MATERIALS FOR A FLORA OF TURKEY: IV

RANUNCULACEAE: II

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RANUNCULUS L.

INTRODUCTION

A monograph of the genus *Ranunculus* Linn. (Sp. Pl. 548: 1753 & Gen. Pl. ed. 5, 243: 1754) remains an outstanding desideratum. No satisfactory classification of the genus as a whole, even to sectional level, exists. For this one has to fall back on the account in De Candolle's Prodromus (i, 26–44: 1824) and the more recent synopsis in Engler & Prantl's Pflanzenfamilien (iii (2) 64–65: 1891), neither of which is at all satisfactory as the recognized groupings are inconveniently large.

There are, however, two regional accounts that are particularly relevant here: the very thorough revision of the North American species by L. Benson (Amer. J. Bot. xxvii, 799–808: 1940; Amer. Midl. Nat. xl,1–261: 1948) in which particular attention is drawn to the neglected character of the nectary scale; and that of P. N. Ovczinnikov (in Fl. U.R.S.S., vii, 332–509: 1937) in which there seems to have been an undue multiplication of subgeneric groups on a largely national basis; but many of these are invalid because they lack Latin descriptions. The foundation for this and other Russian accounts is the well-balanced revision of the Caucasian

species by N. Busch (Kuznetzow, Busch & Fomin, Flora Caucasica Critica, iii (3), 5–182: 1901–1903). Boissier's account in his Flora Orientalis (i, 20: 1867) remains the standard work on the Oriental species of *Ranunculus*, but no attempt is made at sectional division. No revision of the genus in Europe (where it is particularly well represented) has been published, though numerous sallies into specific pockets of chaos have been undertaken by Freyn and Vierhapper. Facing this dilemma, a taxonomist wishing to compile a Flora of Turkey in his lifetime has nowhere to turn for a sectional classification. Being distrustful of sections worked out on a regional basis, I have not attempted to use them as a basis for my enumeration of Turkish species.

The emphasis laid by Benson on the nectary scale has drawn attention to a character that can be of considerable taxonomic importance, particularly at sectional level. I have examined the nectary scale in the majority of Turkish Ranunculi and would hesitate to use it for the separation of closely allied species without examining more specimens from different populations. Considerable variation is found, even within a single flower, both in size and shape of scale and in the degree of adnation to the petal. Within broad limits, however, the form of the nectary scale is a useful taxonomic character, and I agree with Benson in considering the pocket-like scale (i.e. with margins largely adnate to the petal) to be more advanced than the flap which is free nearly to the base. The shape of the scale (whether cuneate or rounded, broadest above or below, emarginate or not at the apex and the length/breadth ratio) may be diagnostic, but unless the difference is striking an examination of more flowers often invalidates what one at first thought to be a diagnostic difference. Without in any way minimising the value of the nectary scale in compiling a *natural classification*, there is no doubt that a key which heavily stresses this character would be inconvenient to use. When all is considered, the mature achene provides the most valuable characters not only for judging the affinity of species, but very often for discriminating between them. In some critical groups, however, (e.g. *R. dissectus* and its allies), the achene proves of very limited use, and in such cases leaf shape provides the main distinctions—a character which, being difficult to describe, has not had as much attention as it deserves.

While attempting to identify the Turkish species of *Ranunculus* (which number about 74), attention was paid to the basal portion of the plant—caudex, rhizome (if present) and roots. When we collect a buttercup it may be in flower or it may be in fruit, but there is no reason why enough of its basal portion should not be collected to show the characteristics of its rootstock. Instead of recognizing taxonomic sections, I have divided the Turkish species of *Ranunculus* Subgen. *Ranunculus* (Subgen. *Euranunculus* (Gren. & Godr.) A. Gray) into five main groups, largely based on rootstock and habit. No taxonomic rank is assigned to these, though for convenient reference I have given them descriptive Latin names. Though several of these groups do, of course, contain different sections (and would contain still more if they were extended to include European species), they are, at least in part, natural groups and reflect an evolutionary progression that is apparently related to their ecology. These five groups are discussed further below, and keyed out on p. 112. *Batrachium* and *Ficaria* are treated (following Benson) as subgenera, but *Ceratocephalus* is maintained as a

distinct genus for reasons given on p. 111. The Oriental species of Subgen. *Batrachium* have been revised by Mr. R. D. Meikle (in Notes R.B.G. Edinb. xxiii, 13–19: 1959).

Groups of Ranunculus recognised for a Flora of Turkey

1. *Praemorsi. Perennials with a very short* (*praemorse*) *rhizome* (*usually erect*) and roots that are either fibrous or sometimes thickened and fleshy, but always ± monomorphic and generally bearing lateral rootlets. In some species the stock is swollen and corm-like. The basal leaves are nearly always ternately or palmately lobed or dissected, and in some species the stem leaves are scarcely reduced—presumably a primitive condition. The torus elongates very little in fruit. The achenes are usually smooth, glabrous and strongly compressed, sometimes with a grooved margin, the beak generally short and broad; the dorsal margin is usually 3-nerved. In all species examined the nectary scale is free nearly to the base.

The *Praemorsi* occur mainly in mesophytic habitats, particularly meadows and mountain pastures. The group in Turkey includes a considerable part of Sect. *Ranunculus* and *R. polyrhizos* in Sect. *Epirotes* (Prantl) Benson (cf. p. 106). Examples are *R. polyanthemos* L., *R. constantinopolitanus* (DC.) Urv. and *R. neapolitanus* Ten.; *R. repens* L. is stoloniferous (with epigeal stolons).

2. *Rhizomatosi. Perennials with more or less elongated, oblique or horizontal rhizomes* and always fibrous, monomorphic roots. Although the leaves are usually palmately lobed or dissected, there is a tendency towards a pinnatisect blade caused by the petiolation of the middle segment which, in its turn, may be compound. The torus scarcely elongates in fruit, and the achene shows little difference from the *Praemorsi*, although hairy-fruited species occur and the beak is often longer and more slender and the venation on the achenial disc more prominent; the achene margin is never grooved but is usually 3-nerved (the lateral nerves being prominent or obscure). The nectary scale is free to the base in three species from the Hyrcano-Colchic forests (*R. brutius* Ten. subsp. *anatolicus* Freyn & Sint., *R. ampelophyllus* Som. & Lev. and *R. buhsei* Boiss.) and in the very distinct *R. sericeus* Banks & Sol. In the other species it is more or less adnate to the petal ($\frac{1}{3}$–$\frac{2}{3}$), and it is these species which, on other morphological grounds, might be considered as relatively advanced members of the group. In Turkey the *Rhizomatosi* are found chiefly in woods and stony alpine habitats where the rhizome presumably has a selective advantage. In such situations numerous unrelated genera possess this type of stock.

The group in Turkey contains all those numerous members of Sect. *Ranunculus* not included in the *Praemorsi*, and I am sure would provide a natural way in which this most unwieldy section might be divided into two series. In Europe, however, the division is not absolute; plants with praemorse or elongated rhizomes are often referred to *R. acris* L. sens. lato (absent from Turkey?)—a species that, on the sum of its characters and general affinities, certainly belongs to the *Praemorsi*. The group also contains Sect. *Thora* DC. (*R. brevifolius* Ten.) with coriaceous leaves.

Whether or not the rhizomatous species in Sect. *Ranunculus* are more advanced than the praemorse group is a difficult question to answer. All one can say is that in the Near East many of the species in the *Rhizomatosi* (e.g. *R. dissectus* M.B. s.l. and *R. crymophilus* Boiss. & Hohen.) are more highly evolved than any members of the *Praemorsi* in the same area. Sect. *Ranunculus* may well be the most primitive section of the genus, and it is perhaps significant that what appear to be the most primitive species of the Turkish *Rhizomatosi* are mesophytic woodland plants, just as the *Praemorsi* are almost confined to damp meadows and alpine pastures. Those species of *Rhizomatosi* found in dry rocky slopes and screes are morphologically more specialised, suggesting that the evolution of the section is related to adaptation to extreme or arid habitats.

J. L. Harper in his account of *R. acris* L. (J. Ecol. xlv, 289–342: 1957) has pointed out that there is no fundamental difference between the praemorse and the elongated rhizome, and that it is largely controlled by direction of growth and rate of decay. Nevertheless, it provides a practical way of dividing Sect. *Ranunculus* into two natural series, and is surprisingly constant so far as the Turkish species are concerned.*

3. *Grumosi. Perennials with dimorphic roots* borne on a very short stock (caudex?). These roots consist of fleshy storage roots (without any lateral rootlets), like a bunch of carrots, and filiform absorbtive roots. The leaves are palmately lobed (*R. oxyspermus* Willd.) or often finely dissected, and many species have evolved densely hairy, 2–3-pinnatisect leaves; some species have heteromorphic basal leaves. The torus usually elongates markedly in fruit. The achenes are more specialised than in the *Praemorsi* and *Rhizomatosi*, and often bear hairs and tubercles, or have a winged margin; the dorsal margin is 1-nerved. In such highly advanced species as *R. isthmicus* Boiss. (*R. orientalis* auct. non L.) the base of the achene is produced into a flattened appendage and the long, hooked beak is compressed and falcate; the whole fruiting head is apparently dispersed like a burr. The nectary scale varies from a free flap (*R. macrorhynchus* Boiss.) to a deep narrow pocket (*R. isthmicus*).

Some species produce slender subterranean stolons (e.g. *R. cuneatus* Boiss. and *R. argyreus* Boiss.) but these are readily broken off so that their use as a diagnostic character is limited (cf. J. B. Crockart in Trans. Proc. Bot. Soc. Edin. xxxii, 415: 1938). The *Grumosi* contain the whole of Sect. *Ranunculastrum* DC. (which might be further subdivided on the basis of fruit characters†) and the monotypic Sect. *Physophyllum* Freyn (*R. bullatus* L.—a remarkable, autumn-flowering species with elliptical basal leaves).

* It may be pointed out that the characters used by Benson (Amer. Midl. Nat. xl, 25: 1948) to distinguish Sect. *Ranunculus* (as Sect. *Chrysanthe*) from Sect. *Epirotes* (Prantl) Benson break down in the Middle East. *R. brachylobus*, for instance, which in its general affinities certainly belongs in Sect. *Ranunculus*, has a nectary scale attached to the middle (at least in subsp. *incisilobatus*), purplish sepals, and (in subsp. *brachylobus*) tubby achenes—characters treated by Benson as diagnostic of Sect. *Epirotes*. Turgid achenes are found in *R. demissus* DC. and *R. dissectus* M.B., both of which have the nectary scale attached to the petal for at least half way. In none of these, however, is the torus manifestly elongated in fruit (the usual case in Sect. *Epirotes*, although there are many exceptions), and there can be no doubt that the general affinities of all these species are with typical members of Sect. *Ranunculus*. The delimitation of the two sections needs study throughout their world range.

† Ovczinnikov (Fl. U.R.S.S. vii, 479–509: 1937) treats *Ranunculastrum* as a subgenus, and divides it into Sect. *Xiphocoma* (Stev.) Ovcz. and Sect. *Pterocarpa* Ovcz. (*nomen*).

The group is essentially a xerophytic one, and is centred in dry habitats in the Mediterranean region, extending to the Atlantic Islands, northern Europe (*R. illyricus* L.) and Central Asia. It is evidently an advanced and specialized group, and it seems very likely that it evolved (at least as far as Sect. *Ranunculastrum* is concerned) from ancestral *Praemorsi* (Sect. *Ranunculus*) by the development of dimorphic roots. Fleshy roots are already well-established in some southern representatives of the *Praemorsi*, and a tendency to produce tuberculate achenes is also present, though not established as a constant specific character. However, the large size of Sect. *Ranunculastrum*, its morphological diversity and wide distribution suggest that the group, despite its specialized nature, is of very considerable age.

The small Subgen. *Ficaria* (Huds.) Benson, whose centre of distribution is in the Eastern Mediterranean, has the same type of root system.

4. *Lancifolii*. This is my only group that contains both perennials and annuals, and is equivalent to Sect. *Flammula* (Webb) Benson. It is a natural, semiaquatic group with both stem and basal leaves undivided (though sometimes toothed), ovate or lanceolate. The roots are usually borne at the nodes of the subterranean part of the stem, but under drier conditions appear to arise in a bunch at the stem base. The achenes are small and scarcely flattened. The group stands well apart from the other Ranunculi considered here, but is probably a rather specialized group; some of the species show a high degree of polyploidy. The characteristic leaf (usually with three main nerves) has probably been derived from the ternate-palmatilobed type, and does not appear to be phyllodic.

5. *Annui*. In this group I place all the annual species with divided leaves. Apart from *R. sceleratus* (Sect. *Hecatonia* (Lour.) DC.), this probably comprises a fairly natural but ill-defined group containing Sect. *Echinella* DC. (*sensu* Benson) and *Ranunculus pinardii* (Stev.) Boiss. whose centre is in the Mediterranean region. (Outlying species occur in California and Australia). Two types of root system are found here:

(a) A subterranean hypocotyl simulating a taproot and bearing roots at its base in addition to adventitious roots arising from the cotyledonary node (the latter are sometimes supressed, apparently when the plant is growing under very dry conditions). The length of the hypocotyl depends on the depth at which the achene germinates. This type of root system occurs only in *R. arvensis* L. and *R. pinardii*, and is not found elsewhere in the genus. Both species grow in drier habitats than the other annual Turkish species.

(b) A bunch of adventitious roots that replace or predominate over a weakly developed or very short-lived hypocotylary root system (not readily noticed): this type of root system is found in *R. muricatus* L., *R. marginatus* Fisch. & Mey., *R. sardous* Crantz, and all other annual species of Sect. *Echinella* (*sensu* Benson) excluding *R. arvensis*, as well as in *Myosurus minimus* L. Most of the species grow in habitats that are distinctly damp (even flooded) during spring, though they dry up later.

The achenes in this group (excluding *R. sceleratus* whose transversely ribbed achenes recall those of Subgen. *Batrachium*) show striking specialization in structure, and also an increase in size correlated with a decrease in number to a single series (*R. arvensis* and *R. pinardii*). The disc usually bears

tubercles, spines or hairs, beaks are often long, and the keel is broadened into a wing (*R. cornutus* DC.) or so narrow as to appear grooved on either side (*R. sardous*): all the species can be determined by ripe achenes alone. The striking elaboration of the achene is presumably an adaptation for dispersal in the open (often weedy) habitats in which most of the species grow, and may be largely responsible for the recent spread of several species beyond their indigenous area.

There can be little doubt that the *Annui* (excluding *R. sceleratus* L.) have been evolved from the *Praemorsi* (sect. *Ranunculus*) by shortening of the life cycle and development of the achenial tubercles already present in some members of that group. The affinity between the perennial *R. bulbosus* L. and the annual *R. sardous* is particularly close. The content of Sect. *Echinella* DC. is discussed further under *R. pinardii* on p. 160.

It might be mentioned here that a persistent taproot is apparently lacking throughout the genus *Ranunculus*. Even in the annual *R. pinardii* the primary root is weakly developed (what looks like a taproot being mostly hypocotyl), and in all perennial species the primary root is quickly replaced by an adventitious root system, as in Monocotyledons. Persistent taproots are, of course, present in many other Ranunculaceous genera (being constant, for instance, in *Aquilegia* and *Paraquilegia*), but a survey of all the species present in the Edinburgh Herbarium failed to find any in *Ranunculus*. It would seem that degeneration of the taproot was a feature of ancestral Ranunculi. A truly acaulous habit (i.e. naked peduncles springing directly from a basal leaf-rosette) is also very rare, and occurs only in a few perennial species (e.g. *R. lowii* Stapf from Borneo, and *R. acaulis* Banks & Sol. ex DC. from S. America).

Assessment of morphological characters

A concise account of the value to be assigned to certain morphological characters has been given by Benson (Amer. Midl. Nat. xl, 7–10 ; 1948) to which I would refer the reader. There are, however, some additional characters that were omitted by Benson or were but briefly mentioned. These are annotated below. (The rhizome and nectary scale have already been discussed).

1. *Roots*. The shape of the roots can provide specific characters, particularly within Sect. *Ranunculastrum* (Group *Grumosi*). These are, however, modified by the environment and apparently show some seasonal variation, so that the character needs to be used with caution.

2. *Collar*. The collar of the plant (i.e. where the basal leaves spring from the caudex) can provide valuable specific differences. It can be nearly naked or clothed with the fibrous remains of leaf bases (the fibres being characteristically reticulate in *R. paludosus* Poiret). This feature is presumably an expression of petiolar anatomy which would repay investigation. Some species produce soft hairs at the collar, others are glabrous.

3. *Leaf shape*. There is no doubt that petiole length is readily modified by humidity, and in some species temperature is known to have a profound effect upon leaf shape. On the whole, however, leaf shape (particularly of the basal leaves) provides the most important diagnostic character after

the achene. It does, however, vary within rather wide limits (particularly in the *Annui*), and the difficulty of describing it has led to its not being used as much as it deserves. Most species with divided leaves show a transition from less divided to more deeply divided blades as we pass from the outside to the inside of the basal rosette—the smaller outer leaves being in the nature of juvenile foliage. Many species (e.g. *R. asiaticus* L.) produce variants with dissected leaves—a striking difference which probably has a very simple genetic basis, since it is often found in the same population as the latisect form. (Similar variation is common in the Umbelliferae.) In some species the transition from juvenile to adult foliage is achieved much more quickly in some individuals than in others (as in *R. isthmicus* Boiss. subsp. *isthmicus* and in *R. paludosus* Poiret). It may be that in closely allied species differing in leaf shape, the difference may be controlled by genes that alter the timing at which particular leaf shapes are produced, thus extending or telescoping the inherited sequence. This may well be the case in Sect. *Ranunculastrum* DC., and would seem to deserve experimental study, particularly to see if the retention of the juvenile leaf form is correlated with polyploidy.

The pinnatisect leaf (at least in the *Rhizomatosi* and *Grumosi*) has apparently been derived from the ternately or palmately divided leaf; the evolutionary trend seems to have been towards a greater degree of dissection often combined with petiolation of the segments.

4. *Indumentum.* The value of this character varies very much from one species to another. In many species the indumentum can be either spreading or adpressed (as in *R. neapolitanus* Ten.), or be completely lacking—even within the same population. The hairs are particularly coarse in *R. constantinopolitanus* (DC.) Urv.; *R. dissectus* M.B. subsp. *huetii* (Boiss.) Davis differs from the other races of the species in having a villosulous indumentum.

5. *Sepals.* It is generally accepted that spreading (or adpressed) *versus* reflexed sepals is a valuable specific character. There is no doubt, however, that both types occur in the same species in nature (as in *R. constantinopolitanus*). The peculiar condition in *R. cuneatus* is mentioned under that species. There are two main types of " reflexed " sepals:

(a) where the sepal blade is quite sharply bent, the tip being pressed back against the peduncle (as in *R. bulbosus* L. and *R. oxyspermus* Willd.).

(b) where the sepals are so widely spreading that they fall back towards the peduncle but are not actually bent. This is the type which causes considerable difficulty in the herbarium, and gets variously described in Floras as spreading or reflexed. It would be better described as deflexed. In some little-known species it is impossible to be sure of the condition.

There seems good reason to consider the truly reflexed (bent) sepal (rare in the family) as a derived condition. It would be a very great help to the taxonomy of *Ranunculus* if collectors would note the posture of the sepal on their field labels.

6. *Achenes.* The specific value of this character hardly needs stressing, and every effort should be made to collect material with ripe fruit. Although the general shape of the achene is fairly constant, this does not apply to some of the details. The beak in some species varies considerably in length and curvature (e.g. *R. cornutus* DC. and *R. constantinopolitanus*

(DC.) Urv.), and the same features of course vary considerably as the fruits mature. Although some species may have constantly pubescent achenes, in others this feature is extremely unstable, glabrous and hairy achenes occuring in the same population (as in *R. macrorhynchus* Boiss. and *R. diversifolius* Boiss. & Ky.). The same applies to the sculpturing on the achene of those species usually assigned to Sect. *Echinella* DC.—in nearly all species smooth-fruited variants are known and can often be found in the same population; this is also the case with a few perennial species, like the European *R. nemorosus* DC., *R. pratensis* Presl and *R. macrophyllus* Desf., all of which are usually smooth but occasionally produce tubercled variants.

