bot.*, Forli, 12 n. s. II: 178. 1936.

Type: no specimens mentioned as type.

Plate XVIII. fig. 1-6.

A perennial herb; underground parts unknown. Shoots shortly puberulous, quadrangular, helictically (sinistrorsely) twining, branched from the base, simple above. Leaves chartaceous, with a petiole which is ca half as long as the blade, radical ones not seen; the cauline leaves ovate to ovate-oblong, 25-70 mm long, 20-55 mm wide, 2.25 times as long as wide, acute and mucronulate, base cordate-sagitate, margin crenate to irregularly lobed (entire or dentate at the base), very shortly sericeous, pinnately nerved. Flowers congested at the top of the axillary very long and twining peduncles, the terminal flower of each group opening before the other ones. Bracts like the leaves, much shorter than the peduncle. Bracteoles linear, as long as the pedicel or shorter. Pedicel as long as the calyx. Calyx densely appressed-puberulous. Sepals 9 mm long, slightly unequal, convex obovate, obtuse and mucronulate; the inner ones with a narrow membranous margin. Corolla white, 28-40 mm long, 3-4 times as long as the calyx. Stamens unequal, the longest one 14 mm; filaments with stalked glands on the dilated part; anthers sagitate, mucronulate at the apex. Ovary ovoid, velutinous and with a glabrous annular disc at the base; style filiform, 5 times as long as the stigmas; stigmas cylindrical-clavate; the terminal flowers usually with three stigmas. Capsule not seen. Fl. April-May.

Growing in clay soil, alt. 200-600 m.

Distribution: known from Libya only.

Specimens seen:

Libya: Pampanini and Pichi-Sermolli 6206, Tmim (Tmistá) (G, K); Sandwith 2625 and Simpson 39593, Telmetha (BM, K); Park 506, Wadi Shira above the Falls (K).

The terminal flowers are mostly provided with three stigmas, a feature which is very rarely met in this genus.

110. *C. mairei* Halacsy in Maire et Petitmengin in Bull. Soc. Scienc. Nancy 3 (7): 176. 1907.

Type: Maire 113, Parnasse near Zouvola lake, holotype (AL), not seen.
Plate XVIII. fig. 7-12.

A prostrate, densely appressed-puberulous herb. Shoots filiform, strongly branched from the base, simple above, 10-20 cm long. Leaves firmly herbaceous, petiolate; the radical leaves with a long filiform petiole, twice as long as the blade, and a blade which is mostly elliptic to suborbicular, 9-15 mm long, 4-6 mm wide, 2.5 times as long as wide, obtuse; the cauline ones with a petiole half as long as the blade, the blade triangular-ovate, 6-99 mm long, 4-5 mm wide, 1.5-1.8 times as long as wide, top acute, base sagitate, margin entire, appressed-puberulous, pinnately nerved. Flowers axillary, solitary on a filiform peduncle. Peduncle shorter than the subtending bract. Bracts like the leaves. Bracteoles minute, much shorter than the pedicel. Pedicel twice as long as the calyx. Sepals appressed-puberulous, unequal; the outer ones 2.5 mm long, oblong, obtuse and mucronulate; the middle one with the right and the left half unequal, one half glabrous and membranous; the inner ones longer than the outer ones, broadly oblong, 3 mm long, apex truncate and mucronulate, the base with two small obtuse auricles, both halves glabrous and membranous. Corolla faintly pink, 8 mm long, glabrous and with dark midpetaline stripes on the outside, 3 times as long as the outer sepals, Stamens unequal, the longest one 6 mm; filaments with sessile glands on the dilated part; anthers oblong, acute at the apex. Ovary velutinous, subglobular, with a glabrous cupshaped disc at the base; style filiform; stigmas filiform, as long as the style. Capsule subglobose, hairy, 5 mm long and far exserted from the calyx; seeds.....
Fl. Jun.-Aug., Fr. Aug.

In sand, on lime and in fields, alt. 720-1500 m.

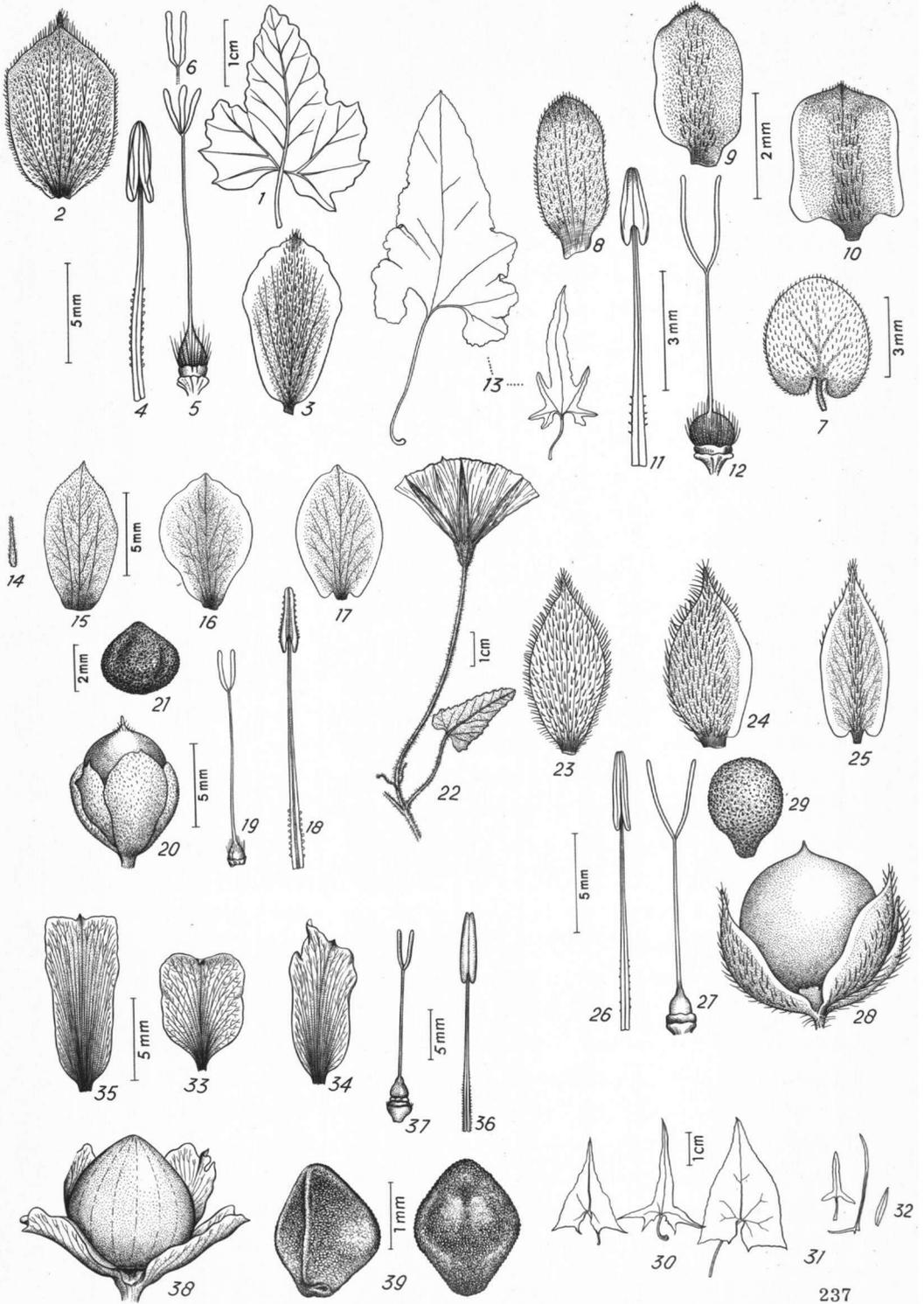
Distribution: known from Greece only.