7. *Pollen morphology*. Though I have not had time to give this subject the attention it deserves, it is obvious from the scattered accounts of Ranunculus pollen grains already published, and from observations made for me by Mrs. L. A. Smoljaninova (using Erdtman's method), that pollen morphology is likely to be of the utmost value in the taxonomy of the genus. To use the new classification of Erdtman and Vishnu-Mittre (Grana Palynologica (N.S.), i (3), 6–9: 1958), zonicolpate, pancolpate and panporate grains occur in Ranunculus, and there are striking differences in the number and length of the colpi, etc. Even species that are very closely allied (as those in Group *Annui*) can often be distinguished by their pollen grains—a feature which may enable us to verify the identification of herbarium material lacking achenes. Like the nectary scale, pollen morphology promises to be of great help in establishing a natural sectional classification of the genus; its main use, however, seems likely to be in determining the identity and relationship of species, and particularly in confirming the direction of evolutionary trends. The basic type of pollen grain in Ranunculus is tricolpate (zonicolpate) and from this all other types have been derived.

The morphology of Ranunculus pollen grains is often rather difficult to examine, and due to this, or to misidentification, the published descriptions of several species are highly suspect. Descriptions of Ranunculus pollen grains will be found in the following accounts:

AVETISIAN, EUGENIE (1954), in T. L. Takhtajan, Fl. Armenia, i, 185–211. (In Russian).

FISCHER, H. (1890). Beiträge zur vergleichenden Morphologie der Pollenkörner. Breslau.

KUMAZAVA, M. (1937). Pollen grain morphology in Ranunculaceae, Lardizabalaceae and Berberidaceae. *Japan Journ. Bot.* viii, 19–46.

WODEHOUSE, R. P. (1936). Pollen grains in the identification and classification of plants. VII: The Ranunculaceae. *Bull. Torrey Bot. Club*, lxiii, 495–514.

YAROSHENKO, P. D. (1947). On the phylogeny of buttercups connected with the evolution of plant communities. *Bull. Armen. Acad. Sci.* (*Nat. Hist. Ser.*) No. 6, 35–51. (In Russian).

The status of Ceratocephalus Moench

Ceratocephalus has frequently been included in *Ranunculus*. Benson, in fact, treats it as a subgenus of the latter. There are, however, several most unusual features in *Ceratocephalus* which to my mind justify generic rank. These features are tabulated below:

1. Fruit with two empty pouches on either side of seed chamber.
2. Cotyledons (in seedling!) linear or oblong-linear. (Even in those species of *Ranunculus* Sect. *Ranunculastrum* with finely pinnatisect leaves (e.g. *R. isthmicus* Boiss. & Heldr.), the cotyledons are ovate or elliptical).
3. Acaulescent annual.
4. Persistent hypogeal hypocotyl simulating a taproot, the roots confined to its base. (No adventitious roots from the cotyledonary node as in *Ranunculus*).
5. Sepals persistent in fruit.
6. Beak of achene lanceolate-falcate, curved-upwards or nearly straight.
7. Leaves palmatisect, entirely basal.
8. Fruits remaining attached to the torus and dispersed as a burr (synaptospermy).

Of these eight features, so far as I know the first four do not occur in *Ranunculus*, and the last four occur but rarely. In the form of its fruits it comes nearest to *Ranunculus* Sect. *Ranunculastrum* (particularly *R. isthmicus* Boiss. & Heldr. which it also somewhat resembles in leaf form). Its root system, however, is nearest to *R. arvensis* L. and *R. pinardii* (Stev.) Boiss., although in both these species adventitious roots are produced under normal conditions. *Ceratocephalus* contains two generally recognised species: *C. falcatus* (L.) Pers. and *C. testiculatus* (Crantz) Roth, both of which occur in Turkey and are sometimes collected together. The former, however, is extremely variable, and a thorough revision of specific limits (if any) throughout the range of the genus is overdue. Takhtajan (Fl. Armenia, i, 209: 1954) treats the genus as monotypic. The pollen grains are tricolpate—the basic type found in Ranunculus.

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Since the main part of this revision was written, I have had the privilege of working in the herbarium of the Botanical Institute at Leningrad where I was able to examine the rich collections of Ranunculus from the Caucasus. The results of this study (in so far as they bear on the Turkish flora) are incorporated in the present paper. For the many ways in which they have helped me, I should like to thank Professor An. A. Fedorov (Curator of the Caucasian collections) and Professor A. L. Takhtajan; and particularly Mrs. L. A. Smoljaninova for her assistance in examing the pollen grains of several species.

TAXONOMIC ENUMERATION

In the following account only the more critical Turkish species, or those of particular interest, have been dealt with in detail. Unless otherwise indicated, all specimens cited in the text and marked on the maps have been examined. An exclamation mark after a synonym means that type material of it has been seen.

SUBGEN. RANUNCULUS

Key to the Groups

1a. At least some of the leaves deeply divided (or, if elliptical and dentate, then plant autumn-flowering and roots heteromorphic: *R. bullatus* in Group 3); never semiaquatic.

2a. Perennial; achenes smooth or tuberculate, glabrous or hairy:

3a. Roots ± monomorphic, long (usually more than 5 cm.), fibrous and cylindrical, or fleshy and fusiform-cylindrical, usually bearing lateral rootlets; torus slightly elongated in fruit, forming a suborbicular fruiting head; achenes usually with three dorsal nerves, usually smooth and glabrous; plants never with subterranean stolons:

4a. Rootstock an erect, much abbreviated rhizome or corm; petal scale free nearly to base; achene with or without a groove on either side of keel (pubescent in *R. polyrhizos*, tuberculate in *R. byzantinus*) . . . . . 1. *Praemorsi* (p. 113)

4b. Rootstock a ± elongated, oblique or horizontal rhizome; petal scale free nearly to base or adnate to ½ or ⅔; achenes never with a grooved margin . . . 2. *Rhizomatosi* (p. 120)

3b. Roots heteromorphic, forming an abbreviated bunch (less than 6 cm. long) borne on a very short stock, partly fleshy, fusiform or even ovoid, without lateral rootlets, partly filiform and fibrous; torus often manifestly elongated in fruit, forming an oblong fruiting head; achenes with one dorsal nerve, smooth or tuberculate, glabrous or hairy, never with a grooved margin. often with a long beak, or winged; plants with or without slender subterranean stolons. Petal scale forming a pocket or free nearly to base . . . . . 3. *Grumosi* (p. 140)

PLATE 5. *R. byzantinus* P. H. Davis (holotype).

PLATE 6. *R. crateris* P. H. Davis (holotype).

2b. Annual; achenes either tuberculate (and hairy in *R. pinardii*), spiny, transversely rugulose or smooth . . 5. *Annui* (p. 155)

1b. All the leaves undivided, lanceolate or ovate, entire or toothed, often glabrous; semiaquatic or helophytic . . 4. *Lancifolii* (p. 154)

Group 1. PRAEMORSI

R. elegans C. Koch in Linnaea xv, 248 (1841).

Syn.: ? *R. grandiflorus* L., Sp. Pl. 555 (1753), *nom. ambig.*

R. anemonefolius DC., Syst. Veg. i, 282 (1818), non *R. anemonaefolius* Poiret, Encyc. Méth. Suppl. iv, 663 (1816).

R. armeniacus Boiss. & Huet in Boiss., Diagn. Ser. II (5), 9 (1856)!

Type: Transcaucasia: frequentissime in provincia Somchetia in vallibus et in montosis, *C. Koch* (isotyp. LE!).

Prov. Gümüşane: Gummus-khane, *Bourgeau* 7; Yailabaschi, in Elias dagh, *Sintenis* 6057, 6057b; in pascuis subalp. supra Fecelem, *Bourgeau* 233 (as *R. calvertii*); Varenidagh, in pascuis subalp. Rakesa, *Sintenis* 5898. Prov. Gümüşane/Erzurum: Tachkeupru entre Baibout et Erzeroum, May 1853, *Huet*. Cilicia: above Tyrtar, 1900 m., am Weg nach Dumbelek, *Siehe* a. 1912 n. 524; Dumbelek Pass am Weg nach Korasch, 1900 m., *Siehe* a. 1909 n. 227. Prov. Maraş: Kuru dagh, Zeytun, 1600 m., *Balls* 1026. Prov. Kars: Yalnizçam, 1900 m., *Davis & Hedge* (D. 29660b); S.W. side of Kisir Dağ between Kars and Ardahan, 2200 m., 16 June 1957, *Davis & Hedge* (D. 29644); Sarikamiş, 2100 m., 13 June 1957, *Davis & Hedge* (D. 29532); Ardahan—Yalnizçam, 1900 m., 16 June 1957, *Davis & Hedge* (D. 29602).

Alt. 1600–2200 m. Water meadows, moist turf near springs, near melting snow; very common on the Kars highlands. Fl. May–June.

The nomenclature of this species requires some explanation. *R. elegans* C. Koch is certainly the species figured by Aubriet in Desfontaine's paper (Ann. Mus. Hist. Nat. Paris, xi, 277, pl. 31: 1808) as the little-known *R. grandiflorus* L., a name whose application has long remained uncertain. I have not, however, been able to track down the specimen which must have provided the basis for one of the two synonyms cited by Linnaeus (Royen's Fl. Leyden. Pl. Hort. Acad. Lugd.-Bat. 492:1740 and Tournefort's Corollarium, 20: 1703). This plant was most probably a Tournefort specimen that was not seen by Linnaeus. It may exist in Paris, but unless it can be identified with certainty it seems unwise to accept the Linnaean name in place of *R. elegans* C. Koch. Linnaeus's phrase name (copied from Royen) is inadequate for identification, and it is quite possible that Aubriet's illustration does not represent the true *R. grandiflorus* L. which has already been variously interpreted as *R. asiaticus* L. and *R. ampelophyllus* Som. & Lev.

In his Flora Orientalis Boissier used the name *R. anemonefolius* DC. in place of the later *R. elegans* C. Koch, and has been followed by later authors. De Candolle's name, however, cannot be used because it is a later homonym of *R. anemonaefolius* Poiret (1816). The identity of Poiret's species cannot be decided without seeing the type in Desfontaine's herbarium, but it is at least clear from the description and type locality

(Istanbul) that it is not the same as *R. anemonefolius* DC. based on a Tournefort specimen collected in Cappadocia. The earliest available name for this species is *R. elegans* C. Koch, of which an isotype (in flower) has been examined in Leningrad. Most of the Anatolian specimens differ from the type (from Somchetia) in having adpressed, instead of spreading hairs on stem and petioles; gatherings with spreading indumentum have, however, occasionally been made in Turkey (e.g. *Sintenis* 6057).

Some confusion surrounds the treatment of *R. elegans* and its close allies both in the Fl. U.R.S.S. and in Grossheim's Fl. Kavkaza (ed. 2). Leningrad material determined as *R. elegans* consists of two different elements: *R. elegans* and an undescribed taxon from Georgia (Tbilisi), Daghestan and Azerbaijan. The latter is the same plant that forms the bulk of the West Caucasian material misidentified as *R. anemonefolius* DC. (itself a synonym of *R. elegans*). Caucasian material of the true *R. elegans* is to be found not only under that name, but also misidentified as *R. szowitsianus* (a variant of *R. caucasicus* M.B. subsp. *subleiocarpus* (Som. & Lev.) Davis and described and figured as *R. szowitsianus* in Grossheim's Fl. Kavkaza, iv, 66, t. vii, f. 9: 1950).

The undescribed Caucasian taxon referred to above is most closely allied to *R. elegans*, but differs in its strongly fibrous collar, stems and petioles covered with very long soft spreading hairs, less reduced stem leaves, broader leaf segments, and larger broader achenes that are less numerous and have a slightly longer beak (i.e. more like those of *R. kotschyi* Boiss.). In the Leningrad herbarium there are certainly many puzzling specimens that are intermediate between this undescribed plant and *R. elegans* whose areas overlap to a considerable extent in Transcaucasia, so that extensive hybridisation may have occurred. There is abundant material, however, of both extremes, and these are morphologically more distinct from one another than many other species of Ranunculus that we are accustomed to recognize. Should we treat these as two species that hybridize, or as subspecies of *R. elegans?*

The distribution of *R. elegans* is predominantly Irano-Turanian, extending from Central Anatolia to South Transcaucasia; the range of the undescribed taxon is predominantly Hyrcano-Colchic, extending from the West Caucasus (where is seems to be abundant) to Daghestan and Azerbaijan. No Turkish material has been seen of this neglected taxon, and as it really requires field or experimental study I refrain from naming it here.*

R. calvertii Boiss. & Huet in Boiss., Diagn. Ser. II (5), 8 (1856).

Syn.: *R. anemonefolius* DC. var. *calvertii* (Boiss.) Boiss., Fl. Or. i, 50 (1867)!

Syntypes: In Armenia circa Erzeroum, *Huet* (G!), *Calvert* (G!).

Armenia, *Calvert & Zohrab* (K). Prov. Kayseri: Argaeus, in pratis montanis, 27 May 1859, *Kotschy*. Prov. Kayseri/Malatya: E. side of pass between Pinarbaşi and Güriin, 1800 m., rocky calcareous slope, 18 June

* Since the above was written, my attention has been drawn to *Ranunculus georgicus* Kem.-Nath. published in the Flora of Georgia (iv, 71: 1948). This is evidently the plant discussed above, but as it is only described in Georgian the name is a *nomen nudum*. Five other new species of *Ranunculus* are published in this work (*R. makaschwilii*, *R. kluchoricus*, *R. scherosii*, *R. transcaucasicus* and *R. alexandrii*), but none of these names has yet been validated.

1954, *Davis, Dodds & Çetik* (D. 21961). Prov. Erzurum: Pasinler—Horasan, near Aras river, 1700 m., on plain (1 plant), 12 June 1957, *Davis & Hedge* (D.29453). Prov. Artvin: Kordevan Dağ (Yalnizçam Dağlari), near Kütül Y., 2100 m., pathside in Picea forest, 28 June 1957, *Davis & Hedge* (D.30191); mountain above Artvin, 1900 m., in pasture, scarce, 19 June 1957, *Davis & Hedge* (D. 29803); *ibid.*, 1700 m., forest clearing, 19 June 1957, *Davis & Hedge* (D. 29768).

Although Boissier treated *R. calvertii* as a variety of *R. anemonefolius* DC. (i.e. *R. elegans* C. Koch), it is specifically distinct from that species in the form of its larger achenes which resemble those of *R. kotschyi* Boiss. Indeed, further material may possibly show that *R. calvertii* is not specifically distinct from the latter. Of the gatherings cited above, D. 29803 and D. 29768 have exceptionally broad leaf segments; such variation, however, occurs in other species of *Ranunculus*.

In habit and leaf shape *R. calvertii* recalls *R. polyanthemos* L. from which it can be readily distinguished by its achenes and reflexed sepals.

R. kotschyi Boiss., Diagn. Ser. I. (6), 5 (1845).

Syn.: *R. anemonefolius* DC. subsp. *kotschyi* (Boiss.) N. Busch in Fl. Cauc. Crit. iii (5), 146 (1903)!

Type: Persia: In paludosis alpis Kuh Daena, *Kotschy* 606 (G, n.v.; K! BM!).

Prov. Van, distr. Şatak: Kavuşşahap Dağ, 2400 m., 22 July 1954, *Davis & O. Polunin* (D. 23025). Prov. Erzincan: Egin ad Euphratem, Hodschadurdagh, *Sintenis* 2225 (as *R. calvertii*); Egin, Kirk-goez, *Sintenis* 2418 p.p. (K—as *R. calvertii*).

The following key should serve to distinguish the three species in the *R. elegans* group recognized above:

1a. Achene 2·5–3 mm. long, broadly oblong-obovate, beak 0·5–0·75 mm.; stems 10–30 cm. tall, adpressed pilose or glabrous. Primary segments of basal leaves divided into narrow, forward-pointing lobes. Flowers usually 2–2·5 (–3) cm. across . . . . . *elegans*

1b. Achene c. 4 mm. long, suborbicular, beak 1–1·5 mm.; stems 25–50 cm. tall, pilose with softly spreading hairs or glabrous:

2a. Primary segments of basal leaves with divergent lobes; flowers 1·2–2 cm. across; beak of achene c. 1 mm. . . . . *calvertii*

2b. Primary segments of basal leaves with forward-pointing lobes; flowers 2–3 cm. across; beak of achene c. 1·5 mm. . . *kotschyi*

R. constantinopolitanus (DC.) Urv. in Mém. Soc. Linn. Par. i, 317 (1822).

Syn.: *R. lanuginosus* L. var. *constantinopolitanus* DC., Syst. Veg. i. 281 (1817).

R. palaestinus Boiss., Diagn. Ser. I (8), 4 (1849)!

R. constantinopolitanus var. *palaestinus* (Boiss.) Boiss., Fl. Or. i, 49 (1867)!

R. anemonefolius DC. var. *balansae* Boiss., Fl. Or. Suppl. 13 (1888)!

R. tauricus Freyn in Bull. Herb. Boiss. Ser. 2, i, 248 (1901)!

Type: An Aubriet drawing (unpublished) based on a Tournefort specimen from Istanbul, in bibl. Jussieu (P, n.v.).

This species is very widespread and variable in Turkey, particularly in stature, leaf shape and in length of beak; the latter, however, is always strongly circinate. A variant with narrow leaf segments was recognized by Boissier as var. *palaestinus*, but such forms occur throughout the range of the species and intergrade with it. The type of *R. anemonefolius* DC. var. *balansae* has been examined and is nothing more than a narrow-leaved high-altitude variant of *R. constantinopolitanus* from Lazistan; similar dwarf gatherings have been seen from mountains in the province of Kastamonu (Ilgaz Dağ, D. 21585) and Bolu (*Alpay* 324). In the Anti-Taurus (Prov. Maraş: Göksun—Çardak, near Findik, 1300 m., D. 27619) every gradation was observed between this form and typical tall specimens —apparently directly dependent on the habitat. Such variants remain quite distinct from *R. fibrillosus* C. Koch and *R. tempskyanus* Freyn & Sint.

O. Schwarz (in Fedde, Rep. xxxvi, 83: 1934) has recorded *R. umbrosus* Ten. & Guss. from Lydia. Although I have not seen his specimens, it seems likely that the record is due to confusion with *R. constantinopolitanus* which, in S.W. Turkey, can have widely spreading and deeply concave (instead of reflexed) sepals (e.g. Prov. Muğla: Marmaris, D. 25296; Prov. Antalya: Aksu, D. 25691).

Gussone's material of *R. umbrosus* Ten. & Guss., kindly sent on loan from Naples, is only a small variant of *R. lanuginosus* L. Indeed, the plant usually identified as *R. umbrosus* in herbaria appears to be no more than a luxuriant shade variant of *R. lanuginosus*, and there seems no reason why *R. umbrosus* should not be treated as a synonym of the latter.

R. fibrillosus C. Koch in Linnaea, xix, 417 (1847).

var. **parviflorus** P. H. Davis, **var. nov.**

A typo scapo superne ramoso 5–10–floro, floribus minoribus (14–15 mm. diam.), vaginis foliorum basalium angustioribus, collo fibroso differt.

Prov. Istanbul: In monte Alemdagh, *Noë* (holo. G).