Specimens seen:

Greece: Maire et Petitmengin 868, Achaia, Phonia (Phenos) Lake (K); Aichley 2314, M. Parnassus (K); Lemperg 628, between Delphi and Kalyvia (K).

This species differs from *C. arvensis* L. by the filiform stems, the small leaves, the 8 mm long corolla, the appressed puberulous indumentum, and the velutinous ovary.

Plate XVIII. fig. 1-6 *C. maireanus*; 1: leaf; 2: outer sepal; 3: inner sepal; 4: stamen; 5: pistil; of the terminal flower; 6: stigmas of the lateral flowers [1-6: Pampanini 6206 (G)]; fig. 7-12 *C. mairei*; 7: leaf; 8: outer sepal; 9: middle sepal; 10: inner sepal; 11: stamen; 12: pistil [7-12: Maire et Petitmengin 628 (K)]; fig. 13-21 *C. palestinus*; 13: leaves; 14: bracteole; 15: outer sepal; 16: middle sepal; 17: inner sepal; 18: stamen; 19: pistil; 20: capsule; 21: seed [13-19: Dinsmore 1409 (E); 20,21: without collector, Tripoli-Keftin, 27.6.1864 (JE)]; fig. 22-29 *C. pitardii*; 22: leaf and flower; 23: outer sepal; 24: middle sepal; 25: inner sepal; 26: stamen; 27: pistil; 28: capsule; 29: seed [22: Sauvage 2412, 31.3.1953 (RAB); 23-27: Sauvage 2413 (RAB); 28,29: Sauvage 14933 (RAB)]; fig. 30-39 *C. scammonia*; 30: leaves of var. *scammonia*; 31: leaves of var. *pseudoscammonia*; 32: bracteole; 33: outer sepal; 34: middle sepal; 35: inner sepal; 36: stamen; 37: pistil; 38: capsule; 39: seeds [30: Bourgeau 114 (W); 31,32 Davis et Hedge D 30166 (E); 33-37: Gathorne-Hardy 547 (E); 38,39: Rechinger 10708 (W)].



111. *C. palestinus* Boiss., *Diagn. Pl. Or. Nov.* 1 (11): 84.1849; Boiss., *Fl. Or. IV*: 107.1875; Dinsmore in Post, *Syr. Pal. Sinai*, ed 2, II: 209.1933, Täckholm, *Stud. Fl. Eg.*: 172.1956.

Type: Boiss. s.n., Palestine, without locality; holotype (G-Boiss.) seen.

C. palestinus var. *diversifolius* Boiss., *Diagn. op. c.p.* 85.

Type: Pestalozza s.n., originally cited as from Bolu, Bithynia, Turkey, later as from Syria (Boiss., *Fl. Or. l.c.*) (G-Boiss.) seen.

C. stenophyllus (Boiss.) Boiss., *Fl. Or. IV*: 106.1875.

Basionym: *C. palestinus* var. *stenophyllus* Boiss., *Pl. Or. Nov.* 2 (3): 124.1856.

Type: Blanche s.n., between Tripoli et Deir Kifa (Keftin), Lebanon (G-Boiss.) seen.

Plate XVIII. fig. 13-21.

A 50-60 cm high perennial, with a ligneous and branched base. Shoots herbaceous, simple or slightly branched, 2 mm in diameter, appressed-puberulous with retrorse hairs. Radical leaves not seen; the cauline ones with a petiole as long as or half as long as the blade; the blade of the lower cauline leaves ovate to linear-lanceolate; that of the upper ones 25-70 mm long, 7-40 mm wide, i. e. 1.25-4 times as long as wide, shallowly 3-lobed with the middle one longer than the two others, acute, base cordate-auriculate, margin crenate, appressed-pubescent, pinnately nerved. Flowers 1 to 3 (-5) in axillary monochasia or dichasia or solitary. Peduncle shorter than the subtending bract. Bracts like the upper leaves. Bracteoles filiform, shorter than the pedicel. Pedicel as long as the calyx. Sepals unequal, puberulous, convex; the outer ones obovate acute, 10 mm long, 6 mm wide; the middle one with the right and the left half unequal, one half membranous; the inner ones membranous, obovate, obtuse, mucronulate, auriculate at the base. Corolla yellow, 25-30 mm long, 2.5-3 times as long as the calyx; each segment with a hairy band on the outside, but the tube quite glabrous. Stamens unequal, the longest one 13 mm; filaments with sessile glands on the dilated part, anthers oblong-sagitate, retuse at the top, with a row of glands along the two slits. Ovary hairy, ovoid, at the base surrounded by a glabrous cup-shaped disc; style glabrous, filiform, three times as long as the cylindrical stigmas. Capsule hairy, ovoid, exserted from the calyx, 8 mm long, 6.5 mm wide, bilocular and with 4 seeds; seeds dark brown, 3.5 mm long, 2.5 mm wide, rugose. Fl. May-Jun. Fr. Jun.

Summit of hills, slopes, thickets, valleys, clay soil, fields; alt. 400 - 1300 m.

Distribution: Lebanon, Palestine, Jordan, Turkey? Egypt ¹⁾.

Specimens seen:

Jordan: Meyers and Dinsmore 3409, Ramallah (L).

Lebanon: Bornmüller 12139, Bhamdun (B, E, JE, W).

Palestine: Dinsmore 1409, Nazareth (E); Letourneux s.n., between Haifa and Akko (G).

Asia minor: Aucher-Eloy 1389 (W).

The occurrence of this species in Turkey is uncertain, as Boissier changed the original citation of the var. *diversifolius* from Bolu, Bithynia to Syria, and the specimen of Aucher 1389, cited as Asia Minor, does not specify the locality.

112. *C. pitardii* Battand. in Pitard, Explor. Sc. Maroc., Bot. 1:74.1913; Sauvage et Vindt, Fl. Maroc, II: 27.1954.

Type: Pitard 2977, Zaër, Oued Cherrat, Morocco, lectotype (AL), not seen. Isotype (P).

C. vidali Pau in Bol. Soc. Esp. Hist. Nat. 21: 279.1921

Type: Pau s.n., Xauen, Spanish Morocco (MA).

C. mesatlanticus or *Ipomoea mesatlantica*, Andréansky in Ind. Hort. Bot. Univ. Budapest 112.1934.

Type: Andréansky s.n., Azrou, Morocco (BP ± or BPU ± ?) not seen.

Plate XVIII. fig. 22-29.

A 17-60 cm high, perennial herb; base ligneous, branched. Root ligneous, 8-20 mm in diameter. Shoots herbaceous, simple, villous. Leaves firmly herbaceous; petiole 1.6-0.6 times as long as the blade; blade of the radical ones ovate or lanceolate, 20-30 mm long, 10-18 mm wide, 1.5-3 times as long as wide, acute, subacute or obtuse, base cordate to subcordate, margin crenate to finely serrate, glabrous or shortly sericeous above, densely and softly puberulous beneath, pinnately nerved. Flowers solitary and axillary, distributed along the whole stem. Peduncle short or wanting. Bracts like the radical leaves. Bracteoles filiform, shorter than the pedicel. Pedicel longer than the subtending

* 1) Tackholm l.c.

bract. Sepals unequal, shortly pubescent; the outer ones 8 mm long, either oblong and acute or elliptical and mucronate; the middle one with the right and the left half unequal, one half glabrous and membranous; the inner ones oblong and mucronate or lanceolate and acute, with both halves glabrous and membranous. Corolla pink, 35 mm long, 4 times as long as the calyx, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens unequal, the longest one 13 mm; filaments with sessile glands on the dilated part; anthers oblong, retuse at the apex. Ovary glabrous, ovoid with a cupshaped disc at the base; style glabrous, filiform, 1.5 times as long as the filiform stigmas. Capsule subglobose, glabrous or with few hairs at the top, 8 mm long and wide, bilocular and 2-seeded; seeds black, tubercled, 5 mm long, 3.5 mm wide. Fl. & Fr. Apr.-May.

In sand, on plains, in forests, on rocks, alt. 500-1500 m.

Distribution: known from Morocco (including Spanish Morocco) only.

a. var. pitardii.

var. typicus Maire, Contr. à l'étude Afr.N. Fasc. 17 in Bull. Soc. Hist. Nat. Afr. Nord. 22: 57.1931 (illegitimate name).

The upper side of the leaves glabrous or with a few short hairs, the lower side softly puberulous; outer sepals oblong and acute.

Specimens seen:

Morocco: Sauvage 2413, Mamora (RAB); Mair s.n., Monod (RAB).

b. var. leucochnous (Benoist) Maire, Contr. l.c. 1931.

Basionym: C. leucochnous Benoist in Bull. Mus. Hist. Nat. Paris, 27: 112. 1921.

Type: Benoist s.n., Ah Leuh, 65 km. S. of Meknès, Morocco (P).

Leaves with the upper side shortly sericeous; sepals elliptical and mucronate.

Specimens seen:

Morocco: Sauvage 2412, Zaian (RAB); Sauvage 1359, *ibid.* (RAB, W); Samuelsson 6809, Azrou (B); Sennen et Mauricio 9472, Spanish Morocco, Riffien (RAB).

I do not agree with Sauvage and Vindt l.c., who combine C. glaouorum with C. pitardii and who separate C. vidali from C. pitardii.

According to a letter from the Budapest herbarium the type of *C. mesatlanticus* Andréansky is not preserved there.

113. *C. scammonia* Linn., Sp. Pl. 1: 153.1753; Choisy in DC., Prodr. IX: 412. 1845; Boiss., Fl. Or. IV: 108.1875; Dinsmore in Post, Fl. Syr. Palest. Sinai, ed. 2, II: 209.1933; Grigor., Fl. USSR XIX: 29.1953; Täckholm, Stud. Fl. Eg. 172. 1956; Rech. f., Fl. Iran (Conv.): 20.1963.

Type: presumably a specimen in van Royen's herbarium at the Rijksherbarium, Leiden.

Specimen in Herb. Linn. 218.4, probably later than 1753.

C. elongatus Salisb., Prodr. 123.1796 (illegitimate name).

Plate XVIII. fig. 30-39.

A glabrous, 30-60 cm high, trailing or twining, rarely ascending perennial herb, provided with a rhizome. Shoots simple or, rarely, branched, 1.5-2.5 mm in diameter, striated. Radical leaves not seen; the cauline ones with a petiole half as long as the blade; blade herbaceous, that of the lower cauline leaves broadly ovate, 15-35 mm long, 11-20 mm wide, ca 1.2 - 1.8 times as long as wide, acute to acuminate, base cordate-auriculate, sagitate, or, rarely, hastate; the blade of the upper ones with linear entire lobes and a hastate-auriculate or hastate base, margin entire or slightly crenate, glabrous, pinnately nerved. Flowers up to 5 (-7) in axillary, at the base dichasial, entirely dichasial or entirely monochasial inflorescences. Peduncle longer than the subtending bract, rarely as long as or shorter. Bracts like the upper cauline leaves. Bracteoles small, 5 mm long, much shorter than the pedicel. Pedicel as long as the outer sepals. Sepals scarious, glabrous, unequal; the outer ones mostly shorter than the inner ones, 7-9 mm long, apex undulate, mucronulate; the middle one with the right and the left half unequal and with an oblique apex; the inner ones 12 mm long, retuse, mucronulate, margin irregularly sinuate. Corolla pale yellow, (2.5) 3-4.5 cm long, 3-5 times as long as the outer sepals, glabrous on the outside, Stamens subequal, the longest one 18 mm; filaments with sessile glands on the dilated basal part; anthers oblong-sagitate, retuse at the apex, thecae with sessile glands along each side of the slit. Ovary glabrous with a fleshy annular disc at the base; style filiform, 3 times as long as the cylindrical stigmas. Capsule glabrous, broadly ovoid, 11 mm long, 10 mm wide, bilocular, 3- or 4-seeded; seeds brown, obovoid,

4 mm long, 3 mm wide, tuberculated. Fl. May-June. Fr. Jun.-Jul.

On mountains, hills, slopes, in open woods, on eroded shallow clay soil, and on soils covered with small pebbles, in fallow fields, rarely in the garigue.

Distribution: Iraq; Turkey; Syria; Lebanon; Palestine, U.A.R. ¹⁾ (Egypt); Krym (USSR); Rhodes Island, Greece; Balkan ²⁾.

a. var. scammonia

Leaves broad; the lower cauline ones with a sagitate-cordate or auriculate base, usually crenate; the bracts and the upper cauline leaves triangular, but the basal lobes not linear.

Specimens seen:

Turkey: Sintenis 1274, Mardin (GOET, STU).

Syria: Haradjian 2711, Latakia (Ladikie) (E).

Lebanon: Hohenack 630, Beirut (E).

Palestine: Davis 4844, Nazareth (El Reina) (E).

Rhodos: Bourgeau 114, Maritza (GOET, W).

Greece: Gathorne-Hardy 547, Pağōndhas, Samos (E).

USSR: Callier 323, Kikines, Krym (Crimea) (E).

Iraq: Rechinger 10708, Mosul (W).

b. var. pseudoscammonia (Koch) Sa'ad nov. stat.

C. pseudoscammonia Koch in Linn. 22: 746.1849.

Type: Koch s.n., Gaue Sber ³⁾, Armenia; holotype (B + ?) not seen.

C. cappadocicus Hausskn. et Sint. ex Woronow in Monit. Jard. Bot. Tiflis, 10: 31.1908.

Type: Sintenis 2864, Kemaliye (Egin), Turkey, lectotype (Probably TGM), not seen.

Isotypes (B, STU).

Leaves smaller than in var. *scammonia*; the bracts and the upper cauline leaves with a hastate or sagitate base; and the basal lobes entire, linear.

* 1) Thackholm l.c.

* 2) Grigor. l.c.

* 3) Locality from the label.

Distribution: Turkey, probably Caucasus and Trans-caucasus.

Specimens seen:

Turkey: Sintenis 926, Kemaliye (Egin), paratype (B); Davis et Hedge D 30166, Artvin (Coruh) (E).

114. C. stachydifolius Choisy in DC., Prodr. IX: 408.1845; Boiss., Fl.Or.IV: 107.1875; Dinsmore in Post, Fl.Syr.Palest. Sinai ed. 2,II: 208.1933; Thackholm, Stud.Fl.Eg. 174.1956; Rechinger f., Fl.Iran (Conv.): 19.1963.