The typical form of *R. fibrillosus* is known only from Bithynian Olympus (Ulu Dağ), whereas the new variety described here is from Alem Dağ on the Asiatic side of the Bosphorus. As no achenes have been seen, its status must remain in some doubt until more material becomes available. Although very closely allied to *R. constantinopolitanus* (and no doubt derived from it), I agree with Boissier in treating *R. fibrillosus* as specifically distinct. The two species can be distinguished as follows:

R. constantinopolitanus	*R. fibrillosus*
Stem many-flowered, 25–70 cm. tall, bearing tripartite leaves in the lower part.	Stem 1–2-flowered (5–10-flowered in var. *parviflorus*) 6–30 cm. tall, subscapose or with reduced linear leaves.
Basal leaves divided to at least $\frac{3}{4}$, 5–10 cm. across.	Basal leaves divided to $\frac{1}{2}$–$\frac{2}{3}$, 2·5–3·5 cm. across.

Ranunculus byzantinus P. H. Davis, **sp. nov.** Pl. 5.

Species haec affinis *R. macrophyllo* Desf. et *R. nemoroso* DC.; a priore radicibus filiformibus, collo manifeste fibroso, caule basi haud bulboso,

foliis caulinis inferioribus longissime petiolatis, lobis foliorum obtusissimis vel etiam subtruncatis recedit; ab altero forma laminae foliorum diversa, foliis caulinis longipetiolatis, achenio profundius bisulcato rostro latiore subuncinato (haud circinnato) differt.

Herba perennis, elata, c. 130 cm. alta. *Rhizoma* praemorsum, erectum. *Radices* tenuiter cylindricae, c. 1·5 mm. latae. *Collum* manifeste fibrosum. *Caules* erecti pilis rigidulis patentim hirsuti, superne laxe ramosi, c. 12-flori. *Folia basalia* longissime petiolata; petiolus hirsutus ad basin in vaginam ovatam ampliatus; lamina ambitu reniformi-orbiculata, 4–7 cm. lata, basi lata cordata, ad $\frac{5}{6}$ tripartita, adpresse hirsuta; segmenta primaria late cuneato-divergentia, sese tegentia, ad $\frac{1}{2}$–$\frac{2}{3}$-trilobata, lobis obtusissimis vel etiam subtruncatis, bicrenato-dentatis. *Folia caulina* sparsa, inferiora longe petiolata ambitu ovato-orbicularia profunde cordata, segmentis ea foliorum basalium simulantibus; folia superiora breviter petiolata vel subsessilia in lobos cuneatos 2–3-partitos dentatos tripartita; summa reducta, sessilia, in lacinias oblongo-lanceolatas simpliciter tripartita. *Pedunculi* sulcati, adpresse pilosi. *Sepala* ut videtur patentia, 6 mm. longa, subadpresse pilosa. *Petala* late triangulari-obovata, obtusissima, 9–10 mm. longa; squamae nectariferae liberæ, 1·4 mm. longae, 1·75 mm. latae, prope basin latiores subauriculatae, in duos partes superiores leviter angustatae, apice truncatae. *Torus* oblongus, superne pilosus. *Antherae* 1·5 mm. longae. *Achenia* c. 20, compressa, suborbicularia, 4 mm. longa, angustissime carinata, carina utrimque anguste bisulcata; discus sparsim et irregulariter et breviter tuberculatus; rostrum triangulari-lanceolatum, paulo recurvatum subuncinatum, 1 mm. longum.

Prov. Istanbul: ex agro Byzantino secus Bosphorum, Jun. 1877, *J. Ball* (as *R. constantinopolitanus*, holo. E). The locality "Unkiaer Skelessi" appears in pencil on the printed label; this is Hunkar iskelesi.

It seems remarkable that this very distinctive plant should only be known from one gathering from the Bosphorus. In this group of species it is difficult to be sure of exact affinities, but the new species appears to be most closely allied to the West Mediterranean *R. macrophyllus* Desf. and the European *R. nemorosus* DC. *R. byzantinus* resembles both in having well-developed stem leaves, broad basal leaf sheaths, spreading sepals, a hairy torus and bisulcate achenes. From *R. macrophyllus* it is readily distinguished by its filiform roots, strongly fibrous collar, stem that is not bulbous at base, longer petioles of the lower stem leaves, and very obtuse (almost truncate) leaf lobes; the achenes of the two species are very similar. *R. byzantinus* resembles *R. nemorosus* in its basal portions (fibrous collar, slender roots and stem without a bulbous base) but differs markedly in its achenes, those of the Bosphorus species being more deeply bisulcate and having a broader, slightly recurved but subuncinate beak—instead of slender and circinate; the new species differs further in its characteristic leaf shape and long-petioled stem leaves. Although the achenes of *R. macrophyllus* and *R. nemorosus* are usually smooth, tubercled variants occur, so that the scattered tubercles present on the fruits of *R. byzantinus* can hardly be considered diagnostic.

The Sicilian *R. pratensis* Presl (*R. heucherifolius* Presl) and the Central-East Mediterranean *R. neapolitanus* Ten. appear to be less closely allied, but as the latter grows in the same area as the new species it seems advisable

to point out the differences. *R. byzantinus* can be readily separated from *R. neapolitanus* by its fibrous collar, slender roots, well-developed and long-stalked lower stem leaves, different leaf shape, spreading sepals, and sparsely tubercled achenes with a longer beak.

The possibility that *R. byzantinus* is a hybrid seems unlikely—the plant is apparently fully fertile and there are no two species in the area that might be expected to produce a hybrid with the diagnostic characters of *R. byzantinus*.

R. neapolitanus Ten., Ind. Sem. Hort. Bot. Neap. 11 (1825).

Syn.: *R. palustris* L. ex Smith in Rees, Cycl. xxix, sp. 52 (1814)!, *nom. ambig.*

R. tommasinii Reichenb., Herb. norm. fl. Germ. exc. cent. xxv, nr. 2479: 1845!

R. eriophyllus C. Koch in Linnaea, xix, 46 (1847)!

Type: Italy: in pratis uliginosis communis (cult. in Naples Botanic Garden from plants collected near Naples), n.v.

Prov. Istanbul: Bebek, 7 May 1944, *M. Başarman*. Prov. Bursa: in reg. inf. Keschisch Dağ (Ulu D.) supra Brussa, *Bornmüller* a. 1899 n. 4018 (as *R. eriophyllus* C. Koch); in Olympo, *Aucher* 30. Prov. Çannakale: Renkoei, in montosis supra Kuzkoei, *Sintenis* 150 (K). Prov. Muğla: Muğla—Kale Tavas, Pinuswald 26 km. nach Muğla, 1200 m., 6 June 1938, *Huber-Morath* 5385. Prov. Niğde: Niğde, in Ortkayardi valley, 1200 m., 19 June 1952, *Davis, Dodds & Çetik* (D. 19080). Prov. Mardin: bei Khaniki, *Sintenis* 854; Mardin—Diyarbakir, 24 km. from Mardin, 1000 m., water-meadow, by stream, 27 May 1957, *Davis & Hedge* (D. 28698). Prov. Urfa: Hilvan—Siverek, 700 m., marshy ground, 18 May 1957, *Davis & Hedge* (D. 28262). Prov. Diyarbakir: N. slope of Karacadağ between Siverek and Diyarbakir, 1100 m., moist pasture, water-meadow, 19 May 1957, *Davis & Hedge* (D. 28300).

Ranunculus neapolitanus was orginally figured and described by Tenore (1825) as having achenes with a longish hooked beak and a terete peduncle. But when he later described *R. umbrosus* Ten. & Guss. (in Tenore, Fl. Neap. Syll. App. v, 15: 1842) he admitted to having had "grave hallucinations" when he attributed these particular characters to *R. neapolitanus*, and it would seem that he originally confused the latter with the plant he later described as *R. umbrosus* Ten. & Guss. (a synonym of *R. lanuginosus* L.). There appears to be no type specimen of *R. neapolitanus* in the Naples Herbarium, but the Naples material collected later by Gussone is short-beaked and can probably be accepted as representing Tenore's concept of this species; it is fortunately the plant for which the name *R. neapolitanus* is generally used. In the original description, however, the stems are described as bearing very spreading hairs, whereas in Gussone's specimens the hairs are antrorsely subadpressed. In view of this, it seems unwise to recognize var. *adpressepilosus* Freyn (emend. Vierh. in Öst. Bot. Zeit. lxxxiv, 132: 1935) since there is doubt concerning the indumentum of Tenore's original *R. neapolitanus*. There is no means of knowing how far his hallucinations went! All the Turkish material has spreading indumentum on stems and peduncles, but otherwise closely resembles Gussone's Neapolitan material.

The synonymy of *R. neapolitanus* needs some explanatory notes. *R. palustris* L. ex Smith is based on a specimen in the Linnean herbarium. This was found to consist of two elements (both covered by Smith's description): the infructescence of *R. neapolitanus* (?) and the leaves and roots of *R. oxyspermus* Willd.(?). As these disparate elements cannot be identified with certainty, it seems best to drop the name *R. palustris* as a *nomen ambiguum*, despite the fact that it antedates *R. neapolitanus*. *R. eriophyllus* C. Koch (described from N. Anatolia) is often treated as specifically distinct from *R. neapolitanus*, differing from it in root shape and indumentum. As Bormüller has pointed out (Fedde, Rep. Beih. lxxxix (1), 7: 1936), the distinction between these two plants is most unclear. The identity of Koch's plant has long been open to question, and as the holotype was apparently destroyed in Berlin during the last war there seemed little hope of settling the question. However, what is evidently an isotype of *R. eriophyllus* exists in Leningrad, and although the specimen is in flower, I am in no doubt that it represents *R. neapolitanus*. This species varies considerably in the thickness of its roots and in the posture of its indumentum, nor are these characters correlated.

Vierhapper (in Öst. Bot. Zeit. lxxxiv, 132: 1935) referred the Oriental material of *R. neapolitanus* to subsp. *tommasinii* (Reichenb.) Vierh. This taxon is based on *R. tommasinii* Reichenb. (Herb. norm. fl. Germ. exc. cent. xxv, nr. 2479: 1845!), a plant that was treated as synonymous with *R. neapolitanus* by Freyn (in Öst. Bot. Zeit. xxv, 116: 1875). I can certainly find no justification for the taxonomic separation of the Italian and Oriental representatives of *R. neapolitanus*. It is clear from Vierhapper's remarks that what he interpreted as typical *R. neapolitanus* is in fact a South Italian plant resembling the long-beaked, Sicilian *R. pratensis* Presl (*R. heucherifolius* Presl), whereas his subsp. *tommasinii* is none other than typical *R. neapolitanus* which extends from Italy to Asia Minor. An isotype of *R. tommasinii* is preserved in the British Museum.

R. velutinus Ten., Ind. Sem. Hort. Bot. Neap. 12 (1825).
Type: Italy: in locis aquosis habitat (cult. in Naples Botanic Garden from material collected near Naples), n.v.

Prov. Istanbul: Rumelihisar, May 1943, *Mete*. Prov. Çannakale: Renkoei, in Dumbrek valley, *Sintenis* 93; Renkoei, above Kuzkoei, *Sintenis* 150b. (with *R. neapolitanus*); Gallipoli, Suvla, *Durham* 46. Lydia: Yamanlurdagh, 800–900 m., *Bornmüller* a. 1906 n. 9011 (as *R. eriophyllus* C. Koch).

Although the type could not be traced in the Naples herbarium, specimens collected later by Gussone agree with Tenore's description except that the indumentum is spreading instead of adpressed. The species is often confused in herbaria with *R. neapolitanus* Ten., which it closely resembles in habit and leaf shape; it can be distinguished by its thinner roots, glabrous torus, terete pedicel (not readily seen in dried flowering specimens) and in having the keel of the achene grooved on either side. In Turkey it is much more limited in its distribution than *R. neapolitanus*, being known only from the W. and N.W. part of the country where the ranges of the two species overlap.

The other Turkish species belonging to Group *Praemorsi* are *R. repens* L., *R. nemorosus* DC. (doubtful, but recorded by both C. Koch and

Handel-Mazzetti from the Trebizond area), *R. polyanthemos* L. (syn. *R. meyerianus* Rupr.), *R. bulbosus* L. subsp. *aleae* (Willk.) Rouy & Fouc., *R. tempskyanus* Freyn & Sint., *R. obesus* Trautv. (LE!), *R. cappadocicus* DC. (n.v.) and *R. polyrhizos* Steph. ex Willd.

Group 2. RHIZOMATOSI

1a. Rhizome clothed in silky scales; achene with a flat triangular beak; torus glabrous. Leaves trisect and sericeous . . . *sericeus*

1b. Rhizome not clothed in silky scales; achene with narrow uncinate or circinate beak; torus usually hairy, at least at the top:

2a. Basal leaves crenately lobed or tripartite:

3a. Roots without lateral rootlets, fleshy; leaves crenately lobed, reniform, glaucous, thick; achene 3–4 mm. long, with a strongly circinate beak . . . . . *brevifolius*

3b. Roots with lateral rootlets; leaves tripartite, not reniform, green; achenes 1·5–3 mm. long:

4a. Torus swollen; collar not fibrous; basal leaves 5–13 cm. across, adpressed hirsute, tripartite to $\frac{1}{2}$ or $\frac{2}{3}$ into broadly cuneate, incised-dentate lobes; stems leafy (Hyrcano-Colchic forests) *ampelophyllus* (p. 122)

4b. Torus not swollen; collar usually fibrous; basal leaves less than 5 cm. across; stems bearing very reduced leaves (alpine plants):

5a. Leaf blades adpressed hirsute; achene 2–3 mm. long, with a circinate beak:

6a. Basal leaves tripartite to $\frac{2}{3}$ or more into broadly cuneate, incised-dentate lobes; rhizome pilose *oreophilus* (p.126)

6b. Basal leaves deeply and palmately tripartite, the segments deeply divided into ± lanceolate laciniae; rhizome glabrous . . . . *sartorianus* (p. 130)

5b. Leaf blades glabrous; achene 1·5–2 mm. long, with an uncinate beak. Leaf lobes crenately toothed or deeply incised-dentate . . . . *brachylobus* (p. 127)

2b. Basal leaves trisect or pinnatisect:

7a. Basal leaves trisect or subpinnatisect, length 1–1·5 × breadth:

8a. Terminal primary segment of basal leaves distinctly stalked (petiolule 0·3–5 cm. long); sepals spreading or reflexed:

9a. Sepals spreading:

10a. Leaf segments dentate almost throughout their length; stem leafy. Achenes with a prominent nerve parallel to adaxial margin:

11a. Beak $\frac{1}{4}$–$\frac{1}{3}$ as long as achene; basal leaves 2·5–6(–10) cm. across, as long or longer than broad, the segments elliptical or cuneate-oblong; rhizome short *caucasicus* (p. 125)

11b. Beak nearly as long as achene, slender; basal leaves 6–15 cm. across, broader than long, the segments ovate-elliptical; rhizome long
brutius subsp. *anatolicus* (p. 123)

10b. Leaf segments toothed only in their upper half, or at the apex, or entire; stem leaves well-developed or reduced:

12a. Achenes c. 4 mm. long with a prominent nerve parallel to adaxial margin; beak 1–2 mm.; plants 12–50 cm. tall:

13a. Beak of achene nearly 2 mm. long; segments (laciniae) of basal leaves narrowly cuneate-oblong, usually coarsely 2–3-toothed only at apex, rather numerous . . . . . *fenzlii* (p. 131)

13b. Beak of achene 1–1·5 mm. long; segments of basal leaves laterally toothed:

14a. Primary segments of basal leaves simple or 3-lobed, rather thick; collar scarcely fibrous
diversifolius (p. 132)

14b. Primary segments of basal leaves deeply divided into several laciniae, thin; collar fibrous
caucasicus (p. 125)

12b. Achenes 2–3 mm. long with an obscure nerve parallel to adaxial margin; beak 1 mm. long, uncinate or circinate; plants 5–25 cm. tall. Basal leaves very variable, often much dissected, the ultimate divisions varying from cuneate-oblong to linear-oblong or lanceolate, few-toothed or entire; stem leaves much reduced . . . . . *dissectus* (p. 134)

9b. Sepals reflexed:

15a. Basal leaves mostly subpinnatisect with two pairs of lateral segments in addition to the trisect terminal one, all dissected into oblong-lanceolate or narrowly cuneate-oblong laciniae that are entire or few-toothed towards the tip; collar strongly fibrous
crateris (p. 131)

15b. Basal leaves trisect, with only one pair of lateral primary segments in addition to the trilobed or tripartite terminal one; collar not fibrous or weakly so:

16a. Primary segments cuneate-obovate (usually 2–3× longer than broad), 3–6 cm. long, margin multi-dentate in upper half; stem erect, tall, 12–15-flowered; petals nearly 3× sepals, 12–13 mm. long; beak nearly straight, subuncinate, 1–1·5 mm.
poluninii (p. 133)

16b. Segments broadly cuneate-triangular (± as long as broad), 1–2 cm. long, the upper margin incised or crenate-lobed; stems procumbent, slender, 1–3-

flowered, petals 2×sepals, 7–10 mm. long; beak circinate-recurved, 2 mm. *trichocarpus* (p. 133)

8b. Terminal primary segment of basal leaves sessile or subsessile (petiolule, if present, less than 3 mm. long); sepals always spreading:

17a. Achenes 4 mm. long, compressed, hairy or glabrous; segments of basal leaves cuneate-obovate or broadly cuneate-oblong, the upper half dentate-margined. Plants (12–50 cm.) tall *diversifolius* (p. 132)

17b. Achenes 1·5–3 mm. long, always glabrous; leaves not as in 17a.:

18a. Primary segments of basal leaves broadly cuneate, lobed or incised to the middle, or less deeply divided:

19a. Primary segments usually divided to the middle into 2–3 multidentate lobes, usually adpressed hairy; achene 3 mm. long, with a prominent nerve parallel to adaxial margin; stems usually leafy . . . *buhsei* (p. 123)

19b. Primary segments deeply incised-dentate, always glabrous; achene 1·5–2 mm. long, without a nerve parallel to adaxial margin: stems bearing few, very reduced leaves *brachylobus* (ssp. *incisilobatus*) (p. 129)

18b. Primary segments divided beyond the middle, often laciniate:

20a. Flowers usually 12–18 mm. across; segments deeply dissected into oblong-lanceolate, glabrescent, subentire, acute laciniae; achene ± inflated, beak circinate; stems usually procumbent *demissus* (var. *major*) (p. 130)

20b. Flowers usually 20–30 mm. across; leaves variable, laciniae often cuneate-oblong, few-toothed near apex and hairy; achene compressed, beak uncinate or circinate; stems sturdy, usually erect . . *dissectus* (p. 134)

7b. Basal leaves manifestly pinnatisect, much longer than broad because of a very distant pair of lateral segments; segments broadly cuneate, lobed-incised, usually glabrous *crymophilus* (p. 140)

R. ampelophyllus Somm. & Lev. in Bull. Soc. Bot. Ital. (1893) 523.

Syn.: *R. grandiflorus* sec. Boiss., Fl. Or. i, 46 (1867), non L. (1753).
R. macrophyllus Ledeb., Fl. Ross. i, 42 (1842), non Desf. (1798)!
R. vitifolius Boiss. & Bal. in Boiss., Fl. Or. Suppl. 9 (1888)! non Royle (1839).
R. vitifolius Boiss. & Bal. var. *minor* Boiss., Fl. Or. Suppl. 9 (1888)!
R. ledebouri Lipsky, Fl. Cauc. 207 (1899).

Lectotype: Turkey (Lazistan): in sylvis *Piceae orientalis* prope Djimil 1600 m., *Balansa* (G, n.v.; K!—isotype of *R. vitifolius*).