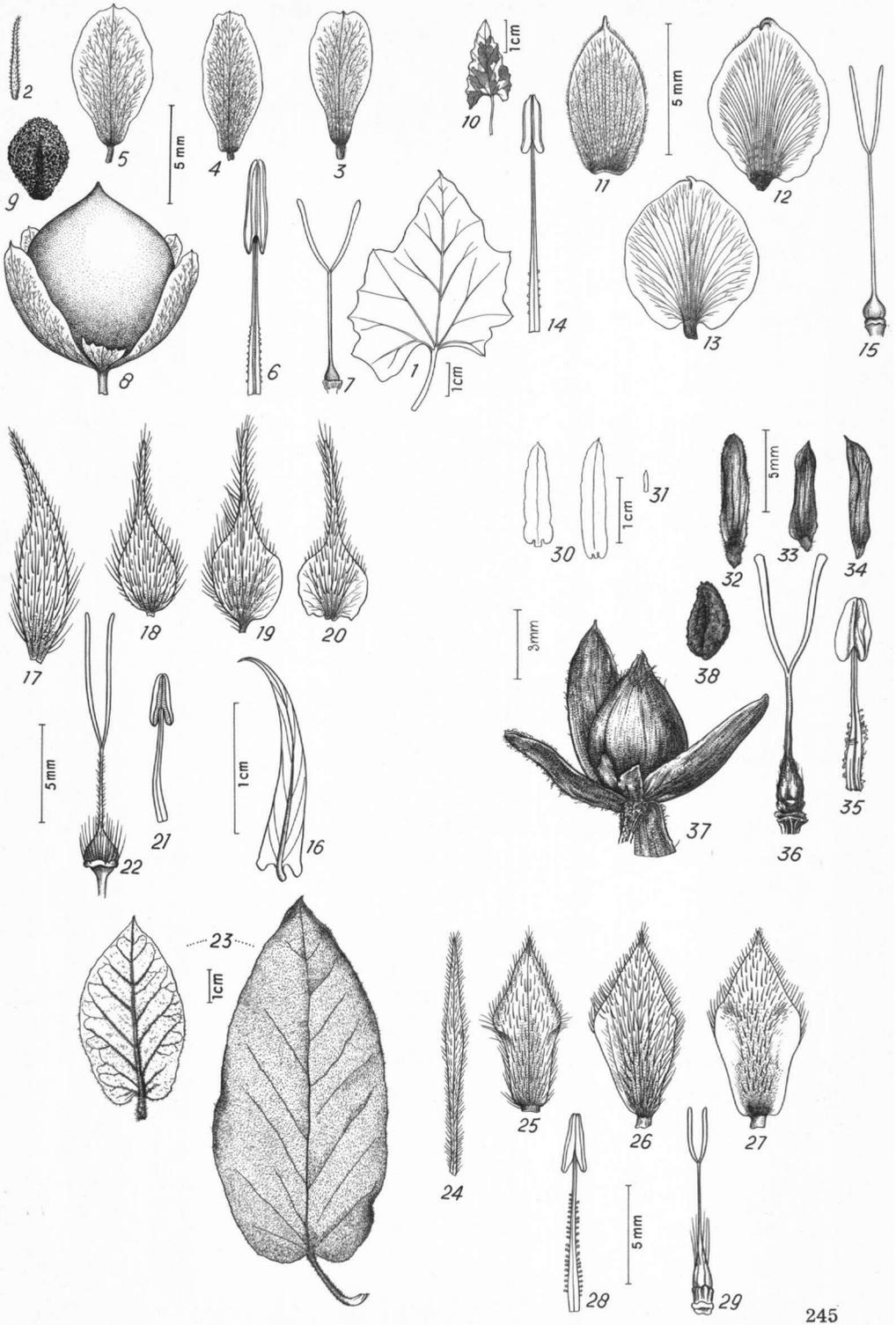
Type: Olivier s.n., out of Aleppo near Mosul, Syria-Iraq, lectotype (G-DC). Plate XIX. fig. 1-9.

A (18) 50-60 cm high perennial herb; base ligneous and branched. Root ligneous, up to 6 mm in diameter, perpendicular. Shoots simple or slightly branched, 2-3 mm in diameter, appressed-puberulous with retrorse hairs. Leaves petiolate; petiole 1.25-0.75 times as long as the herbaceous blade; blade of the radical ones oblong-ovate to broadly ovate, 17-30 (-40) mm long, 10-20 (-24) mm wide, ca 1.5 times as long as wide, top obtuse, base cordate, margin crenate to crenate-dentate; blade of the cauline ones ovate, 15-30 mm long, 12-28 mm wide, ca 1.1-1.25 times as long as wide, top obtuse or acute, mucronulate, base cordate, margin irregularly dentate-crenate; puberulous beneath, appressed-pubescent above, sometimes densely velvety on both sides, pinnately nerved. Flowers solitary or up to 4 (-7) in an axillary monochasium or dichasium; peduncle as long as or longer than the subtending bract. Bracts like the cauline leaves. Bracteoles filiform, shorter than the pedicel. Pedicels 2-3 times as long as the calyx. Sepals unequal, scarious, slightly hairy; the outer ones 5-7 mm long, either obovate, retuse and mucronulate or oblong and obtuse; the middle one with the right and the left half slightly unequal; the inner ones like the outer ones, but both halves broadly membranous and the base truncate. Corolla dark purple, 22-28 mm long, glabrous on the outside, 4 times as long as the calyx. Stamens subequal, 11 mm long; filaments with sessile glands on the dilated part; anthers oblong, with retuse apex. Ovary ovoid, glabrous or with a few hairs at the top; style glabrous or with a few hairs, 1.5 times as long as the filiform stigmas. Capsule glabrous, ovoid, acute, 11 mm long, 8 mm wide, protruding from the persistent calyx, bilocular, 4-seeded; seeds dark brown, 4 mm long, 2 mm wide. Fl. Apr.-May. Fr. June.

In deserts, on hills, as a weed in field., on banks of rivers, and in cal-

Plate XIX. fig. 1-9 *C. stachydifolius* var. *stachydifolius*; 1: leaf; 2: bracteole; 3: outer sepal; 4: middle sepal; 5: inner sepal; 6: stamen; 7: pistil; 8: capsule; 9: seed [1-7: Bornmüller 1528 b (B): without collector 524 (JE)]; fig. 10-15 *C. variegatus*; 10: leaf; 11: outer sepal; 12: middle sepal; 13: inner sepal; 14: stamen; 15: pistil [10-15: Voeke 3803 (GOET)]; fig. 16-22 *C. zargarianus*; 16: leaf; 17: bracteole; 18: outer sepal; 19: middle sepal; 20: inner sepal; 21: stamen; 22: pistil [16-22: Parsa 568 (K)]; fig. 23-29 *C. canariensis*; 23: leaves; 24: bracteole; 25: outer sepal; 26: middle sepal; 27: inner sepal; 28: stamen; 29: pistil [23-29: Bourgeau 1428 (C)]; fig. 30-36 *C. fruticosus* var. *fruticosus*; 30: leaves; 31: bracteole; 32: outer sepal; 33: middle sepal; 34: inner sepal; 35: stamen; 36: pistil; 37, 38: var. *glandulosus*; 37: capsule; 38: seed [30-36: Bornmüller 2612 (W); 37, 38: Perraudière 1429 (C)].

PLATE XIX



careous vineyards; alt. 500-1000 m.

Distribution: Iran, Turkey, Syria, Lebanon, Jordan, Egypt.

a. var. stachydifolius.

Plant sparsely hairy, leaves and flowers large; flowers up to 4 (-7) in dichasia or monochasia.

Specimens seen:

Iran: Bent et Wright 412-502, Lorestan, Khorramābād (W); Gauba 1625, Elburz (B).

Iraq: Bornmüller 1529, Kirkūk (B, HBG, STU, W); Rechinger 10.084, Sulaymaniyah (W); Russeau s.n., near Mosul, paratype (G-DC).