Prov. Trabzon: Sumila, *Sintenis* 1587; Chamsikey (Hamsiköy), in Picieto, 2.7.1917, *Schischkin*; Hamsi-Keui, growing on steep non-lime slopes, clearings in woods of Picea etc., 11.7.1934, *Balls* 1651. Erzurum, *Zohrab* 773 (probably Erzurum—Trabzon). Prov. Rize: in sylvis humidis Ponti Lazici litoralis prope Rhize, *Balansa* (1357—type of *R. vitifolius* var. *minor*). Prov. Giresun: Hochstaudenflur im *Picea–orientalis*–Wald, Tamdere—Kulakkaya, 4 km. nördlich Tamdere, 1480 m., *Huber-Morath* 13087. Prov. Artvin: mt. above Artvin, 1800 m., *Picea* forest, rhizomatous, sepals spreading, very variable in stature and leaf size, 19.6.1957, *Davis & Hedge* (D. 29796); *ibid.*, boggy ground under *Alnus*, 19.6.1957, *Davis & Hedge* (D 29759); Tiryal Dağ above Murgul, 1600 m., *Picea-Rhododendron* forest, 23.6.1957, *Davis & Hedge* (D. 29968); Kordevan Dağ (Yalnizçam Dağlari), near Kutul Y., 2100 m., *Picea* forest, 28.6.1957, *Davis & Hedge* (D. 30220); Yalnizçam–Artvin, 17.7.1954, *A. Heilbronn.*

This very distinctive mesophytic species is confined to Hyrcano-Colchic forest of N.E. Turkey (cf. Map 1) and Transcaucasia where it is usually associated with the endemic *Picea orientalis*. It is presumably a relict species.

R. brutius Tenore, Fl. Nap. i, 315, t. 50 (1811–15).

subsp. **anatolicus** Freyn & Sint. in Bull. Herb. Boiss. iii, 34 (1895).

Syntypes: Turkey: Paphlagonia: Tossia in Kiefernwalde bei Karaberdjik, 15.7.1892, *Sintenis* 4628 (W, n.v.). Prov. Gümüşane: am Darsos-Dagh in Wäldern an Bachufern, 6.6.1894, *Sintenis* 5794 (W, n.v., E!) und in Tannenwäldern zwischen Godena und Basbén, 14.6.1894, *Sintenis* 5899 (W, n.v.).

All the Turkish specimens of this species that I have seen apparently belong to subsp. *anatolicus*. It grows in Hyrcano-Colchic forests from Lazistan to Ulu Dağ, with an outlying station on Trojan Ida. A typical specimen has also been seen from Thessaly (Chaliki, in mte. Mikrigura, *Sintenis* 643). It differs from the European subsp. *brutius* only in having broader leaf segments that are acute or even subacute instead of being attenuated and subacuminate. But as Bornmüller has indicated (Fedde, Rep. Beih. lxxxix (1), 9: 1936), the morphological separation is not a sharp one. Most of the Leningrad material from Abchasia appears to be subsp. *brutius*.

R. buhsei Boiss., Fl. Or. i, 45 (1867).

Syn.: *R. caucasicus* M.B. var. *astrantiaefolius* Rupr., Fl. Cauc. 25 (1869)!

R. astrantiaefolius (Rupr.) Boiss. & Bal., Fl. Or. Suppl. 11 (1888); and var. *polypetalus* Boiss. (l.c.)!

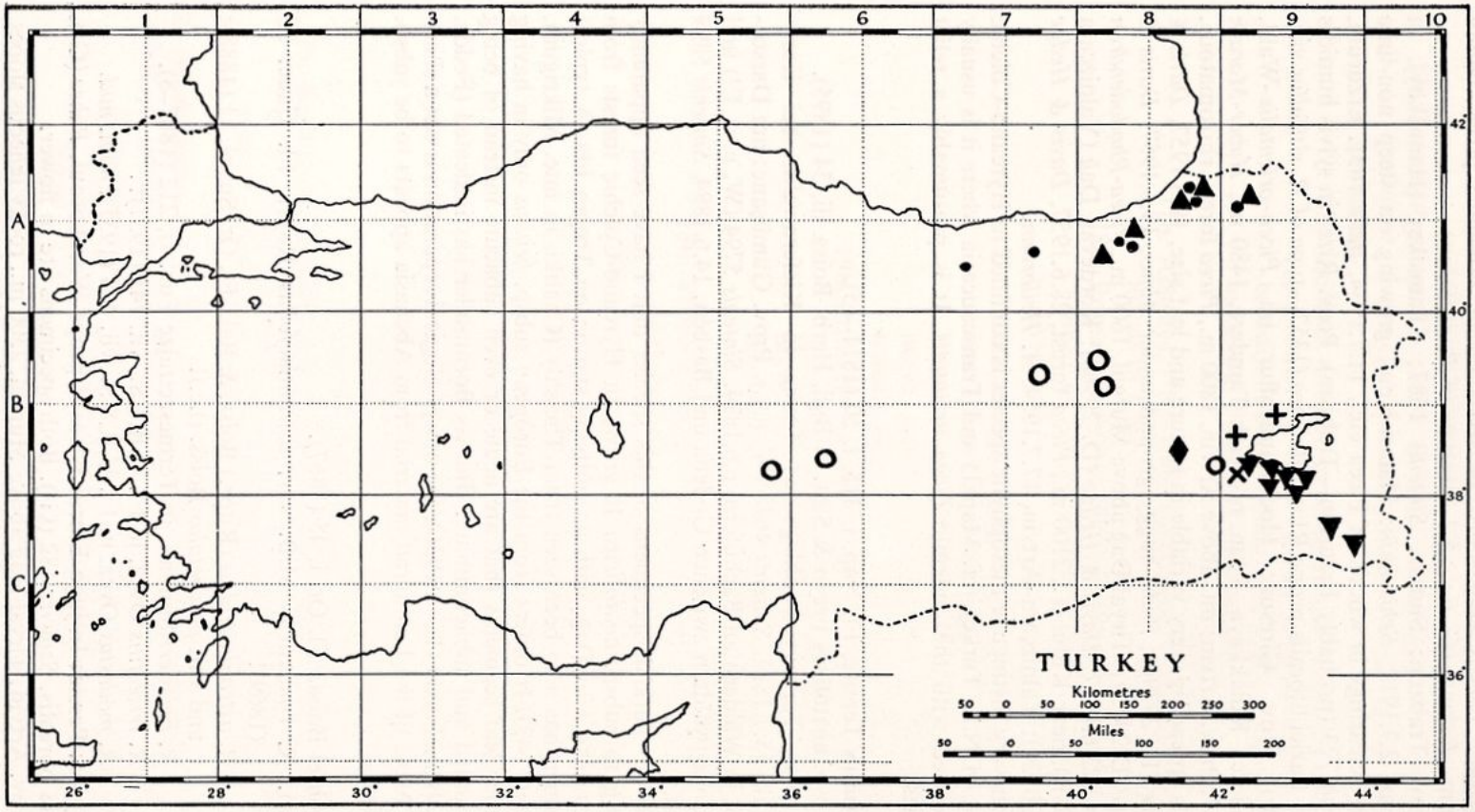
R. boissieri Simonk. in Termeszetrajze Fuz. xi, 212 (1887–8).

R. trisectilis Ovcz. in Fl. U.R.S.S., vii, 743 (1937)!

R. modestus Ovcz. in Fl. U.R.S.S., vii, 424 (1937), *nom. nud.*

Syntypes: Persia: In jugo Elbrus borealis prope Warahosoul, *Buhse* (G!). Persia borealis, *Szowitz* 182 (G!). Both specimens are in flower.

Prov. Artvin: Tiryal Dağ above Murgul, 2300 m., rocky igneous slopes, 23.6.1957, *Davis & Hedge* (D. 29935); *ibid.*, 1700 m., pasture at edge of



MAP 1. Distribution in Turkey of species in group *Rhizomatosi*. ● *R. ampelophyllus* Som. & Lev. ▲ *R. buhsei* Boiss. ○ *R. fenzlii* Boiss. + *R. crateris* P. H. Davis. ▼ *R. diversifolius* Boiss. & Ky. × *R. poluninii* P. H. Davis ◆ *R. trichocarpus* Boiss. & Ky.

Fagus forest, 13.8.1957, *Davis & Hedge* (D. 32355); Şavval Tepe above Murgul, 2800 m., rocky igneous N. slope, 12.8.1957, *Davis & Hedge* (D. 32329); mt. above Artvin, 1700 m., forest clearing, 19.6.1957, *Davis & Hedge* (D. 29770); Kordevan Dağ (Yalnizçam Dagl.) near Kutul Y., 2100 m., in Picea forest, 28.6.1957, *Davis & Hedge* (D. 30206); *ibid.*, 2200 m., pasture at edge of forest, 28.6.1957, *Davis & Hedge* (D. 30227); *ibid.*, 2200 m., edge of Picea forest, 28.6.1957, *Davis & Hedge* (D. 30196). Prov. Trabzon: N. side of Soğanli Dağ above Çaykara (igneous), 2000–2200 m., steep igneous slopes, 4.8.1957, *Davis & Hedge* (D. 32130). Prov. Rize: Lazistan, near Djimil, 1900 m., *Balansa* 1355; près de Djimil, 2800 m., *Balansa* 1356 (type of var. *polypetalus*); Lazistania Turcica: distr. Atine, ad limitum sylvarum prope pagum Kale-Bala, 1900 m., 1.9.1917, *Schischkin* (BM).

Distribution shown in Map 1.

R. caucasicus M.B., Fl. Taur. Cauc. ii, 27 (1808).

Key to the Subspecies

Basal leaves with the middle segment usually tripartite, divided into elliptical, bifid or trifid lobes toothed nearly to base; beak $\frac{1}{4}$ as long as always glabrous achene . . . . . subsp. *caucasicus*

Basal leaves with the middle segment usually trisect, divided into more numerous, cuneate-oblong laciniae coarsely toothed mainly in the upper half; beak $\frac{1}{3}$ as long as hairy or glabrous achene subsp. *subleiocarpus*

subsp. **caucasicus**

Syn.: *R. caucasicus* M.B. var. *alpicola* Trautv. in Acta Hort. Petrop. ii, 492 (1873)!

Type: In Caucaso subalpino: in collibus circa acidulam Narzana frequens, *M. Bieberstein* (LE!).

Ad fines turcicas, *Radde* 319. Prov. Kars: in monte Aschich-dade [near Tuzluca] *Radde* 430 (lectotype of var. *alpicola* Trautv.). Prov. Bayazit: in pratis alpinis jugi Czingil inter pagos Orgov et Kare, c. 2000 m., 15.5.1916, *Schischkin* (var. *alpicola* Trautv.—n.v.).

subsp. **subleiocarpus** (Som. & Lev.) P. H. Davis, **comb. nov.**

Syn.: *R. raddeanus* Regel var. *subleiocarpus* Som. & Lev., Enum. 10 (1900).

R. raddeanus Regel, Ind. Sem. Hort. Petrop. 1865, p. 39 (1865)!

R. szowitsianus Boiss., Fl. Or. i, 42 (1867)!—forma foliis multisectis.

R. bourgaei Boiss., Fl. Or. i, 43 (1867), p.p.!

R. sommieri Alb. in Bull. Herb. Boiss. i, 245 (1893)!

R. raddeanus Regel subsp. *subleiocarpus* (Som. & Lev.) N. Busch in Fl. Cauc. Crit. iii (3), 160 (1903).

R. osseticus Ovz. in Fl. U.R.S.S. vii, 743 (1937)!

Type: Caucasus (Suanetia): in silvis editioribus montis Tetenar, 1800 m., 1.8.1890, *Sommier & Levier* (FI, n.v.).

Prov. Kars: Konk, between Ardahan and Yalnizçam, 1950 m., grassy slopes and depressions, erect perennial, sepals adpressed, mostly in moister places than *R. oreophilus* M.B. (D. 29613), fruit strongly flattened,

16.6.1957, *Davis & Hedge* (D. 29610; fl. and fruit); distr. Sarikamiş, 10.6.1914, *Litvinov*. Prov. Gümüşane: Mont Gummus-khane dans les pâturages, 26.5.1866, *Bourgeau* p.p.

After examining several hundred sheets of the *R. caucasicus* complex at Leningrad, I have felt bound to accept a wide circumscription for this very plastic species. Despite the efforts of Ovczinnikov (Fl. U.R.S.S. vii, 412: 1937) and Grossheim (Fl. Kavkaza ed. 2, iv, 58: 1950), I cannot separate *R. raddeanus* Regel and *R. sommieri* Alb. from each other, nor treat them as more than one subspecies of *R. caucasicus* (subsp. *leiocarpus* —the earliest available epithet at subspecific rank) differing from subsp. *caucasicus* mainly in leaf shape. Whereas subsp. *caucasicus* extends from the Crimea to N. Persia, subsp. *subleiocarpus* is centred in the west and middle parts of the Caucasus range, W. Transcaucasia and Turkish Armenia where the two taxa often grow in different localities. The morphological resemblance between them is rather close, and intermediates between them are so very numerous that it would be both inconvenient and unnatural to maintain them as separate species; it seems likely that they have hybridised extensively. *R. caucasicus* var. *alpicola* Trautv. is no more than a dwarf mountain race of subsp. *caucasicus*—parallel forms occur in subsp. *subleiocarpus* and in many species of *Ranunculus* with a wide altitudinal range. *R. szowitsianus* Boiss. (whose *locus classicus* is in Karabagh in Russian Azerbaijan, not in N. Persia as Boissier claimed) appears to be an exceptionally dissected variant of *R. caucasicus* subsp. *subleiocarpus*, and is linked to the typical form of the latter by numerous intermediate gatherings.

R. caucasicus (particularly subsp. *subleiocarpus*) appears to hybridise with *R. dissectus* M.B. (particularly subsp. *napellifolius* (DC.) Davis), but to combine them into one species would seem, on morphological grounds, to be too drastic a course to adopt. The whole group requires experimental study.

R. oreophilus M.B., Fl. Taur. Cauc. iii, 383 (1819); Landolt in Berichte Schweiz. Bot. Gesell. lxiv, 64, 75, t. 24 (1954).

Syn.: *R. acutilobus* Ledeb., Fl. Ross. 40 (1842)!
R. acutidentatus Rupr., Fl. Cauc. 286 (1869)!
R. villarsii sec. Boiss., Fl. Or., non DC. (*nom. confusum*).

Syntypes: Crescit in montibus altioribus Tauriae Caucasique orientalis . . . *M. Bieberstein* (LE!).

Prov. Artvin: Kordevan Dağ (Yalnizçam Dağlari) at Kutul Y., 2100 m., rocky igneous slopes, 29.6.1957, *Davis & Hedge* (D. 30353); Tiryal Dağ above Murgul, 2300 m., igneous rock ledges, 23.6.1957, *Davis & Hedge* (D. 29951). Prov. Trabzon: N. side of Soğanli Dağ above Çaykara, 2000–2200 m., steep rocky igneous slopes, 4.8.1957, *Davis & Hedge* (D. 32133); *ibid.*, 2000 m., D. 32177 (leaf lobes exceptionally pointed).

I find myself unable to separate *R. acutilobus* Ledeb. (mapped by Grossheim from Turkish Armenia) from *R. oreophilus* M.B.; the latter varies greatly in depth and acuteness of leaf incision, nor is this character correlated with any achenial difference. The type of *R. acutilobus* in Leningrad consists of one plant that has lost its flower, but evidently represents an extreme variant of *R. oreophilus* (similar to *Davis* 32177).

At the most, *R. acutilobus* might be accorded varietal rank, distinguished by its acuminate leaf teeth and often larger leaves and taller stature.

Like *R. buhsei*, *R. ampelophyllus* and *R. brachylobus* subsp. *brachylobus* in the same group (*Rhizomatosi*), *R. oreophilus* in Turkey is probably confined to the N.E. (Hyrcano–Colchic) corner of Anatolia. I have not seen the specimen from Bithynian Olympus (*Bornmüller* 4083) assigned by its collector to this species; it may be the plant that was gathered on the same mountain by Aucher and which I have referred to *R. sartorianus* Boiss. & Heldr. The distribution of both species is shown on Map 2.

R. brachylobus Boiss. & Hohen. in Boiss., Diagn. Ser. I (8), 6 (1849).

Key to the subspecies

Leaves divided to ½–¾ into obtuse, crenate dentate lobes; achene apparently ± inflated with an obtuse abaxial margin subsp. *brachylobus*
Leaves more deeply tripartite or even trisect, the segments more deeply incised into coarse subacute teeth; achene apparently ± compressed with a subcarinate abaxial margin . . subsp. *incisilobatus*

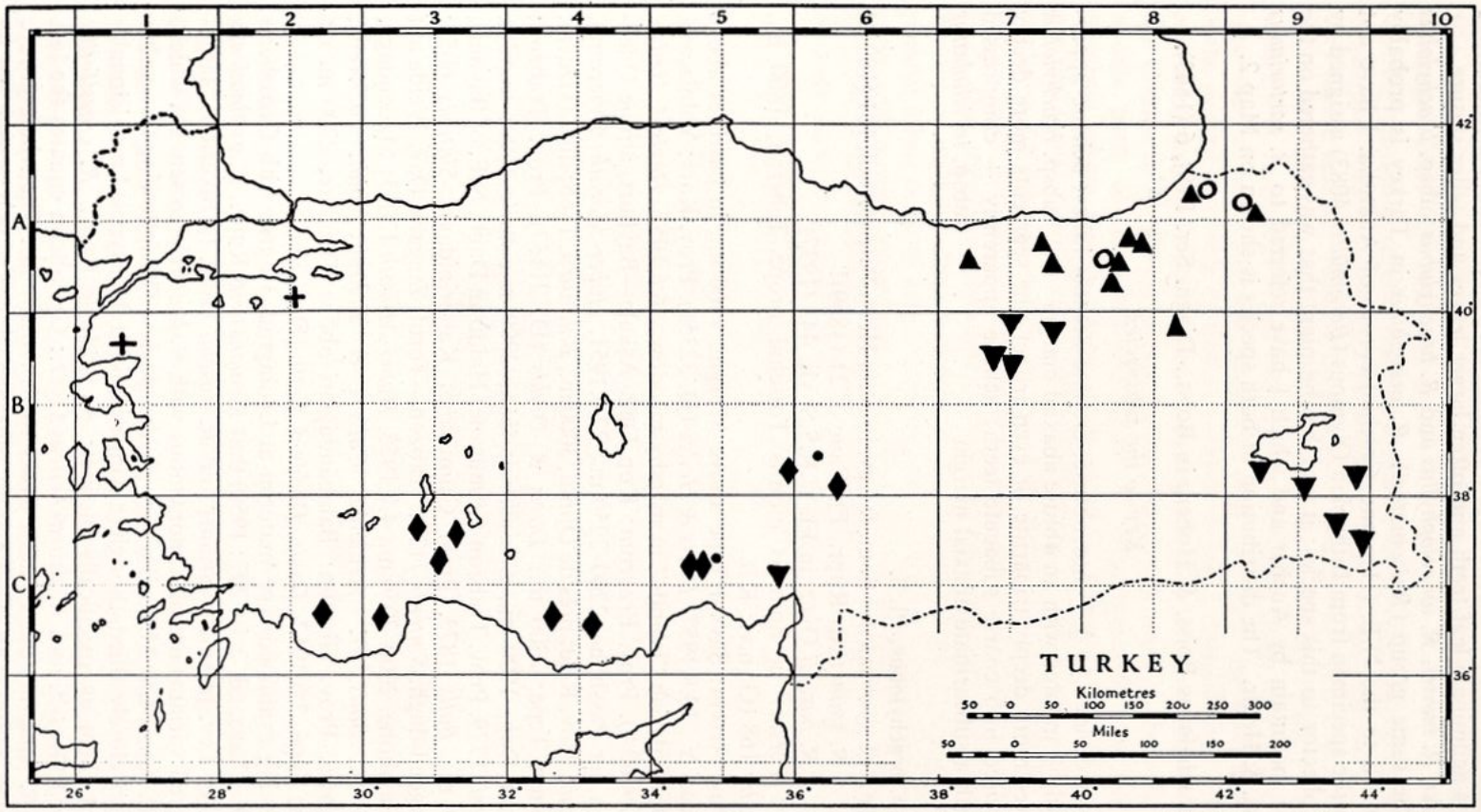
subsp. **brachylobus,** Pl. 8.

Syn.: *R. gymnadenus* Som. & Lev. in Acta Hort. Petrop. xxii, 181 (1894)!
R. suaneticus Rupr., Fl. Cauc. i, 21 (1869)!
R. buschii Ovcz. in Fl. U.R.S.S. vii, 443 (1937)!

Type: Persia: In humidis montis Totschal prope Teheran, 1800 m., *Kotschy* 168 (G, n.v.; K!).

Prov. Artvin: Şavval Tepe above Murgul, 1800 m., in pastures above Golbaşi Y., 13.8.1957, *Davis & Hedge* (D. 32351). Prov. Kars: Yalnizçam, 1900 m., dryish "islands" in marshy meadow, 16.6.1957, *Davis & Hedge*, (D. 29660A). Prov. Erzurum: Kop Dağ, Aşkale—Bayburt, alpine Quellfluren der Passhöhe, 2200–2250 m., 27.6.1951, *Huber-Morath*; Erzeroum, *Zohrab*. Prov. Rize: près de Djimil, 3000 m., *Balansa* a. 1866; dist. Ikizdere, Vercinin Tepe, 3300 m., *Davis & Dodds* (D. 21157). Prov. Trabzon: Zigana Dağ, 1900 m., *Schischkin*; *ibid.*, 2000 m., *Balls* 1690; Sumila, *Sintenis* 1779. Prov. Trabzon/Gümüşane: Haldizan Dagh, N.E. of Bayburt, 2850 m., *Balls* 1873. Prov. Gümüşane: Kaldirimdagh, *Sintenis* 6055; Karagoell-dagh, *Sintenis* 7120; Trabzon—Torul, Zingana Dağ, Weide auf der Passhohe, 2000–2050 m., 4.7.1955, *Huber-Morath* 13085; Madendagh, 3100 m., *Balls* 551. Armenia, *Calvert & Zohrab*; *ibid.*, 26.5.1862, *Bourgeau*. Prov. Giresun: Balabandağlari above Tamdere, 2700 m. on Kilinç Tepe, 7.8.1952, *Davis, Dodds & Çetik* (D. 20533).

Having examined type material at Leningrad, I agree with Grossheim (Fl. Kavkaza, ed. 2, iv, 297: 1950) that *R. suaneticus* Rupr., *R. gymnadenus* Som. & Lev. (a small variant) and *R. buschii* Ovcz. (a luxurious, large-flowered variant) are all synonymous with *R. brachylobus* sen. str. which, like *R. caucasicus* M.B., is a very plastic species. The following Caucasian taxa are closely allied, though (having examined their types) I provisionally accept them as specifically distinct: *R. baidarae* Rupr., *R. crassifolius* (Rupr.) Grossh. and *R. dzavakheticus* Ovcz.; Grossheim equates the last with *R. baidarae*, but I find it closer to *R. crassifolius*. The whole group, however, requires an experimental approach similar to that carried out by



MAP 2. Distribution in Turkey of species in group *Rhizomatosi*. + *R. sartorianus* Boiss. & Heldr. ○ *R. oreophilus* M.B. ▲ *R. bracyhlobus* Boiss. & Hohen. subsp. *brachylobus* ▼ *R. brachylobus* subsp. *incisilobatus* P. H. Davis ◆ *R. demissus* DC. var. *major* Boiss. ● Intermediate between *R. brachylobus* subsp. *incisilobatus* & *R. demissus* var. *major*.

PLATE 7. *R. poluminii* P. H. Davis (holotype).

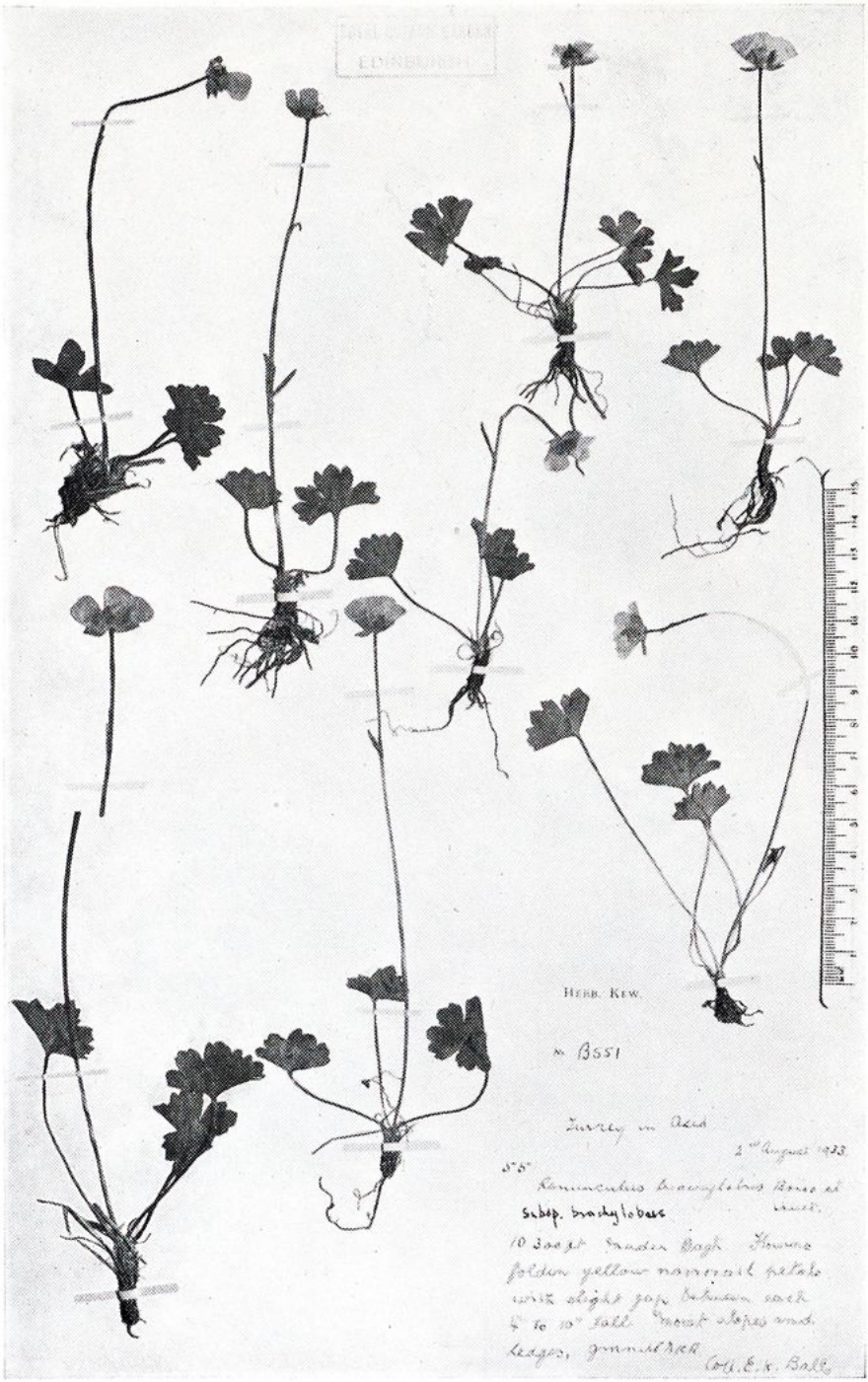


PLATE 8. *R. brachylobus* Boiss. & Hohen. subsp. *brachylobus* (*Balls* 551).

PLATE 9. *R. brachylopus* Boiss. & Hohen. subsp. *incisilobatus* P. H. Davis (holotype).

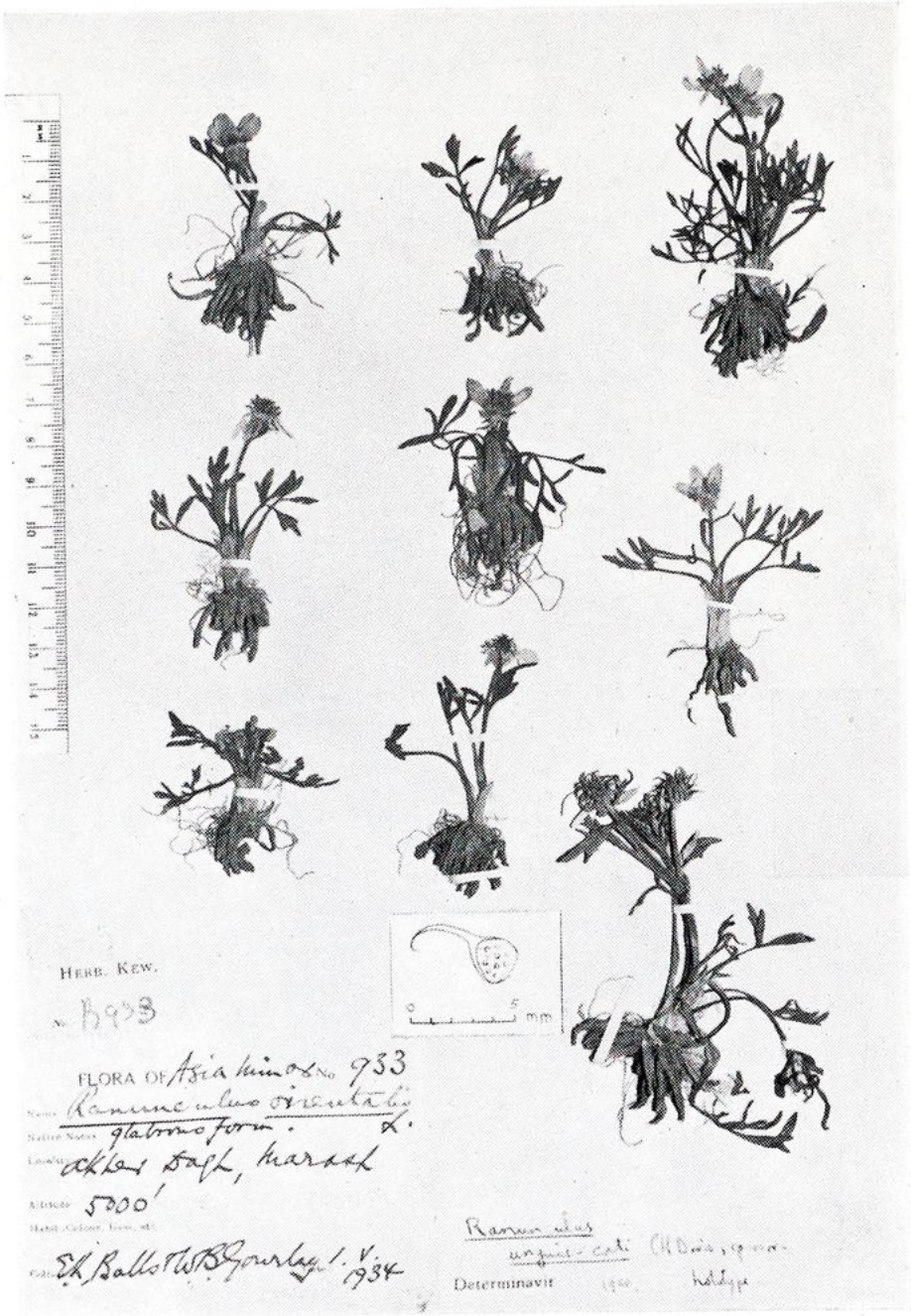


PLATE 10. *R. unguis-cati* P. H. Davis (holotype).

Landolt on the allied Central European species (Landolt in Berichte Schweiz. Bot. Gesell. lxiv: 1954).

R. brachylobus subsp. *brachylobus* belongs to the Hyrcano-Colchic element and extends into the Caucasus and Elbruz (N. Persia). It is very variable in stature and flower size, and plants with hairy and glabrous stems sometimes occur in the same gathering (D. 21157 and D. 20533). It is possible, however, that hairiness may be due to introgression with the closely allied *R. oreophilus* M.B. which grows in the same area.

subsp. **incisilobatus** P. H. Davis, **subsp. nov.** Pl. 9.

A typo foliis magis profunde tripartitis vel etiam trisectis, segmentis in dentes subacutos grosse incisis, acheniis ut videtur magis compressis margine abaxiali subcarinato differt.

Rhizoma obliquum, breve, 4–8 mm. latum; collum nudum vel parce fibrosum; radices cylindricae, c. 1 mm. latae. *Caules* plerumque erecti, glabri, 1–2(–4)-flori, foliis basalibus 2–3-plo longiores, (3–)8–70(–90) cm. alti, 1–1·5 mm. lati; pedunculi teretes, adpresse pilosi vel glabrescentes. *Folia basalia* longe petiolata, glabra, viridia (vel interdum glaucescentia) ambitu orbicularia basi cordata, 1–6 cm. lata, profunde tripartita vel etiam trisecta, segmentis triangularibus rare attingentibus, lateralibus saepe profunde bilobis, omnibus grosse inciso-lobatis, lobis (dentibus) ovatis subacutis vel ovato-lanceolatis. *Folia caulina* 1–2, reducta, inferiora saepe breviter petiolata vel subsessilia in lacinias oblongo-lineares trisecta, superiora simplicia, sessilia, lineari-oblonga vel linearia. *Flores* plerumque 2–3 cm. diam. *Sepala* adpressa, ovata, obtusa, adpresse pilosa, saepe purpurascentia. *Petala* late cuneato-obovata, obtusissima, aurea, sepalis duplo longiora; squamae nectariferae obovatae, emarginatae, fere ad medium petalum adnatae. *Torus* pilosus. *Achenia* 50–80, in caput rotundum dense aggregata, semiorbicularia, ± compressa, 3 mm. longa, 2–2-5 mm. lata, margine abaxiali acuto subcarinato leviter gibboso; rostrum 1 mm. longum, tenue, uncinatum vel etiam uncinato-circinnatum.

Prov. Tunceli: Munzur Dağ above Ovacik, 2400 m., moist turf by flushes, 18.7.1957, *Davis & Hedge* (D. 31342: holotype E, isotype K, BM); *ibid.*, 2600 m., by rivulets, 16.7.1957, D. 31194; *ibid.*, 2800 m., moist turf on N. slope, 16.7.1957, D. 31237. Prov. Erzincan: Keşiş Dağ above Cimin, 2550 m., bushy igneous N. slope, 28.7.1957, *Davis & Hedge* (D. 31760); Bachufer im Kara Dağ, Erzincan—Refahiye, 27 km. östlich Refahyie, 1940 m., 2.7.1953, *Huber-Morath* 13090. Prov. Bitlis d. Kotum: Karz Dağ above Kamer, 2600–2700 m., *Davis & O. Polunin* (D. 24590). Prov. Hakkari: Cilo Tepe, 2900 m., 8.8.1954, *Davis & Polunin* (D. 24119); Cilo Dağ, 10 km. W. of Cilo Tepe, 3650 m., 9.8.1954, D. 24179; Kara Dağ, 3150 m., *Davis & O. Polunin* (D. 24407); *ibid.*, 2850 m., D. 24394. Prov. Van: Van—Başkale, on Halanduran Dağ, 3000 m., (25 km. from Başkale), *McNeill* 647; Kavuşşahap Dağ (above Şatak), 3200 m., 23.7.1954, *Davis & O. Polunin* (D. 23120); Cuhgedigipass Hoşap—Başkale, Bachufer 1 km. südöstlich der Passhöhe, 2840 m., 9.7.1951, *Huber-Morath* 10959. Armenia, *Calvert & Zohrab*. In alpibus Ponticis, 1860 m., a. 1859, *Kotschy* (Iter Cilic. Kurd.—as *R. villarsii* in Boiss. Fl. Or.; G). Cilicia: Dombelek dagh, 2600 m., 6.1895, *Siehe* 203 (E). Bulgar Dagh, Karli Boghas et in valle Gusguta, 1950 m., *Kotschy* 37, 21c (K).

Habitat: Alt. 1900–3200 m., moist slopes, by melting snow and rivulets, flushes, shady ledges.

Subsp. *incisilobatus* replaces subsp. *brachylobus* further south in Turkey, where it is centred in Irano-Turanian territory. Specimens from Sipikor Dağ near Erzincan (*Sintenis* 1118, 3335) are intermediate between the two races, though closer to subsp. *incisilobatus*. How far the apparent difference in achene shape holds good cannot be ascertained till more ripe fruits of each race are available. Subsp. *incisilobatus* also grows on Arl Gird Dağ (Helgurd Dağ) in Northern Iraq (*Guest* 2866, 2883, *Gillett* 12448, *Bornmüller* a. 1893 n. 828), occurring there in a dwarf, decumbent form. The Turkish distribution of both subspecies is given in Map 2.

R. sartorianus Boiss. & Heldr. in Boiss., Diagn. Ser II (1), 8 (1853).

Syn.: *R. oreophilus* M.B. var. *sartorianus* (Boiss. & Heldr.) Boiss., Fl. Or. i, 41 (1867)!

Lectotype: Greece: in pascuis sylvaticae superioris Olympi Thessali, *Heldreich* a. 1851 (G, n.v.; K!).

Prov. Çannakale/Balikesir: Mt. Ida, *Sintenis* 740 (as *R. sibthorpii* in Boiss., Fl. Or. Suppl. 10: 1888). Prov. Bursa: Olympus, *Aucher* 31 (untypical).—Map 2.

This species, described from Greece, is very closely allied to *R. oreophilus* (which it resembles in the circinate beak of the achene) but differs in the characters given in the key. Aucher's specimen from Bithynian Olympus approaches *R. oreophilus* in having somewhat less deeply divided leaves than is usual in *R. sartorianus*. Two Caucasian sheets at Leningrad apparently belong to this species, though others determined as *R. sartorianus* are certainly *R. oreophilus* M.B.

R. demissus DC., Syst. Veg. i, 276 (1818).

var. **major** Boiss., Fl. Or. i, 42 (1867).

Syntypes: Turkey: In Alpibus Lyciae, *Pestalozza* (G, n.v.), *Bourgeau* (G, n.v.; K!), montis Davros dagh Pisidiae, *Heldreich* (G, n.v.; K!), Tauri Cilicici, *Kotschy* (G, n.v.; K!), *Balansa* (G, n.v.; K!), Berytdagh Cappadociae, *Heldreich* (G, n.v.).

Lycia: Beidagh, 10.7.1883, *Pichler*. Prov. Muğla: Girdev Dağ (Eren D.), 6.8.1947, *Davis & Bilger* (D. 13981). Prov. Isparta d. Sütçüler: Dedegöl Dağ above Dedegöl tarn, 2800 m., 3.8.1949, *Davis & Bilger* (D. 16020). Prov. Antalya: Bozburun Dağ above Tozlu Çukur Y., 1900–2100 m., 25.7.1949, *Davis & Bilger* (D. 15666). Prov. Konya: Jelibel Dagh zwischen Ermenek und Karaman, Kalkgeröll Nordhang, 2020 m., 10.6.1948, *Huber-Morath* 8767; Ermenek—Jelibel Dagh, Kalkfelsen 28 km. ob. Eremenek, 1660 m., 9.6.1948, *Huber-Morath* 8766; Karagöl above Bulghar Maaden, 2700 m., *Siehe* a. 1912 n. 298. Prov. Içel: Gülnar—Ermenek, *Pinetum Pallasianae* 78 km. nach Gülnar, 1400 m., 11.6.1950, *Huber-Morath* 10401. Prov. Niğde d. Ulukişla: Bulgar Dağ near Sari Tepe Y., 2700 m., 2.9.1949, D. 16561. Prov. Kayseri: Bakir Dağ near Akoluk Y., 2300 m., 28.6.1952, *Davis, Dodds & Çetik* (D. 19511). Prov. Maraş d. Göksun: Berit Dağ above Arpa Çukuru Y., 2700 m., 26.6.1952, *Davis, Dodds & Çetik* (D. 20315).