Turkey: Davis et Hedge D. 28188, Urfa (E).

Syria: Barkoudah 1262, Jebel ed Druze (U).

Jordan: Meyers et Dinsmore M 1651, Madaba (L).

b. var. villosus Hallier f. in Bot. Jahr, Syst. Pflanzenges. Pflanzengeogr. 18: 107.1894.

Type: Aucher 1393, Egypt, without locality, lectotype (W).

C. damascenus Boiss. et Gaill. in Boiss., Diagn. Pl., Or. Nov. 2 (6): 122. 1859.

Type: Gaillardot 2058, around Damascus (Damas), holotype (G-Boiss.).

The whole plant densely hairy; leaves smaller than in the var. *stachydifolius*, on both sides velvety; corolla 20 mm long; flowers often solitary or in pairs.

Distribution: Turkey, Syria, Lebanon, Jordan, Egypt.

Specimens seen:

Turkey: Haussknecht s.n., between Gaziantep (Ainteb) and Nusaybin (Nisib) (W).

Syria: Kotschy 231, Aleppo (L, W); Meyer 452; Zebdāni (W).

Lebanon: Jouannet-Marie 487, Les Cēdrēs (W).

Jordan: Meyers et Dinsmore 17176, Hadi (W).

U.A.R. (Egypt): Simpson 4714, Alexandria (BM).

115. C. variegatus Sa'ad nov. spec.

Plate XIX. fig. 10-15.

Herba puberula. Pars basalis caulis primarii et plantae pars subterranea ignotae. Caules gracillimi, 1 mm diam. Folia radicalia nondum visa; folia caulina petiolo circ. 14 mm longo instructa, lamina tenuiter herbacea, ovato-sagittata, 28-35 mm longa et 12-20 mm lata, apice acuta, margine dentata, maculis dilute viridibus variegata. Flores nunc solitarii vel bini, nunc in dichasium 3-florum dispositi in axillis bractearum quae foliis caulinis similiores sunt. Pedunculus gracillimus, bractea suffulciente brevior; bracteolae subulatae, pedicello breviores. Pedicellus circ. 6 mm longus. Sepala inaequalia, omnia tamen 6 mm longa, obtusa et mucronulata, membranacea; exteriora obovata, virga mediana extus parce pilosa instructa; medianum cum dimidio dextro a dimidio sinistro diverso; interiora suborbicularia, tota glabra. Corolla colore ignoto, 12 mm longa, segmentorum quinque unoquoque virga mediana extus in parte superiore pilosa instructo. Stamina inaequilonga, longissimo 9 mm longo; filamenta in parte dilatata glandulis sessilibus vestita; antherae oblongae, apice acutae. Ovarium ovoideum, glabrum, basi disco circumdatum; stylus filiformis, stigmatibus etiam filiformibus bis longior, glaber. Capsula nondum visa. Typus: Vocke 3803, Asia Minor sine loco exacto (GOET).

Distribution: known from Asia Minor only.

For this species no specific locality can be given, as Vocke, like some other collectors of his time, merely mentioned the name of the region in which the plants were collected: in this case Asia Minor, i. e. the Asiatic part of what today is Turkey. In a letter from the director of the herbarium at Goettingen I was informed that no particulars are known there with regard to Vocke's travels in Asia Minor.

C. variegatus differs from *C. pitardii* Battand., *C. althaeoides* L. and *C. fatmensis* Kunze by the nature of its leaves, which are thinly herbaceous and blotted with light green spots, from *C. pitardii* moreover by the presence of up to three flowers in the axil of the bract, the subulate bracteoles, the short pedicel and the membranaceous, obovate, obtuse and mucronulate outer sepals, which, in addition, are slightly hairy in the middle, from *C. althaeoides* by the shape of the leaves and bracts, which lack the incisions in the upper part, and by the 12 mm long corolla, and from *C. fatmensis* by the dentate leaf margin and the 12 mm long corolla.

116. *C. zargarianus* Parsa in Kew. Bull. 2: 214. 1948; Rechinger f., Fl. Iran (Conv.): 18. 1963.

Type: Parsa 568, Tiss near Bandar 'Abbās, Iran, holotype (K).

Icon: Rechinger l.c. Tab. 4. fig. 2.

Plate XIX. fig. 16-22.

A sparingly pubescent perennial herb; the hairs partly appressed and partly spreading. Underground parts not seen. Upper part of the shoots herbaceous, twining. Lower leaves not seen. Cauline ones firmly herbaceous, shortly petiolate; petiole $1/10$ the length of the blade; blade lanceolate, ca. 25 mm long, ca 3 mm wide, i.e. 8 times as long as wide, top acute with a spinescent mucro, base auriculate, indumentum appressed-pilose, pinnately nerved. Flowers up to 8 in a compact, 2.5 cm long axillary cincinnus. Bracts like the leaves. Peduncle longer than the subtending bract. Bracteoles of the outer flowers leafy, sessile, lanceolate, acuminate, while the inner flowers of the inflorescence are provided with filiform bracteoles. Calyx long-sericeous; sepals unequal, 8 mm long; the outer ones ovate, long-acuminate, the middle one with the right and the left half unequal, one half glabrous and membranous; the inner ones convex, broadly ovate, long acuminate, with both halves glabrous and membranous. Corolla yellow when dry, 20 mm long and 2.5 times as long as the calyx, with hairy bands on the outside, but the tube quite glabrous. Stamens unequal, the longest one 8 mm long; filaments glabrous; anthers oblong, with retuse apex. Ovary ovoid, velutinous, with a shallow glabrous cup-shaped disc at the base; style stout, hairy; stigmas filiform, 1.5 times as long as the style. Capsule not seen. Fl. May. Fr. time not known. Alt. 100 m.

Distribution: known from the type locality only.

Subsectio 12. Frutescentes Peter.

Shrubby or subshrubby; branches twining.

117. C. canariensis L. Sp. Pl. I: 155. 1753; Desr. in Lam. Encycl. III: 556. 1798; Choisy in DC. Prodr. IX: 413. 1845.

Type: in herb. Linn. 218.17, lectotype (LINN) seen.

C. pannifolius Salisbury, Parad. Lond. I: t. 20. 1805.

Type: Icon. Parad. Lond. I: t. 20. 1805.

C. pallidus Salisb., Prodr. 123. 1796 (nom. illeg.).

Plate XIX. fig. 23-29.

A softly villous, glabrescent or rarely woolly liana. Shoots twining, 3-4 mm in diameter; the old ones with a brown bark. Radical leaves unknown; the cauline ones petiolate; petiole $\frac{1}{2}$ - $\frac{1}{3}$ the length of the blade; blade firmly herbaceous to chartaceous, ovate-oblong, rarely ovate, 50-100 mm long, 20-50 mm wide, 2-2.5 times as long as wide, acute to acuminate, sometimes mucronulate, base subcordate, margin entire, shortly appressed-pubescent or, rarely, glabrous, pinnately nerved. Flowers 3 to several, in unequal dichasial-monochasial axillary inflorescences borne on peduncles which are much shorter than the subtending bract. Bracts like the leaves. Bracteoles filiform to elliptical, acuminate, shorter than the pedicel. Pedicel as long as or longer than the calyx. Sepals unequal, with spreading hairs or glabrous, obovate, 8 mm long, acute, mucronulate; the outer ones without a membranous margin; the middle ones with unequal halves, one half membranous; the inner ones auriculate, with the two halves membranous. Corolla purple or light violet, 18 mm long, 2.2 times as long as the calyx, with hairy bands on the outside, but the lower part of the limb and the tube quite glabrous. Stamens subequal; filaments with stalked glands on the dilated part; anthers oblong-sagitate, retuse at the apex. Ovary conical, glabrous or with few hairs, with a glabrous cup-shaped disc at the base; style glabrous, as long as the cylindrical stigmas. Capsule glabrous, obovoid, shorter than the persistent calyx; seeds dark brown, irregularly tuberculated, 3 mm long, 2 mm wide. Fl. May-Jul. Fr. time not known.

Climbing to the top of high trees in forests, alt. 700-900 m.

Distribution: Canary and Madeira Isles.

a. var. canariensis.

C. bourgaei, Bolle in *Bonplandia* 11: 54. 1861.

Type: Bourgeau s.n., near Arafo Tenerife (not seen).

The whole plant softly pubescent; branches usually robust; leaves chartaceous, appressed pubescent.

Specimens seen:

Canary Isles: Børgesen 395, Tenerife, Las Mercedes (C); Bornmüller 975, *ibid.* (HBG, JE, STU, W); Burchard 219, Tenerife (CAIM, E); Murray s.n., Gran Canaria (C); Bourgeau 1428, Tenerife (C, GOET, JE, W).

b. var. *massonii* (Dietr.) Sa'ad stat. nov.

C. massonii, Dietr. Nachtr. Gaertn. II: 377. 1816, based on *C. suffruticosus* Ait., Hort. Kew ed. 2, 1: 331. 1810, non Desf. 1798.

C. saxatilis Salisb. Prodr.: 124. 1796, non Vahl, Symb. III: 33. 1794.

Type: Masson s.n., Madeira Is. (K).

C. volubilis Brouss. ex Link in Buch, Besch. Ins. 145. 1825.

No type mentioned.

Rhodorrhiza volubilis Boll. in Bonpl. 9: 54. 1861.

Type: Buch 204, Tenerife near Tagnana (not seen).

C. lopezsocasi Svent. Addit. Fl. Canar. I: 46. 1960.

Type: Lopezsocas s.n., Pluviaria Isl., Canary Isls. 18. 5. 1947, lectotype (not known).

The whole plant glabrous.

Specimens seen:

Canary Isl.: Murray s.n., Lanzarote ¹⁾, 16. 5. 1902 (K); Bourgeau 1427, Risco de Cogana ¹⁾ (G).

Madeira: Mandon 180, Rubero de S. Julian ¹⁾ (G).

118. *C. fruticosus* Desr. in Lam., Encycl. III: 541. 1789; Choisy in DC, Prodr. IX: 414. 1845.

Type: a specimen cultivated in the Jardin du Roi, Paris, from seed collected in the Canary Isl., holotype (P) seen.

Rhodorrhiza fruticulosa Webb. & Berth., Phyt. Canar. III: 33. t. 140. 1844.

Plate XIX. fig. 30-38.

A 90-120 cm high, tomentellous suffrutescent plant. Shoots ligneous; branches twining. Leaves firmly herbaceous; petiole $\frac{1}{7}$ the length of the blade, linear-lanceolate to linear-oblong, 16-35 mm long, 4-11 mm wide, 3.5-4 times as long as wide, acute, subacute or obtuse, mucronulate, base auriculate or cuneate, margin entire, indumentum tomentellous or glabrous, pinnately nerved. Flowers solitary or up to 6 in an axillary dichasium. Bracts like the leaves. Bracteoles small, filiform, but when the number of flowers is more than one, the bracteoles become longer but without exceeding the calyx. Peduncle shorter

* 1) Locality given from the label.

than the subtending bract. Bracts like the leaves. Pedicel longer than the calyx. Sepals unequal, tomentellous; the outer ones 5-9 mm long, 2-4 mm wide, either oblong, obtuse, and mucronulate or elliptical, acute and mucronulate; the middle one with the right and the left half unequal, one half glabrous and membranous; the inner ones 6-8 mm long, broadly oblong, obtuse or acute, mucronulate, with both halves glabrous and membranous. Corolla pink, 12-17 mm long, twice as long as the calyx, with hairy bands on the outside, but the tube quite glabrous. Stamens unequal, the longest one 8 mm; filaments with stalked glands on the dilated part; anthers oblong-sagitate, obtuse. Ovary hairy, conical, with a glabrous cup-shaped disc at the base; style glabrous, filiform; stigmas filiform, 1.5 times as long as the style. Capsule ovoid, hairy, hidden by the persistent calyx, 5 mm long, 4 mm wide, bilocular, 3-seeded; seeds black, tuberculated, 3 mm long, 2-2.5 mm wide. Fl. & Fr. Feb. Jan.

In mountains.

Distribution: known from the Canary Isl. only.

a. var. fruticulosus

C. venosus Hallier in Bot. Jarb. 18: 109. 1894.

Type: Bourgeau 14276, Tagnana, Tenerife (not seen).

Plants slender; leaves ca 16 mm long, 4 mm wide; flowers usually solitary; the outer sepals 5-6 mm long, 2 mm wide, oblong, obtuse (mucronulate).
Specimens seen:

Børgesen 444, Tenerife, St. Cruz (C, W); Børgesen 537 *ibid.* (C); Bornmüller 2612 *ibid.* (B, JE, STU, W).

b. var. glandulosus (Webb.) Sa'ad stat. nov.

Basionym: *Rhodorrhiza glandulosa* Webb. in Lindl., Bot. Reg. 17 Misc. p. 70. n. 152. 1841.

C. glandulosus Hallier in Bot. Jahrb. 18: 102. 1894.

No specimen mentioned as type.

C. perraudieri Coss. in Bull. Soc. Bot. Fr. 3: 58. 1856.

Type: Perraudièri s. n., Barranco de Chyana, Tenerife (P) seen.

Rhodorrhiza perraudieri (Coss.) Bolle in Bonpl. 9: 54. 1861.

C. subauriculatus (Burch) Lindinger in Abh. Gebiet Auslandsk. Hamb. 21 Reihe C. Naturw. 8: (Beitr. veg. Fl. kanar. Ins.) 190. 1926.

Rhodorrhiza subauriculata Burch. in Fedde Rep. 13: 57. 1913.

Type: Burchard s.n., Gomera Isl. (not seen).

Plant robust; leaves 20-35 mm long, ca 11 mm wide; outer sepals 8-9 mm long, 4 mm wide, elliptical (mucronulate).

Specimens seen:

Burchard 315, Tenerife (HBG, JE, W); Bolle s.n. *ibid.* (COI, W).

c. var. glabrior Sa'ad var. nov. a varietatibus aliis indumento subnullo et seminibus sublaevibus recedens.

Typus: Hermigna 190 G, Gomera Island (K).

Isotype (BM).

C. dryandri Spreng. Syst. I: 597.1825.

Type: in herb. Willdenow under *C. fruticosus dryandri* (not seen).

Plant rather glabrous, leaves mostly mucronulate; seeds almost smooth.

Specimens seen:

Grand Canaria: Murray s.n., without locality 9.5.1894 (BM, K).

Species not seen or of which the occurrence is doubtful in the region studied:

X *C. beguinotii* Maire et Weiller in Bull. Soc. Hist. Nat. Afr. Nord. 30: 293.1939. This species is a hybrid between *C. humilis* Jacq. and *C. siculus* L. typus: Beguinot 1114, l'Ouadi Kauk, Lybia (AL).

C. capituliferus Franch. in Révoil, Comali 41.1882. The author did not see any specimen of this species from the area studied, but according to Täckholm, Stud. Fl. Egypt. 172.1956 it occurs in the S. E. of Egypt. It seems to me that it is a tropical species and that its occurrence in this part is uncertain.