All the Turkish material of *R. demissus* is assigned here to var. *major* whose distribution is given in Map 2. It differs from var. *demissus* (con-

fined to the Lebanon) in its more attenuated acute laciniae and usually glabrous petioles and stems; its stature is very variable. Material of var. *major* from the western part of its range (Lycia, Pisidia and W. Isauria) appears to have less compressed and smaller achenes than plants from Cilicia and the Anti-Taurus, in this character resembling var. *demissus*.

The following gatherings from the Cilician Taurus are particularly puzzling: Burucik, Kucuk Kur, 1700 m., in moist semi-shade under cliffs, 9.6.1934, *Balls* 1353; *ibid.*, 1650 m., limestone rocks and damp stony places by spring, *Balls* 1330; Taurus bei Mersin, *Siehe* 519 (ANK). These gatherings show a striking resemblance to *R. marschlinsii* Steud., a Corsican endemic that has presumably evolved from ancestral *R. demissus* during prolonged geographical isolation. The Cilician specimens (which are without ripe fruit) differ from the rather uniform Corsican material mainly in having slightly larger flowers and more deeply divided (subtrisect) leaves; these features, however, sometimes occur (though not in the same specimen) in Corsican material. It seems most probable that we have here a case of convergent evolution. The Cilician population may either represent a local facies of *R. demissus*, or may possibly have arisen from hybridisation between *R. demissus* var. *major* and *R. brachylobus* subsp. *incisilobatus*, both of which grow in the same area. A gathering of mine from the Anti-Taurus (Binboğa Dağ above Yalak, 2200 m., *Davis & Dodds*: D. 20153) is certainly intermediate between these two taxa and may represent a hybrid swarm. It does not, however, resemble *R. marschlinsii*.

In refraining from referring the Cilician population to *R. marschlinsii*, I am following the advice of E. Landolt (*in litt.*). *R. demissus* requires taxonomic revision throughout its disjunct geographical range from southern Spain to Afghanistan.

R. fenzlii Boiss., Fl. Or. i, 44 (1867).
Lectotype: Turkey: in summo jugo Tchosch Dagh Ciliciae Kurdicae ad nives, 2250 m., a. 1859, *Kotschy* 107 (G!; K! BM!).

In monte Devetepe Tauri Cilicici, *Kotschy* 10 (syntype—abnormal filaments). Prov. Kayseri (Anti-Taurus): Bakir Dağ at Akoluk Y., 2000 m., *Davis, Dodds & Çetik* (D. 19457); *ibid.*, 2300 m., *Davis, Dodds & Çetik* (D. 19511, p.p., with *R. demissus* var. *major*). Prov. Maraş dist. Göksun: Binboğa Dağ, 2700 m., *Davis, Dodds & Çetik* (D. 19985). Prov. Erzincan: Egin, Hodschadurdagh, *Sintenis* 2224. Prov. Tunceli: Munzur Dağ above Ovacik, 2600 m., rocky limestone slopes, 16.7.1957, *Davis & Hedge* (D. 31136); *ibid.*, 2650 m., 19.7.1957, D. 31419; *ibid.*, 2400 m., 18.7.1957, *Davis & Hedge* (D. 31322). Prov. Bitlis: Kambos Dağ above Hurmuz, 2250 m., *Davis & O. Polunin* (D. 23466: atypical—flowers small, leaves large and multisect).

This species is certainly closely allied to *R. dissectus* subsp. *huetii*, but may be readily distinguished by its larger achenes with a longer beak and prominent nerve parallel to the adaxial margin. Its distribution is shown on Map 1.

Ranunculus crateris P. H. Davis, **sp. nov.** Pl. 6.

Affinis *R. fenzlii* sed collo conspicue fibroso, floribus minoribus magis numerosis, foliis basalibus subpinnatisectis, sepalis reflexis differt.

Herba perennis, glaucescens, caulibus et foliis adpresse pilosis vel etiam glabris. *Rhizoma* horizontale vel obliquum, 5–7 mm. latum, inter bases radicum filiformium 1 mm. latiorum adpresse hirtum. *Collum* fibris longis basi subreticulatis dense vestitum. *Caules* 25–45 cm. alti, inferne 2 mm. lati, remote foliosi, superne ramosi, 2–5-flori. *Folia basalia* subpinnatisecta, petiolo 3–6(–11) cm. longo; lamina ambitu ovato-oblonga vel suborbicularis, 4–6·5 × 3–5(–6) cm., e duobus paribus segmentorum lateralium et segmento terminali petiolulato trisecto composita; segmenta ± profunde bifida vel trifida, vel terminalia trisecta, 2–4(–5) cm. longa; laciniae oblongo-lanceolatae vel anguste cuneato-oblongae, integrae vel apicem versus pauce dentato-incisae. *Folia caulina* internodiis multo breviora, inferiora et mediana breviter petiolata (petiolo vaginato), trisecta, segmentis lateralibus profunde bipartitis, segmento terminali, petiolulato profunde tripartita, laciniis lineari-lanceolatis subintegris; superiora reducta, in lacinias lineares 3–5 basin versus dissecta, 1–2 cm. longa. *Pedunculi* tenues, teretes. *Sepala* reflexa, 5–6 mm. longa, extra villosula, late ovata, obtusa. *Petala* late obovata, 9–11 × 7–9 mm., aurea, sepalis duplo longiora; squamae nectariferae cuneatae (1·5 mm. longae, 1·3 mm. latae), apice leviter retusae, ad $\frac{1}{3}$–$\frac{2}{3}$ petalum adnatae. *Antherae* 1·75 mm. longae. *Torus* ad apicem pilosus, in fructu vix elongatus. *Achenia* 5–20, in caput globosum laxe conferta, compressa, semiorbiculata, glabra, 3–4 mm. longa, nervo juxta marginem adaxialem vix curvatum utrimque percursa, nervo semicirculari haud prominente juxta marginem abaxialem obtusam remote persursa, rostro abrupte superata, disco obscure nervoso; rostrum anguste lanceolatum, falcato-circinnatum, 1–2 mm. longum.

Prov. Bitlis: Nemrut Dağ (Nimrod Dagh), above Sogurt, 2350 m., 3.7.1954, *Davis & O. Polunin* (D. 23565: holo. K; iso. E); *ibid.*, 2300 m., in crater with *Juniperus pygmaea*, 3.7.1954, *Davies & O. Polunin* (D. 23505); *ibid.*, scree on N. slope of crater, 2500 m., open community, scree rather mobile, sepals reflexed, 12.9.1956, *McNeill* 587; Süphan Dağ, 3300 m., sandy ground with moisture near surface, 28.8.1954, *Davis & O. Polunin* (D. 24749—leaves glabrous, glaucous).

R. crateris—named after its habitat on Nemrut Dağ, said to be the largest perfect crater in the world—is closely allied to *R. fenzlii* Boiss. The new species differs from the latter in its reflexed sepals (observed in the field), very fibrous base, subpinnatisect basal leaves with two pairs of lateral segments (instead of one) below the dissected terminal one, and more branched inflorescence with more numerous flowers. The finely dissected upper stem leaves of *R. crateris* are also found in *R. fenzlii* and *R. diversifolius*.

The new species is only known from the two extinct volcanoes in the province of Bitlis. The gathering from Suphan Dağ differs from the others in having glabrous, glaucous leaves; the same type of variation, however, occurs with *R. fenzlii*, a species which, so far as I know, has always been collected on limestone. Cf. Map 1.

R. diversifolius Boiss. & Kotschy in Boiss., Fl. Or. i, 45 (1867).
Type: Turkey: in humidis alpinis Armeniae Kurdicae ad Chana Putkie prope Müküs, 2400 m., *Kotschy* 739 (G!).

Prov. Bitlis: Karz Dağ above Kotum, 2250 m., *Davis & O. Polunin* (D. 22295); Pelli Dağ above Pelli, 3000 m., 7.7.1954, *Davis & O. Polunin* (D. 22502). Prov. Bitlis/Van: mt. 10 km. S.E. of Pelli, 2400 m., 8.7.1954, *Davis & O. Polunin* (D. 22595); *ibid.*, 2500 m., *Davis & O. Polunin* (D. 22534). Prov. Van d. Şatak: Kavuşşahap Dağ, 3100 m., 23.7.1954, *Davis & O. Polunin* (D. 23146); d. Gevaş: Artos Dağ, 3000 m., at yayla, 8.7.1954, *Davis & O. Polunin* (D. 22854). Prov. Hakkari: Kara Dağ, 3000 m., 15.8.1954, *Davis & O. Polunin* (D. 24400); Cilo Dağ, below Cilo Y., 2700 m., 10.8.1954, *Davis & O. Polunin* (D. 24237).

As interpreted here, *R. diversifolius* is a very variable species confined to Turkish and Iraqi Kurdistan (cf. Map 1). Its sepals are spreading but its carpels can be hairy or glabrous. Within its area it is the most common mountain buttercup, growing on rocky slopes (often limestone) between 2400 and 3100 m., and flowering near late snow patches from June to September. Its relationship to the much rarer *R. trichocarpus* Boiss. & Ky. is discussed under that species.

R. trichocarpus Boiss. & Kotschy in Boiss., Fl. Or. i, 47 (1867).
Type: Turkey: in alpinis nive derelictis Armeniae Kurdicae prope Musch (Muş), 2400 m., *Kotschy* 440 (G!; K—poor!).

The type gathering of *R. trichocarpus* (of which there are two good sheets at Geneva) differs from *R. diversifolius* in being a much more slender, flexuous decumbent plant with very small flowers and differently shaped leaves; the lamina is thin and subpinnatisect—i.e. the rachis is produced beyond the first pair of segments, and the ultimate segment is usually trisect; the sepals are apparently reflexed. *R. trichocarpus* var. *hausskknechtii* Bornm. (Bull. Herb. Boiss. Sér. II, iv, 1080: 1904) differs from the type not in its carpels (which can be glabrous or hairy in both taxa), but only in its broader, obtusely toothed leaf-segments; material has been seen from Persia and N. Iraq, but I am not convinced that the sepals are always reflexed. Whether *R. trichocarpus* is really specifically distinct from *R. diversifolius* cannot be decided till the former is better known. The extreme variability of *R. diversifolius* suggets that introgression may have occurred.

Ranunculus poluninii P. H. Davis, **sp. nov.** Pl. 7.

Affinis *R. diversifolio* Boiss. & Kotschy sed caulibus plerumque altioribus, foliis valde glaucis, floribus magis numerosis, sepalis reflexis brevioribus, rostro achenii subrecto breviore recedit.

Herba perennis, elata, eximie glauca. *Rhizoma* horizontale vel obliquum, 5–10 mm. latum. *Collum* vix fibrosum sed adpresse pilosum. *Caules* 50–60 cm. alti, inferne 2–3 mm. lati, striati, parce pilosi vel glabresecentes, remote foliosi, late et laxe paniculati, c. 12–15-flori. *Folia basalia* trisecta, glabra, glauca, crassiuscula, petiolo 3–7 cm. longo basi adpresse piloso, lamina 6–11 cm. lata, ambitu triangulari-orbiculata; segmentum medianum petiolulatum (petiolulo 1–3 cm. longo), obovatum valde obtusum subintegrum, vel obovato-orbiculare trilobum vel tripartitum, in duobus partibus superioribus dentatum (dentibus utrimque 8–12, ovato-triangularibus breviter et obtuse acuminatis), venis parallelo-divergentibus; segmenta lateralia sessilia vel breviter petiolulata, cuneato-obovata, dentata. *Folia caulina* internodiis multo breviora, infima breviter petiolata,

foliis basalibus similia, mediana subsessilia lamina trisecta segmentis cuneatis inciso-dentatis saepe bifidis vel trifidis; superiora reducta, sessilia, tripartita, segmentis lanceolatis subintegris vel lateralibus profunde bifidis, 1–3 cm. longis, vel summa etiam minuta. *Pedunculi* longi, tenues, teretes, adpresse pilosi. *Sepala* reflexa, ovata, extra adpresse pilosa, 4·5–5 mm. longa, late ovata. *Petala* late obovata, 12–13×9–10 mm., obtusissima vel leviter retusa, aurea, sepalis fere triplo longiora; squamae nectariferae late cuneato-oblongae (1·6 mm. longae, 1 mm. latae), apice leviter emarginatae, fere ad medium petalum adnatae. *Antherae* linearioblongae, fere 2 mm. longae. *Torus* ad apicem brevipilosus, in fructu vix elongatus. *Achenia* 15–20, caput globosum formantia, compressa, semiorbiculata, hirta, c. 3·5 mm. longa (rostro excluso), nervo juxta marginem adaxialem vix curvatum utrimque valido percursa, nervo semicirculari juxta marginem abaxialem obtusam remoto percursa (inter nervo et marginem exteriorem nervulosa), abrupte et breviter rostrata; rostrum triangulari-lanceolatum, rectum vel recurvum, utrimque nervosum, apice subuncinatum, 1–1·5 mm. longum.

Prov. Bitlis distr. Kotum: Karz Dağ above Kamer, 2300 m., in limestone ravine, leaves glaucous, sepals reflexed, 24.8.1954, *Davis & O. Polunin* (D. 24596. holo. E; iso. K, BM).

Despite its reflexed sepals and hairy achenes—features shared with *R. trichocarpus*—this handsome new species is more closely related to *R. diversifolius* which it closely resembles in habit and leaf shape and which can have glabrous or hairy achenes. *R. poluninii* differs from *R. diversifolius* in its usually taller stature, very glaucous leaves, more numerous flowers, shorter, strongly reflexed sepals (observed in the field), and shorter nearly straight beak of the achene. From *R. trichocarpus* it can be readily distinguished by its tall erect stems supporting more numerous flowers, larger thicker glaucous leaves with more elongated segments bearing more numerous teeth, larger petals nearly three times as long as the sepals, and achene with a shorter nearly straight beak.

R. poluninii was found only in one ravine on Karz Dağ, and was at once recognised in the field as specifically distinct from *R. diversifolius* which grows on another part of the same mountain. There seems some reason to consider reflexed sepals as a more specialised condition than an adpressed or spreading calyx in *Ranunculus*. It may well be that both *R. poluninii* and *R. trichocarpus* sen. str. (both with reflexed sepals) have been derived from the more widespread *R. diversifolius*, and that *R. crateris* (with reflexed sepals) has been derived from the more widespread *R. fenzlii*. At any rate, the fact remains that this group of Ranunculi has its centre of speciation in Turkish Kurdistan, just as the *R. dissectus* complex is centred in Turkish Armenia.

R. dissectus M.B., Fl. Taur. Cauc. ii, 25 (1808).

In his Flora Orientalis (vol. 1), Boissier recognised as specifically distinct four Turkish species (*R. huetii*, *R. bourgaei*, *R. napellifolius* and *R. sibthorpii*) that are included here in one polymorphic species, *R. dissectus* M.B. described from the Crimea. In their typical form most of these are very distinct, and the same applies to some of the varieties which Boissier placed under *R. huetii* in his Supplement. The difficulty is, however, that no hard and fast line can be drawn between them; specimens showing

intermediate characters are not uncommon, and in several cases there is reason to suspect introgression. These taxa might, indeed, be considered as species that hybridise, but with our knowledge almost confined to a study of herbarium material it seems more convenient to recognise several subspecies within *R. dissectus*—the earliest specific name. With the exception of subsp. *dissectus*, the group is confined to Anatolia and adjacent Transcaucasia. The distribution of the 5 Turkish subspecies is shown on Map 3. Both *R. caucasicus* and *R. fenzlii* are closely allied to *R. dissectus* sensu lato but differ (among other characters) in having larger achenes with a prominent nerve parallel to the adaxial margin.

Key to the subspecies

1a. Flowers large, usually 3–3·5 cm. across. Leaves suborbicular in outline; laciniae oblong-linear (sometimes cuneate oblong) with short lateral teeth, densely adpressed pilose or sometimes glabrescent. Stems erect, sturdy, 10–25 cm., often 1·5 mm. thick. Rootstock thick (c. 1 cm. broad). Achenes very numerous 2. subsp. *napellifolius*

1b. Flowers smaller, 1·5–3 cm. across:

2a. Laciniae oblong or narrowly oblong-cuneate, acute and usually with coarse lateral teeth; leaves and stems usually spreading pilose-villous. Flowers 2–3 cm. across. Lamina suborbicular in outline. Rhizome slender, usually not more than 5 mm. thick. (Crimea) 1. subsp. *dissectus*

2b. Laciniae cuneate-oblong and mostly tridentate at apex, or if lanceolate or linear-lanceolate then entire or with very few lateral teeth; leaves and stems glabrous, subpilose or villosulous:

3a. Laciniae cuneate-oblong, mostly tridentate at apex; leaves usually suborbicular in outline, villosulous like the stems. Flowers 15–20 (often 20) mm. across. Stems sturdy, 1–2-flowered 3. subsp. *huetii*

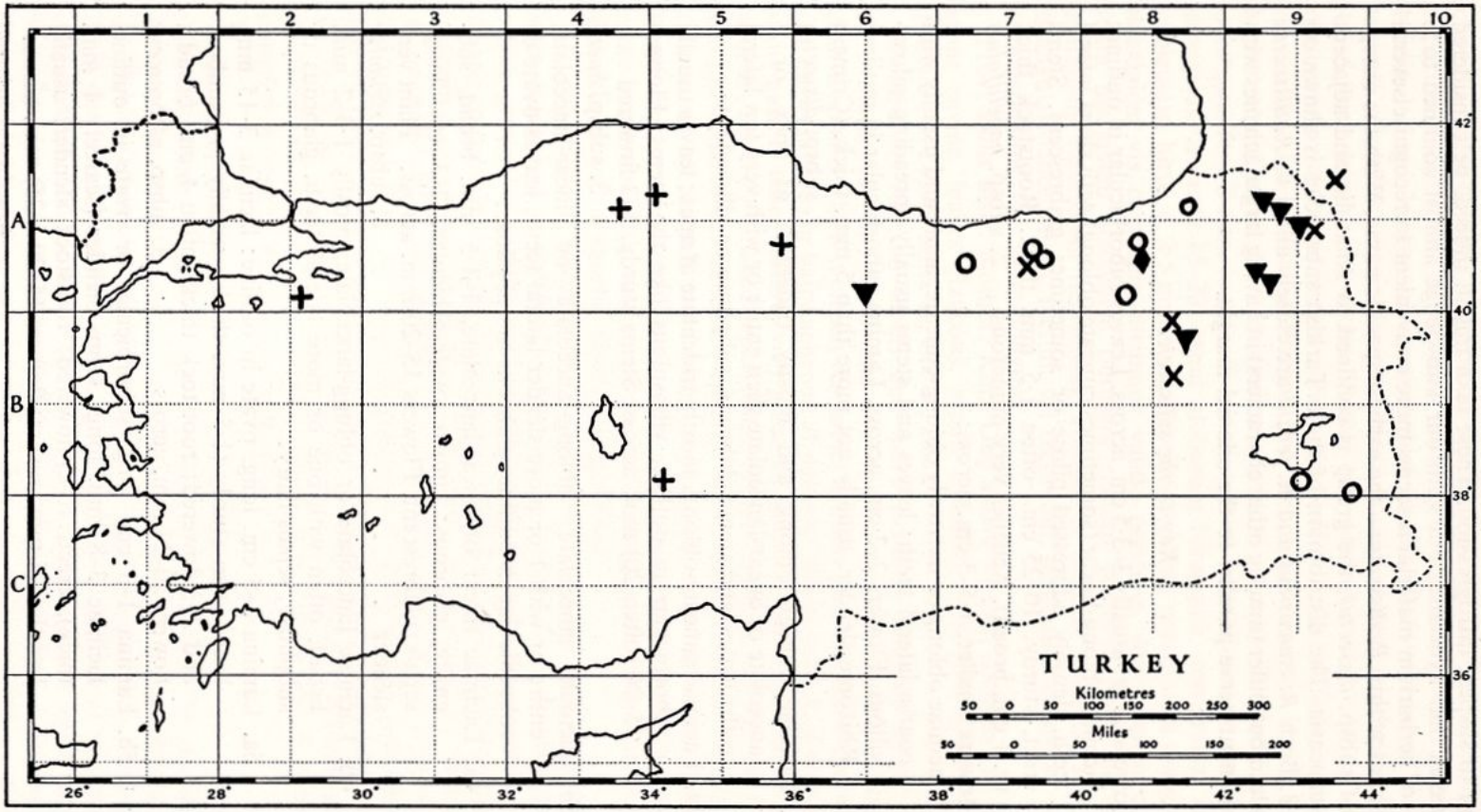
3b. Laciniae lanceolate, oblong-lanceolate or linear-lanceolate, entire or with 1 or more slender lateral teeth; leaves ovate or suborbicular in outline, glabrous or subpilose:

4a. Laciniae linear or linear-lanceolate, 1–1·5 mm. broad, subentire, glabrous; lamina ovate-orbicular, 2–3 cm. long; sepals glabrescent. Flowers 15–20 mm. across. Plant very slender . . . . . 6. subsp. *rigidulus*

4b. Laciniae lanceolate or oblong-lanceolate, mostly 1·5–2 mm. broad, often with one or more lateral teeth, glabrous or subpilose; sepals hairy:

5a. Lamina 3–5 cm. long, ovate in outline; laciniae 3–15 mm. long; stem sturdy (1·5 mm. thick), usually procumbent and 2–3-flowered; rootstock thick (often 1 cm. broad); flowers 20–27 mm. across . 5. subsp. *glabrescens*

5b. Lamina 1–3 cm. long, suborbicular or ovate in outline, laciniae 3–8 mm. long; stems slender (scarcely 1 mm. thick), erect, 1(–2)-flowered; rootstock slender, usually less than 5 mm. across; flowers 15–20 (–25) mm. across 4. subsp. *sibthorpii*



MAP 3. Distribution in Turkey of *R. dissectus* M.B., sensu lato. ▼ subsp. *napellifolius* (DC.) Davis O subsp. *huetii* (Boiss.) Davis + subsp. *sibthorpii* P. H. Davis × subsp. *glabrescens* (Boiss.) Davis ◆ subsp. *rigidulus* (Boiss.) Davis

1. subsp. **dissectus**

Type: Crimea: Ad montis Tschaturdag scrobes, *M. Bieberstein* (LE!).