C. heterotrichus Maire in Bull. Soc. Hist. Nat. Afr. Nord. 26: 159.1935. Type: Lutherear s.n., Sahara occidental (AL); no specimens seen from this species.

C. krauseanus Regl. et Schmalh. in Act. Hort. Petrop. VI: 339.1879; type collected near Samarkand (LE), not seen. Grigoryev, Fl. USSR XIX: 19.1953 accepted it as a good species, but he cited "in the first description of this species was indicated that the type specimen had been collected in the environment of Samarkand, but on the label stands: environment of Tashkent; probably both indications are erroneous, as the species never has been collected there afterwards. *C. krauseanus* only occurs in the plane of the river Naryn".

C. phrygius Bornm. in Fedde Repert. Nov. Sp. 5: 168.1908; type: Warburg et Endlich 515, Eski-Scheher, Phrygia (B⁺), not seen. The author did not see any specimen which could be referred to this species.

C. stocksii Boiss., Fl. Or. IV: 110.1875.

Syn.: *C. tenellus* Stocks in Hook. Journ. 4: 172.1852.

The type of this species was described from Pakistan, but according to Rechinger, Fl. Iran (Conv.): 21.1963 it occurs in Turkomaniya, but he did not cite any specimen from this part.

Uncertain species:

C. aegyptius Linn., Syst.ed.10,2: 923.1759; Linné referred to his Sp.Pl. I: 162. 1753; in the latter work he cited this species as an *Ipomoea* occurring in America. This species does not occur in the region studied by the present author.

C. argenteus Lam., Fl.Fr.II: 266.1778. The Index Kewensis cited this species as a synonym of *C. cneorum* L. but this is a species which does not occur in France. According to the description it is probably *C. lanuginosus* Desr. 1789. The type of *C. argenteus* Lam. is not in herb. (P-Lam.) but as Lamark referred to Tournefort it may be in herb. Tournef. in Paris, but the present author did not have the chance to see this type.

C. benehoavensis Bolle in Bonplandia 11: 54.1861. Type: without collector, Pico del Cedro, September 1852, in Palma Isl. The description is not sufficiently clear to decide which species Bolle meant.

C. cneorum Gouan, Fl. Monsp.Sistr.Pl.n. 1850.28.1765; no type specimen mentioned. The description is short and it is difficult to know what species Gouan meant.

C. quadriflorus Hochst. in Lorent, Wanderungen; 335.1845; no type specimen mentioned. The description is not sufficiently clear to know which species Hochst. meant.

C. rupestris? Buch, Besch. Canar. Ins.: 193.1825; no type specimen mentioned. It is impossible from the description to know what species Buch meant.

C. ? salonifolius Lowe, in Trans. Comb. Phil. Soc. 4: 22.1831; no type specimen mentioned. The description is too short to know what Lowe meant.

Descriptions not seen:

C. althaeoides Tenore, Syll. Fl. Neap. 92.1831; it is cited by Index Kewensis

I: 600.1895 as a synonym of *C. tenuissimus* which is treated by the present author as a synonym of *C. althaeoides* L. var. *pedates* Choisy; but Tenore l.c. referred to *Fl. Neapolitana* vol. I-II which was not seen by the present author.

C. patens Clarke, *Trav. ed.* 2,1 : 22.

accepted by *Index Kewensis* I: 604.1895 as a good species distributed in the Orient.

C. sagittatus Dulac., *Fl. Hautes Pyr.*: 439.1867.

It is cited by *Index Kewensis* I: 605.1895 as a synonym of *C. arvensis* L.

C. scandens Delile, *Ind. Sem. Hort. Monsp.* 17.1847.

It is accepted by *Index Kewensis* I: 605.1895 as a good species occurring in Egypt.

Species occurring in the area studied by the present author, but transferred already in the *Index Kewensis* to other genera. (quoted from *Index Kewensis*).

Synonyms of *Calystegia silvatica* Choisy in DC. *Prodr.* IX: 433.1845:

Convolvulus inflatus Desf. *Tabl. ed.* 1: 74.1804.

C. sylvaticus, Waldst. et Kit., *Pl. Rar. Hung.* III: 290. t. 216. 1812.

Synonyms of *Calystegia sepium* R. Brown *Prodr.* 483.1821:

C. acutifolius Phil. ex Reich., *Fl. Chile* V: 183.1910.

C. catesbaei Spreng., *Syst.* I: 603.1825.

C. crassipes Kunze ex Choisy in DC. *Prodr.* IX: 433.1845.

C. laetus Salisb. *Prodr.*: 128.1796.

C. lactescens Gronov. ex Choisy in DC. *Prodr.* IX: 433.1845.

C. lucanus Tenore, *Fl. Neap. Prodr. App.* V: 9.1826.

C. major Gilib., *Fl. Lituan.* I: 43.1781.

C. maritimus Gouan, *Fl. Monsp.* 27.1765.

C. repens Linn. *Sp. Pl.* I: 158.1753.

C. sepium Linn. l.c. p.153.

C. sepincola St. Lag. in Ann. Soc. Bot. Lyon VII: 123.1880.

Synonyms of *Calystegia soldanella* R. Brown Prodr. 483.1821:

C. asarifolius Salisb., Prodr. 125.1796.

C. maritimus Lam., Fl. Fr. II: 265.1778.

C. pseudo-soldanella Mer. in App. Loisel. ex Bull. Férussac
111.1828.

C. reniformis Poir. in Lam. Encyc. Suppl. III: 475.1813.

C. soldanella Linn. Sp. Pl. I: 159.1753.

Synonyms of *Calystegia hederacea* Wall. in Roxb. Fl. Ind. ed. 2 Carey et Wall.
II: 94.1824.

C. acetosaefolius Turcz. in Bull. Soc. Nat. Mosc.: 73.1840.

C. pubescens Thell. in Viertelj. Naturf. Ges. Zürich, 52: 459.1907.

C. wallichianus Spreng., Syst. IV. Cur. Post. 61.1827.

C. physoides Pomel, Nouv. Mat. Fl. Atl. II: 294.1875:

The author of this species l.c. described this taxon as *Calystegia physoides* but when he compared his new taxon with other species, he erroneously put it under *Convolvulus*. The present author saw the isotype of this *Calystegia* in (P).

C. barbarus Pomel, Nouv. Mat. Fl. Atl. II: 294.1875.

No type specimen cited by the author, but as he described the bracts as more inflated than in *Calystegia physoides*, it is probably a *Calystegia* and not a *Convolvulus*.

Synonyms of *Ipomoea palmata* Forsk., Fl. Aeg. 43.1775:

C. bellus Spreng., Syst. I: 509.1825.

C. caricus Linn., Syst. ed. 10: 922.1758-59.

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C. lymphaticus Vell. Fl.Flum.II: t.47.1825.
C. lupulifolia Griff. Notul.IV: 284.
C. mucronatus Forst., Fl.Prod.14.1786.
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1. *C. acanthocladus* Boiss.
2. *C. argyracanthus* Rech. f.
3. *C. fruticosus* Pall.
4. *C. leiocalycinus* Boiss.
 - a. var. *leiocalycinus*
 - b. var. *stocksii* Boiss.
 - c. var. *lycioides* Boiss.
5. *C. retrosepalus* Sa'ad
6. *C. spinosus* Burm.
7. *C. caput - medusae* Lowe
8. *C. hamarinensis* Rech. f.
9. *C. hystrix* Vahl
10. *C. oxyphyllus* Boiss.
 - a. ssp. *oxyphyllus*
 - b. ssp. *oxycladus* Rech. f.
11. *C. spinifer* Popov
12. *C. ulicinus* Boiss.
13. *C. urosepalus* Pau
14. *C. lanatus* Vahl
15. *C. oxysepalus* Boiss.
16. *C. turrillianus* Parsa
17. *C. virgatus* Boiss.

18. *C. chondrilloides* Boiss.
 - a. var. *chondrilloides*
 - b. var. *burzianus* Sa'ad
 - c. var. *villosus* Bornm.
19. *C. divaricatus* Rgl. et Schmahl
20. *C. dorycnium* L.
 - a. ssp. *dorycnium*
 - b. ssp. *oxysepalus* (Boiss.) Rech.f.
 - c. ssp. *hirsutus* (Rgl. et Schmahl) Sa'ad
21. *C. eremophilus* Boiss.
22. *C. erinaceus* Ledeb.
 - a. var. *erinaceus*
 - b. var. *kermanensis* Sa'ad
23. *C. koeieanus* Bornm.
24. *C. korolkowii* Rgl. et Schmahl
25. *C. leptocladus* Boiss.
26. *C. lindbergii* Sa'ad
27. *C. pseudocantabricus* Schrenk
 - a. var. *pseudocantabricus*
 - b. var. *dianthoides* (Kar. et Kir.) Sa'ad
28. *C. rectangularis* Rech.f.
29. *C. sarothrocladus* Boiss. et Haussk.
30. *C. scoparius* L.f.
31. *C. turcomanicus* (Kuntze) Petrov
 - a. var. *turcomanicus*
 - b. var. *villosus* Sa'ad
32. *C. aucheri* Choisy
33. *C. gracillimus* Rech.f.
34. *C. linoides* Bornm.
35. *C. floridus* L.f.
36. *C. abdallahi* Sa'ad
37. *C. calvertii* Boiss.
38. *C. commutatus* Boiss.
39. *C. lanuginosus* Desr.
 - a. var. *lanuginosus*
 - b. var. *villosus* Boiss.
40. *C. schirazianus* Boiss.

41. *C. sericocephalus* Juz.
42. *C. cantabricus* L.
43. *C. cneorum* L.
 - a. *ssp. cneorum*
 - b. *ssp. latifolius* (Reichenb.) Sa'ad.
44. *C. lineatus* L.
 - a. *var. lineatus*
 - b. *var. angustifolius* Kotschy
45. *C. oleifolius* Desr.
46. *C. holosericeus* Marsch. Bieb.
 - a. *var. holosericeus*
 - b. *var. macrosepalus* Haussk. et Bornm. ex Bornm.
47. *C. aitchisonii* Clarke
48. *C. anatolicus* Sa'ad
49. *C. assyricus* Griseb.
50. *C. boissieri* Steud.
51. *C. cataonicus* Boiss. et Haussk.
52. *C. compactus* Boiss.
 - a. *ssp. compactus*
 - b. *ssp. parnassicus* (Boiss. et Orph.) Sa'ad
53. *C. konyacus* Sa'ad
54. *C. libanoticus* Boiss.
55. *C. mazicum* Emberger et Maire
56. *C. orophilus* Sa'ad
57. *C. pulvinatus* Sa'ad
58. *C. radicosus* Held. et Sart.
59. *C. asyrensis* Kotchy
60. *C. buschiricus* Bornm.
61. *C. cateniflorus* (Rech.f.) Sa'ad
62. *C. cephalophorus* Boiss.
63. *C. cephalopodus* Boiss.
64. *C. euphraticus* Bornm.
65. *C. gonocladus* Boiss.
66. *C. jordanensis* Sa'ad
67. *C. kotschyanus* Boiss.
68. *C. persicus* L.
69. *C. pyrrhotrichus* Boiss.

70. *C. reticulatus* Choisy
 a. *ssp. reticulatus*
 b. *ssp. waltherioides* (Boiss. et Haussk.) Sa'ad
71. *C. schimperi* Boiss.
72. *C. secundus* Desr.
73. *C. spicatus* Peter ex Hallier
74. *C. stapfii* Rech.f.
75. *C. ammocharis* Boiss. et Haussk.
76. *C. austro-aegyptiacus* Abdallah et Sa'ad
77. *C. caelesyriacus* Boiss.
78. *C. cancerianus* Abdallah et Sa'ad
79. *C. deserti* Hochst. et Steud.
80. *C. georgicus* Sa'ad
91. *C. gharbensis* Battand. et Pitard
82. *C. glomeratus* Choisy
 a. *var. glomeratus*
 b. *var. gymnospermus* Sa'ad
83. *C. humilis* Jacq.
84. *C. meonanthus* Hoffm. et Link
85. *C. pentapetaloides* L.
86. *C. pilosellifolius* Desr.
 a. *var. pilosellifolius*
 b. *var. linearifolius* Sa'ad
 c. *var. leiocalycinus* Sa'ad
87. *C. prostratus* Forsk.
88. *C. rhyniospermus* Hochst. ex Choisy
 a. *var. rhyniospermus*
 b. *var. laevis* Sa'ad
89. *C. rottlerianus* Choisy
90. *C. sabatius* Viv.
 a. *var. sabatius*
 b. *var. mauritanicus* (Boiss.) Murbeck
91. *C. siculus*
 a. *ssp. siculus*
 b. *ssp. agrestis* (Hochst. ex Schweinf.) Verdecourt
 c. *var. agrestis*
 d. *var. elongatus* (Willd.) Battandier

92. *C. supinus* Coss. et Kral.
93. *C. tricolor* L.
 a. var. *tricolor*
 b. var. *cupenianus* Sa'ad
 c. var. *heterocalyx* Maire
94. *C. valentinus* Cav.
 a. var. *valentinus*
 b. var. *suffruticosus* (Desf.) Pau et Font Quer
95. *C. aleppensis* Sa'ad
96. *C. althaeoides* L.
 a. var. *althaeoides*
 b. var. *pedatus* Choisy
97. *C. arvensis* L.
 a. var. *arvensis*
 b. var. *linearifolius* Choisy
 c. var. *villosus* Choisy
98. *C. betonicifolius* Mill.
 a. var. *betonicifolius*
 b. var. *armemus* Sa'ad
 c. var. *tomentosus* Boiss.
99. *C. cassius* Samuelsson ex Rech.f.
100. *C. dryadum* Maire
101. *C. durandoi* Pomel
102. *C. farinosus* L.
103. *C. fatmensis* Kunze
104. *C. galaticus* Rost. ex Choisy
105. *C. germaniciae* Boiss. ex Haussk.
106. *C. glaouorum* Br.-Bl. et Maire
107. *C. lanjouwii* Sa'add
108. *C. longipedicellatus* Sa'ad
109. *C. maireanus* Pamp.
110. *C. mairei* Halacsy
111. *C. palestinus* Boiss.
112. *C. pitardii* Battand.
 a. var. *pitardii*
 b. var. *leucochnous* (Benoist) Maire
113. *C. scammonia* L.

- a. var. *scammonia*
- b. var. *pseudoscammonia* Sa'ad
- 114. *C. stachydifolius* Choisy
 - a. var. *stachydifolius*
 - b. var. *villosus* Hallier
- 115. *C. variegatus* Sa'ad
- 116. *C. zargarianus* Parsa
- 117. *C. canariensis* L.
 - a. var. *canariensis*
 - b. var. *massonii* (Dietr.) Sa'ad
- 118. *C. fruticulosus* Desr.
 - a. var. *fruticulosus*
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C U R R I C U L U M V I T A E

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