Crimea: Mountain at Ai-Petri, 20.5.1914, *Levandovsky* (K). Yaila prope Ai-Petri, 25.5 & 7.6., 1900, *K. Golde* (E). Distr. Yalta: Nikitsky yaila, 1350 m., rocky limestone slopes at top of *Pinus sylvestris* forest, 3.6.1959, *Davis* 33370; *ibid.*, 1400 m., top of limestone escarpment, 3.6.1959, *Davis* 33357. Distr. Alushta, N. slope of Roman Kosh, 1200 m., edge of beech woods in semi-shade, 3.6.1959, *Davis* 33401.—Endemic.

2. subsp. **napellifolius** (DC.) P. H. Davis, **comb. et stat. nov.**

Syn.: *R. napellifolius* DC., Syst. Veg. i, 282 (1818).

Type: Turkey: in Cappadocia, *Tournefort* (P, n.v.).

Armenia, *Calvert & Zohrab* (K—glabrescent variant). Armenia, *Aucher* 4002. Armenia, *Calvert & Zohrab* (as *R. dissectus*). Kurdistan, *Brant & Strangways*. Prov. Erzurum: Tech-Dagh supra Erzeroum, 2100–2400 m., a. 1853, *Huet*; Erzerum, *Zohrab* 771. Prov. Sivas (Pontus Galaticus): Yildiss Dagh, 2400 m., *Bornmüller* a. 1890 n. 1662 (as *R. bourgaei*). Prov. Kars: Kisir Dağ, 2800 m., 3.7.1957, *Davis & Hedge* (D. 30544); distr. Ardahan: in summo montis Kabagh-tapa, 17.6.1907, *K. Satunin*; distr. Gülabert, in declivitate aperta montis, 2200 m., 17.5.1914, *Turkevicz* 298 (forma foliis latisectis); distr. Kağizman, prope Karakurt, in silvis *Popula tremula* constans, in declivitate boreale 1800–2100 m., 9.5.1914, *Turkevicz* 188; distr. Kağizman, ad declivitatem orientalem, in fruticetis sparsis, 30.4.1914, *Turkevicz* 81 (forma foliis latisectis).

The specimens at Leningrad collected by Turkevicz have been determined by Grossheim (1947) as *R. merovensis* Grossh.—a taxon, described from N. Persia (Atropatania), that is really synonymous with *R. crymophilus* Boiss. which probably does not occur in Russia. The specimens of Turkevicz often have leaf segments that are not only broader than in typical subsp. *napellifolius* but also glabrescent; however, I see no reason why they should not be referred to this subspecies; N. Busch, in fact, has already identified them as *R. napellifolius*. Plants of this latisect type are more common in Russian Armenia, where intermediates between them and dwarf forms of *R. caucasicus* are not uncommon. Indeed, a gathering of mine from Prov. Kars (Kisir Dağ, 2600 m., D. 30572) may represent a hybrid swarm between *R. dissectus* subsp. *napellifolius* and *R. caucasicus* subsp. *subleiocarpus* (Som. & Lev.) Davis, and was collected at an altitude intermediate between them.

3. subsp. **huetii** (Boiss). P. H. Davis, **comb. et stat. nov.**

Syn.: R. *huetii* Boiss., Diagn. Ser. II (5), 7 (1856)!
R. bourgaei Boiss., Fl. Or. i, 43 (1867), p.p.!
R. dissectus M.B. var. *velutinus* Boiss. in Ann. Sci. Nat. Sér. 2, xvi, 353 (1841)!
R. huetii var. *lazicus* Boiss., Fl. Or. Suppl. 11 (1888)!
R. huetii var. *bourgaei* (Boiss.) Boiss., Fl. Or. Suppl. 11 (1888) p.p.!

Type: Turkey: in Armenia, in pratis ad Tachkopru inter Baibout et Erzeroum, *Huet* (G, n.v.; K!).

Armenia, *Aucher*. Prov. Rize: Djimil Dagh, *Balls* 1922; près de Djimil, 2800 m., 8.1866, *Balansa*; in alpinis ad Tchirantach Ponti Lazici, 2250 m.,

Balansa 28 (type of *R. huetti* var. *lazicus*—G!). Prov. Trabzon: Zigana Dagh, 2000 m., *Balls* 1690a. Prov. Gümüsane: in pascuis alpinis Armeniae prope Gumuchkhane, *Bourgeau* 3, p.p. (type of *R. bourgaei*; G! K!); Kanakbasch in Davros Dagh, *Sintenis* 5795; Kaldirim Dagh, *Sintenis* 6058; Kara Kaya Dagh, Sakarsa, N. of Bayburt, 24.7.1934, *Balls* 1837. Prov. Giresun: Yedigozu Y., Passhöhe zwischen Asarcik und Tamdere, 2120–2200 m., 1.7.1955, *Huber-Morath* 13088. Prov. Van: Artos Dağ above Gevaş, 3450 m., near melting snow, 15.7.1954, *Davis & O. Polunin* (D. 22868); Ispiriz Dağ above Başkale, 3400 m., *Davis & O. Polunin* (D. 23687—forma foliis subpinnatisectis laciniis latis). Prov. Artvin: jugum ad fontes Chatyla et Murgul-su, 2400 m., 16.5.1914, *Turkevicz* (forma laciniis glabrescentibus).

Two taxa treated here as synonymous with subsp. *huetii* require a note. The type gathering of *R. bourgeai* Boiss. is a mixture: the Geneva sheet consists of a tall flowering specimen of *R. caucasicus* subsp. *subleiocarpus* and specimens in flower and fruit of *R. huetii*; Boissier's description appears to cover both plants, so that the name *R. bourgaei* is best cited as a synonym under each of these earlier-described species. The same gathering at Kew is more difficult to determine: it apparently comprises *R. dissectus* subsp. *napellifolius* (*R. napellifolius*), and what may be hybrids between this taxon and subsp. *huetii* or even *R. caucasicus* subsp. *subleiocarpus*. In short, the meagre evidence available suggests some promiscuity between the alpine buttercups near Gümüşane which requires investigation in the field. *R. huetii* var. *lazicus* Boiss. is no more than a robust variant of subsp. *huetii* with rather tall (up to 20 cm.) flexuous stems (very like *Balls* 1837).

Subsp. *huetii* may be considered as occupying a central position in the *R. dissectus* complex, being linked by intermediate specimens to subspp. *sibthorpii*, *glabrescens* and *napellifolius*. Both *R. caucasicus* M. B. and *R. fenzlii* Boiss. are rather closely allied to *R. dissectus* sensu lato.

4. subsp. **sibthorpii** P. H. Davis, **subsp. nov.**

Syn.: *R. dissectus* M.B. var. *glabrescens* Boiss. in Ann. Sci. Nat. Sér. 2, xvi, 353 (1841).

R. ponticus C. Koch in Linnaea, xix, 46 (1847): type destroyed.

R. sibthorpii Boiss., Diagn. Ser. II (1), 7 (1853)! *nom. illegit.*

R. camozzianus Clem., Sert. Olymp. 6, t.1 (1855)!

Type: Turkey: in regione alpino Olympi Bith., Aug. 1850, *Clementi* (holo. K–isosyntype of *R. sibthorpii* Boiss.; isotype of *R. camozzianus* Clem.).

Prov. Bursa (Bithynia): Ulu Dağ (Olympus), 1600–1800 m., bank of stream in meadows and forest below hotel, *H. E. Moore* 7301; *ibid.*, *H. E. Moore* 7318; *ibid.*, 2180–2440 m., *H. E. Moore* 7272; *ibid.*, *Aucher* 43, 31; *ibid.*, *Mitchell*; *ibid.*, Herb. Stuart Mill; *ibid.*, *Pichler*; *ibid.*, *Bornmüller* a. 1899 n. 4022; *ibid.*, 30.6.1944, *M. Başarman*; *ibid*, 2200 m., *Krause*; *ibid.*, 1800–1900 m., 27.6.1954, *Huber-Morath* 12315.

Prov. Kastamonu: Tossia: Giaurdagh, in pratis subalp., 17.5.1892, *Sintenis* 3877 (as *R. huetii & R. bourgaei*); Ilgaz Dağ, 2100 m., earthy scree, 6.6.1954, *Davis & O. Polunin* (D. 21555). Pontus Galaticus: Sana Dagh, in pratis alpinis, 1600 m., 15.5.1890, *Bornmüller* 1835a (as *R. huetii* var. *glabrescens*). Prov. Amasya: in monte Ak-dagh ad nives, 1700 m.,

9.6.1889, *Bornmüller* 30 (as *R. huetii* var. *glabrescens*). Prov. Niğde: Hasan Dağ, above Taşpinar, 2700 m., 16.6.1952, *Davis, Dodds & Çetik* (D. 18953).

R. sibthorpii has hitherto been treated as endemic to Bithynian Olympus, Boissier stressing the circinate beak as a character by which it could be distinguished from *R. huetii*; but this feature also occurs in some otherwise typical gatherings of the latter and cannot be used as a reliable specific character.

As interpreted here, subsp. *sibthorpii* extends as far east as Paphlagonia (with an outlying station on Hasan Dağ in Cappadocia). In the eastern part of its range, however, it tends to have more pinnatisect (ovate) hairier leaves and a more sturdy rhizome than is usual on Olympus, and the laciniae tend to be shorter—varying, in fact, in the direction of the more eastern subsp. *huetii* which differs from it in having cuneate-oblong laciniae that are usually tridentate at the tip.

R. ponticus C. Koch (1847) was based on a Turkish specimen collected by Thirke and provides the earliest name for the plant at specific rank. Boissier changed the name to *R. sibthorpii* because he considered Koch's name inappropriate—the specimen having come from Bithynian Olympus and not the "Pontic Alps". However, we are under no obligation to adopt Koch's epithet at subspecific rank, so that I have retained Boissier's well-known epithet, *sibthorpii*, for the subspecies. As *R. sibthorpii* is an illegitimate name, subsp. *sibthorpii* is published here as a new name in accordance with the note to Art. 72 (International Code of Botanical Nomenclature, Paris, 1955: 1956).

5. subsp. **glabrescens** (Boiss.) P. H. Davis, **comb. et stat. nov.**

Syn.: *R. huetii* Boiss. var. *glabrescens* Boiss., Diagn. Ser. II (5), 8 (1856)!

Type: Turkey: In monte Techdagh et circa Erzeroum, *Calvert* 568 (G!; K!).

Prov. Kars: Kisir Dağ, 3000 m., pasture near snow, 3.7.1957, *Davis & Hedge* (D. 30545). Prov. Artvin: in cacumine montis Arsian, in locis apertis arenosis lapidosis, 20.7.1911, *Vvedensky* (forma foliis villosulis). Prov. Erzerum/Muş: in mont. Bimgoell (Bingöl Dağ), 2400 m., *Kotschy* suppl. 742 (G—fl. 15–18 mm. diam.). Prov. Gümüşane: Kargagoelldagh, *Sintenis* 7118 & 7119 (forma atypica).

On Kisir Dağ this plant grows on the same mountain as *R. dissectus* subsp. *napellifolius* (glabrescent variant), but at a higher altitude. No intermediates were observed in the field. Both Sintenis's gatherings from Karagoelldagh approach subsp. *huetii*. Subsp. *glabrescens* extends into Russian Armenia (distr. Achalzich, *Radde* 177!) where it is represented by the villosulous variant collected by Vvedensky in the province of Artvin.

6. subsp. **rigidulus** (Boiss.) P. H. Davis, **comb. et stat. nov.**

Syn.: *R. huetii* Boiss. var *rigidulus* Boiss., Fl. Or. Suppl. 11 (1888)!

Affinis subsp. *sibthorpii* P. H. Davis sed foliis in lacinias tenuiores magis numerosas multisectis, sepalis glabrescentibus, rostro uncinato differt.

Herba tenuis; rhizoma breve, obliquum, 3–6 mm. latum; collum tenuiter fibrosum. *Folia basalia* glaberrima, multisecta (rigidula?), petiolis longis tenuissimis; lamina ambitu triangulari-orbicularia, trisecta, 2–3·5

cm. longa, segmento mediano petiolato; segmenta in lacinias lineares vel lanceolato-lineares subintegras, 3–10 mm. longas, 1–1·5 (–2) mm. latas, multisecta. *Caules* tenues, erecti, 12–17 cm. alti, glabri, 1–3-flori, superne paucifoliati. *Folia caulina* profunde dissecta, inferiora petiolata multisecta, superiora sessilia in lacinias lineares palmatisecta, summa trisecta vel etiam integra et linearia. *Pedunculi* superne adpresse pilosuli. *Flores* parvi, 15–20 mm. lati. *Sepala* glabrescentia vel interdum sparsim pilosa, ovata, patentia. *Petala* late obovata, sepalis fere duplo longiora, 7–9 mm. longa. *Achenia* (matura?) semiorbicularia, compressa, 2 mm. longa, 1·25 mm. lata, nervo juxta marginem adaxialem utrimque percursa, oblique rostrata; rostrum tenue, 0·75 mm. longum, uncinatum.

Prov. Rize: in regione alpina superiore Ponti Lazici supra Djimil, 2700 m., *Balansa* (holo. G); Rize Kardas, 2300 m., wet ledges of non-lime cliffs in deep shade, 3.7.1933, *Balls* 453.

This distinctive plant is known only from the two Lazistan gatherings cited here. It is most closely allied to subsp. *sibthorpii*, from which it can be distinguished by its very slender numerous leaf laciniae and glabrescent sepals. The plant is of delicate growth and nearly glabrous.

R. crymophilus Boiss. & Hohen. in Boiss., Diagn. Ser. I, viii, 6 (1849).

Syn.: *R. merovensis* Grossh. in Beih. Bot. Centralbl. xliv (2), 212 (1927)! (non sec. Fl. U.R.S.S. vii, 429: 1937).

Type: Persia: Prope moles glaciales in alpibus Hasartschal in parte occid. montis Elbrus, 3000 m., *Kotschy* 496 (G, n.v.; K! BM!).

Prov. Hakkari: Cilo Dağ, 10 km. W. of Cilo Tepe, 3600 m., damp earth near late snow, 9.8.1947, *Davis & O. Polunin* (D. 24197); *ibid.*, earthy scree near snow, D. 24181.

Though described by Boissier as "tandem reflexis", the sepals of this species appear (in herbarium material) to be spreading but deeply concave. Type material of *R. merovensis* Grossh. (treated as a species allied to *R. napellifolius* DC. in Fl. U.R.S.S.) shows this taxon to be synonymous with *R. crymophilus* which varies considerably in indumentum and stature.

Group 3. GRUMOSI

Key to the R. cuneatus—R. oxyspermus complex in Turkey

1a. Sepals spreading:

2a. Achene tuberculate but glabrescent, the curved adaxial margin broadly keeled (winged), the beak recurved and strongly uncinate; basal leaves cordate at base, with segments widely divergent above and crenately lobed . *sprunerianus* (p. 141)

2b. Achene tuberculate and ± hairy, the curved adaxial margin narrowly keeled, the beak straight but divergent, sometimes recurved, never uncinate; basal leaves cuneate or truncate at base, with cuneate segments:

3a. Fleshy roots long and filiform, 3–6 cm. long; collar fibrous; leaves subsericeous with the central segment obtusely 3-7-toothed; achenes usually forming a round head *argyreus* (p. 145)

3b. Fleshy roots linear-oblong, shorter; collar scarcely fibrous; leaves greenish or subsericeous, the central segment usually narrowly cuneate and obtusely trifid; achenes usually forming an ovate head . . . . . *cuneatus* (p. 145)

1b. Sepals reflexed:

4a. Achenes with the adaxial margin nearly straight, produced into a ± straight, erect or divergent beak; disc tuberculate; basal leaves with 9–60 lobules or teeth, the central segment often narrowed into a short stalk-like portion below:

5a. Stems and petioles ± villose; basal leaves (excl. outermost ones) with 15–60 teeth, truncate or subcordate at base *oxyspermus* (p. 141)

5b. Stems and petioles adpressed pilose; basal leaves with 9–18 lobules, cordate at base . . . *rumelicus* (p. 146)

4b. Achenes with the adaxial margin distinctly curved and produced into a recurved beak; disc tuberculate or smooth; basal leaves with 7–11 lobules or teeth, the central segment cuneate from base and bluntly trifid:

6a. Basal leaves cuneate or truncate at base; achenes tuberculate, ± hairy; flowers c. 2·5 cm. across . . *cuneatus* (p. 145)

6b. Basal leaves cordate at base; achenes smooth, glabrous; flowers c. 2 cm. across . . . . *reuterianus* (p. 146)

R. sprunerianus Boiss., Diagn. Ser. I (1), 64 (1842).

Syntypes: In collibus Atticae et in faucibus Hymetti et Pentelici Boetiae prope Oropo, *Spruner*, a. 1842 (G, n.v.); insula Chios et Asia Minori, *Aucher* [42] (G, n.v.; K!).

Prov. Muğla: Yatagan, 100 m., 1.4.1956, *Davis & O. Polunin* (D. 25561). Prov. Mersin d. Gülnar: Bozagaç–Ahirini (between Gülnar & Gilindire), 700 m., 14.4.1956, *Davis & O. Polunin* (D. 26027). In Pisidiae monte Davros Dagh, 2100 m., *Heldreich* a. 1845 (K—as *R. demissus* v. *major*; possibly wrongly labelled?). Lycia, *Forbes*.

Specimens of this species have been seen from Greece, Bulgaria, the Aegean islands (including Samos and Chios) and Syria (Anti-Lebanon). Boissier originally published the specific epithet as "*Sprunnerianus*", being under the impression that the collector's name was "Sprunner"; this is treated here as an orthographic error. The Turkish distribution is shown on Map 4.

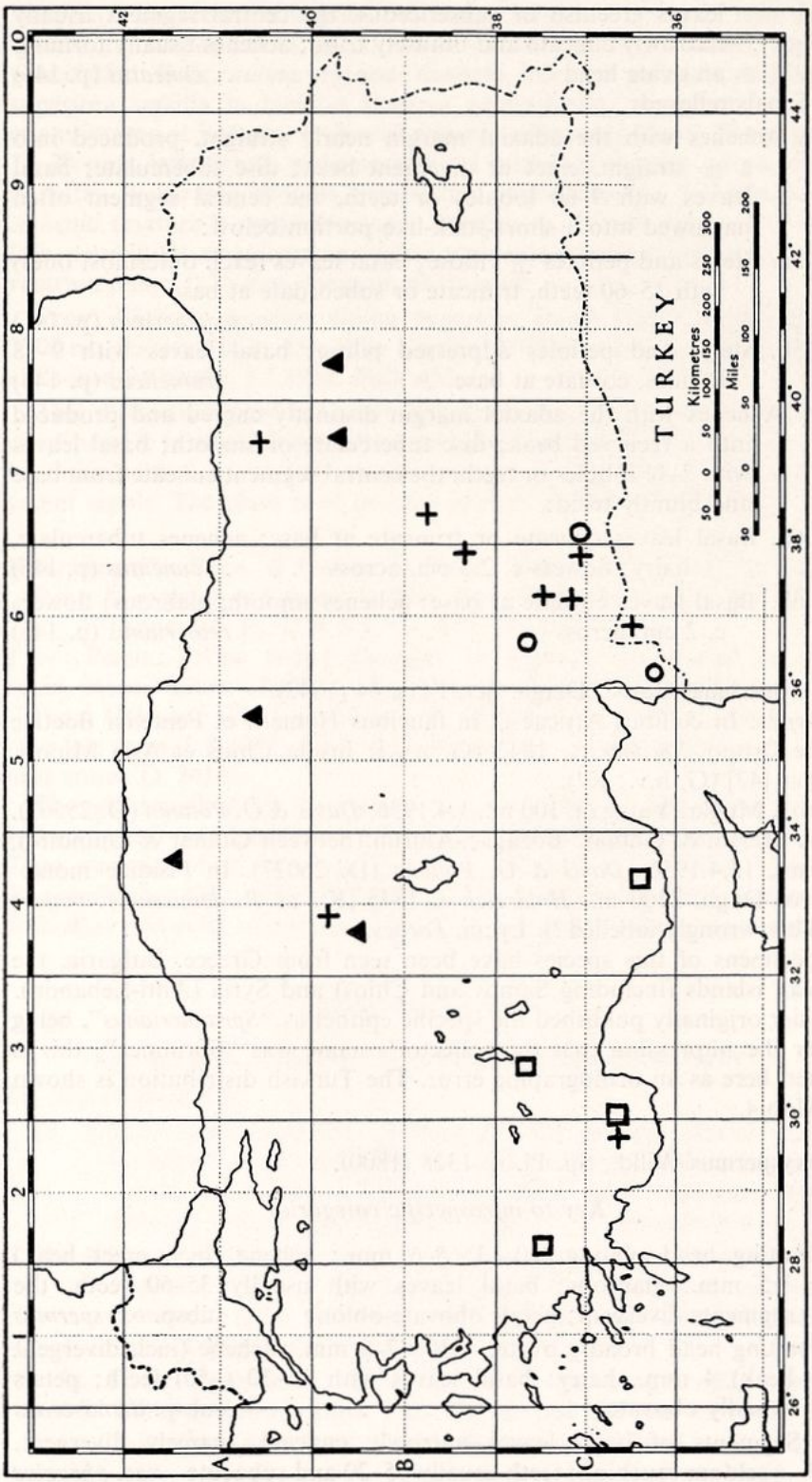
R. oxyspermus Willd., Sp. Pl. ii, 1328 (1800).

Key to infraspecific categories

1. Fruiting head oblong, 10–13 × 5–6 mm.; achene (incl. erect beak) 3·5 mm., glabrous; basal leaves with usually 35–60 teeth, the segments divergent; petals obovate-oblong subsp. *oxyspermus*

1. Fruiting head broadly ovate, 8–10 × 7–8 mm.; achene (incl. divergent beak) 4 mm., hairy; basal leaves with 15–30 (–50) teeth; petals broadly obovate . . . . . subsp. *damascenus*

2. Segments of basal leaves narrowly cuneate, scarcely divergent, seldom touching; teeth usually 15–20 and subacute var. *phrygius*



MAP 4. Distribution in Turkey of species in group *Grumosi*. □ *R. sprunerianus* Boiss. ▲ *R. oxyspermus* Willd. subsp. *oxyspermus* O *R. oxyspermus* subsp. *damascenus* (Boiss. & Gaill.) Davis var. *damascenus* + *R. oxyspermus* subsp. *damascenus* var. *phrygius* (Boiss.) Davis

2. Segments of basal leaves widely divergent, overlapping; teeth more numerous, usually rounded . . . . var. *damascenus*

subsp. **oxyspermus**

Type: "In Sibiria ad fluvium Tereck" (B, n.v.).

Asia Minor, *Aucher* 4009. Prov. Erzincan: Tercan—Aşkale, above Tercan, 1650 m., *Davis* 29361; Altbuschik-Chan, *Sintenis* 2175. Prov. Amasya: Amasia, in cultis lapidosisque reg. inf., *Bornmüller* 33. Prov. Kastamuni: Kastamuni, *Manissadjian* 644 (variant with broad petals). Prov. Ankara d. Hayman: 40 km. südwestlich Ankara, Wegrand 5 km. vor Ilkizce, 1050 m., 11.5.1956, *Huber-Morath* 14286.

The type locality (Terek river) is in the central part of the main Caucasus range, not Siberia.

Distr.: S.E. Europe (Bulgaria, Crimea)! Caucasus! N. Iraq! N. & N.W. Persia! Turkestan!

Habitat: Stony slopes and fields in the Irano-Turanian part of N. Anatolia.

subsp. **damascenus** (Boiss. & Gaill.) P. H. Davis, **stat. nov.**

var. **damascenus.**

Syn.: *R. damascenus* Boiss. & Gaill. in Boiss., Diagn. Ser. II, (6), 5 (1859)!

R. oxyspermus M.B. var. *damascenus* (Boiss. & Gaill.) Post, Fl. Syr. Pal. Sin. ed. 2, i, 11 (1932)!

Type: Syria: in cultis circa Damascum, *Gaillardot* (G, n.v.; K!).

Euphrates, *Chesney* 96. Prov. Urfa: Biredjik, Tat Ain, *Sintenis* 332. Prov. Hatay: Antakya—Yalyladağ, near Şenkoy, 1000 m., *Davis & Hedge* (D. 27169); plaine d'Amuk entre les Mts Amanus et Kurd Dagh, *Haradjian* 904. Prov. Maraş: Koyunoluk Dağ between Maraş and Göksun, 1300 m., *Davis & Hedge* (D. 27586B); *ibid.*, 1200 m., *Davis & Hedge* (D. 27574).

Distr: Syria! Jordan!

var. **phrygius** (Boiss.) P. H. Davis, **comb. et stat. nov.**

Syn.: *R. phrygius* Boiss., Fl. Or. i, 29 (1867)!

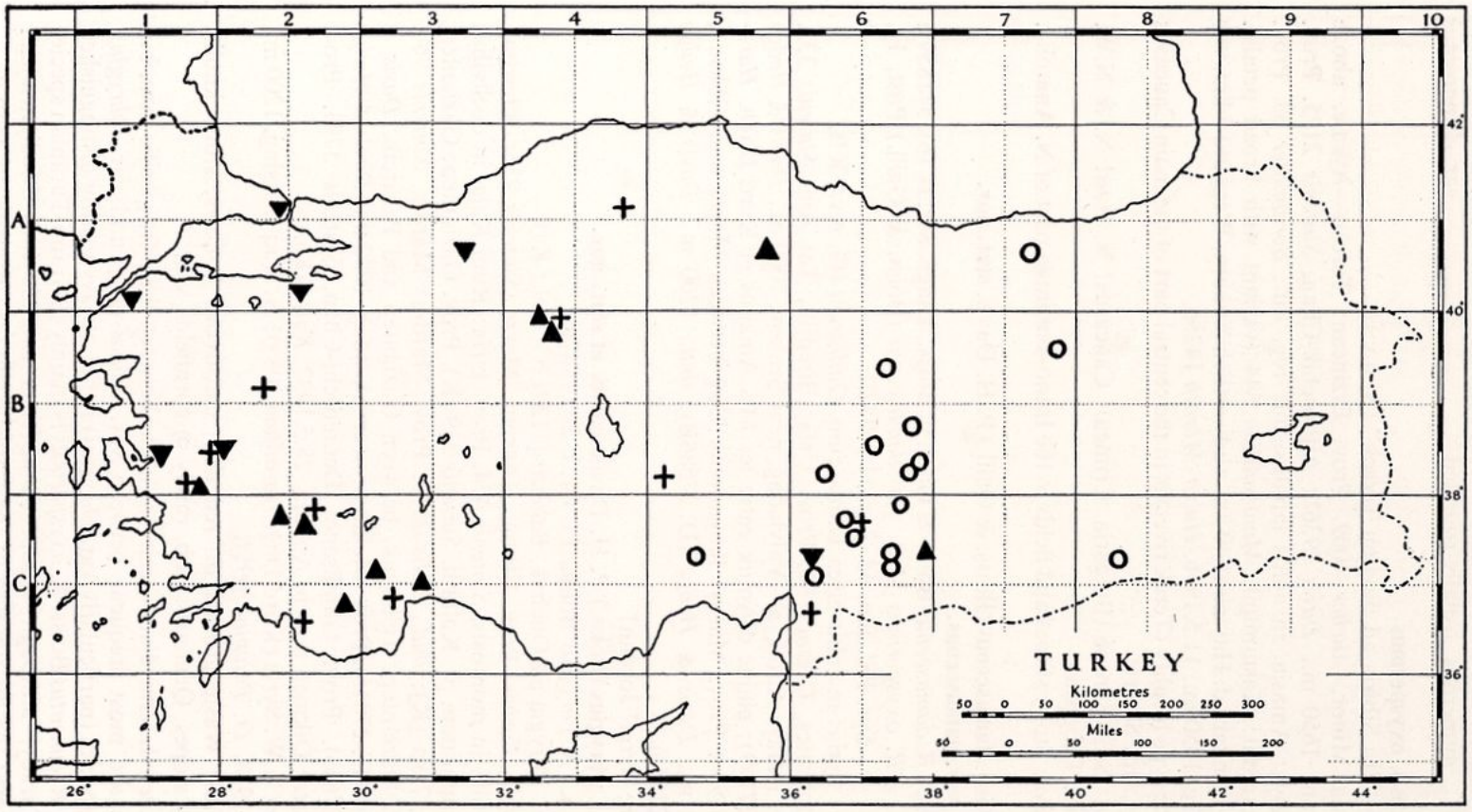
Type: Phrygia ad Ouchak, *Balansa* [1129] (G, n.v.; K!).

Lycia, *Forbes*. Prov. Elaziğ: Kharput, Mezre, *Sintenis* 235; Kharput, Pekenik, in montosis, *Sintenis* 474. Prov. Urfa: Rum Kala, in declivibus ad Euphratem pr. Kalfatli, *Sintenis* 329 (K). Prov. Gaziantep: Gaziantep, *Balls* 769a (K); *ibid.*, *Balls* 2165. Prov. Mardin: Mardin, *Sintenis* 964. Prov. Gaziantep: Telhuyuk, between Gaziantep and Pazarcik, *Davis & Hedge* (D. 27815). Prov. Malatya: near Akcadağ, 1000 m., *Davis & Hedge* (D. 27663). Prov. Gümüşane: Denrenschi-Chan, *Sintenis* 5793. Prov. Ankara: Dikmen tepe b. Ankara, 28.5.1932, *Kotte* (K).

Distr: N.W. Syria (Kurd Dağ, *Haradjian* 1089)! N. Iraq (Sarsing, 1200 m., 20.4.1958, *O. Polunin* 5091)!

Habitat: Waste ground on red clay, calcareous hollows, stony knolls, rocky slopes, Quercus scrub, rarely in cornfields, etc.

Notes: Intermediate specimens occur between the infraspecific taxa, but these are most frequent between var. *damascenus* and var. *phrygius*. The species (particularly var. *phrygius*) is not always readily distinguished from *R. cuneatus* Boiss. *R. oxyspermus* is mainly an Irano-Turanian species in Turkey, although subsp. *damascenus* extends into Mediterranean territory; the distribution of the infraspecific taxa is given on Map 4.



MAP 5. Distribution in Turkey of species in group *Grumosi*. ○ *R. cuneatus* Boiss. ▲ *R. argyreus* Boiss. + *R. reuterianus* Boiss. ▼ *R. rumelicus* Griseb.

R. cuneatus Boiss., Diagn. Ser. I (8), 2 (1849).
Type: Turkey: In Tauro Cilicico, *Kotschy* 9, sub *R. oxyspermo* (G, n.v.; K! BM!).

Cilicia: Gustguta Tal, *Siehe* n. 219 a. 1896; Taurus, c. Fadinas, *Kotschy* 2. Prov. Gümüşane: Wang, in montosis, *Sintenis* 7478; Gumusch-Khane, *Bourgeau* 4. Prov. Malatya: Doğanşehir–Surgu, 1250 m. *Davis & Hedge* (D. 27704B); *ibid.*, *Davis & Hedge* (D. 27703); Doganşehir, 1200 m., *Davis & Hedge* (D.27700). Prov. Malatya d. Besni: Surgu–Perveri, Felsschutt Urgestein 2 km. sudlich Surgu, 1280 m., 26.5.1956, *Huber-Morath* 14280. Prov. Tunceli: Pülümür, 1500 m., *Davis & Hedge* (D. 29271—form with fleshy roots long and slender); above Pülümür, 1850 m., *Davis & Hedge* (D. 29287A); Kharput, Wisachmed Baba, *Sintenis* 236. Prov. Maraş: Koyunoluk Dağ between Maraş & Goksun, 1300 m., *Davis & Hedge* (D. 27586A); Mehmet Bey 10 km. N. of Göksun, 1300 m., *Davis & Hedge* (D. 27599); Ahir Dağ above Maraş, 1500 m., *Davis & Hedge* (D. 27395); Tekne Dağ between Göksun & Malatya, 1500 m., *Davis & Hedge* (D. 27543). Prov. Mardin: Mardin castle, 1200 m., *Davis & Hedge* (D. 28342). Prov. Gaziantep: Gaziantep, 900 m., *Balls* 796 (E); Dülük Baba N. of Gaziantep, 1100 m., *Davis & Hedge* (D. 27867). Prov. Elaziğ: Elaziğ—Kale, 1300 m.; *Davis & Hedge* (D. 28924). Egin: Hoschneden-baschi, *Sintenis* 2222. Anti-Taurus: Kassan Oghlu, *Kotschy* 61. Prov. Seyhan d. Osmaniye: *Cedrus—Abies-cilicica*-Mischwald ob Yarpuz, gegen Yaglipinar, 1500–1680 m., 27.5.1956, *Huber-Morath* 14283. *Distr.*: Syria! Lebanon! N. Iraq (Sarsing, 1200 m., 20.4.1958, *O. Polunin* 5089)!

Habitat: Rocky limestone (terra rossa), chalky and igneous slopes, fallow fields, 1200–1800 m., in Irano-Turanian and sometimes Mediterranean communities. It has not been collected W. of Cilicia (cf. Map 5).
Notes: A very variable species, particularly in indumentum, but with characteristic, narrowly cuneate segments, the median one being shortly trilobed. The sepals (observed in the field) vary from spreading (or even adpressed) to weakly or irregularly reflexed, spreading and reflexed sepals being often found on the same flower. The species has been much confused in herbaria with *R. argyreus* Boiss., *R. reuterianus* Boiss. and *R. oxyspermus* Willd. (particularly with subsp. *damascenus* var. *phrygius*) and it is possible that hybridisation occurs. Material from Amasya, Gaziantep and Ankara is sometimes particularly difficult to place.

R. argyreus Boiss. in Ann. Sci. Nat. Sér II, xvi, 352 (1841).
Type: Mesopotamia, *Aucher* [35] (G, n.v.; K!).

Prov. Ankara: Angora, 1000 m., *Balls* 205; Angora, in valle Kavaklidere, 900 m., *Bornmüller*, 13678; Ankara, Weg nach Dikmen, 6.5.1932, *Kotte*; Dikmen bei Ankara, 19.4.1942, *J. Romieux* 5938; Tschankaya, 1931, *R. Görz* 38. Prov. Denizli: Cadmus, Konas Dağ, Westhang, Felsen, 1500 m., 3.5.1938, *Huber-Morath* 5382: Baba Dağ (above Denizli), 2100 m., 19.6.1938, *Davis* 234. Prov. Aydin: in summis Mesogis supra Tralles, a. 1842, *Boissier*. Prov. Antalya: Kurkuteli, 1100 m., *Tengwall* 379 (as *R. reuterianus*): in arvis incultis ad Tcharyklar secus Adalia, *Bourgeau* 4; in glareosis montis Elmalu, *Bourgeau* 5. Prov. Amasya: Amasya, in vinetis 15.4.1889, *Bornmüller* 32 (roots unusually short). Caria, *Pinard*: Amasya,

Manissadjian 247. Prov. Urfa: Euphrat–Urfur, bei Kalfatli, *Sintenis* 329b. p.p.

This species has quite often been confused with *R. cuneatus* (cf. key) and even *R. reuterianus*. Although found mainly in West and Central Anatolia (cf. Map 5), it extends into Mesopotamia. A gathering from Northern Iraq (Rowanduz gorge, 750 m., *Guest* 2046, in flower) apparently belongs to this species.

R. reuterianus Boiss., Diagn. Ser. I (1), 65 (1842).
Syntypes: Turkey: in regione alpina, Mesogis supra Tralles, *Boissier* (G, n.v.; K! E! BM!); Cadmus supra Aphrodisiam in Caria, 6.1842, *Boissier* (G, n.v.).

Prov. Kutahya (Phrygia): Demirci–Simav, *Pinus pallasiana* forest, 13 km. nordlich ob Demirci, 1340–1390 m., *Huber-Morath* 12314. Lydia: Çiplak Dağ ob Armudlu, 880 m., *Huber-Morath* 2212; Tmolus östlich ob Boz Dağ köy, 1520–1600 m., *Huber-Morath* 2213. Prov. Çankiri d. Ilgaz: Yaylacik, 1000 m., in *Pinus nigra* forest, 5.6.1954, *Davis & O. Polunin* (D. 21537). Prov. Ankara: Ankara, Çubukdere, 10.5.1935, *Krause* 4737; Ankara, 15.4.1936, *Gassner* 214; Ankara, Weg nach Kalaba, 4.5.1932, *Kotte*. Prov. Antalya (Lycia): Mons Solyma, a. 1845, *Heldreich*; Lycia: Cragus Mts and Katara Pass, *Forbes* 21. Prov. Niğde: Hasan Dağ, near Taşpinar Y., 2000 m., *Davis, Dodds & Çetik* (D. 18988: luxuriant form). Montagnes d'Amanus et de Sir, près Marash, Mai 1899, *Haradjian* (a robust variant with latisect leaves, the segments being broadly triangular and ± overlapping: var. *haradjianii* Rech. fil. in Arkiv för Botanik, Ser. II, v (1), 142: 1959).

A specimen from the Lycian Taurus (Gombe–Kaş, *H. & E. Walter* 13998) may also belong to this species. The distribution is given on Map 5.

R. rumelicus Griseb., Spic. Rum. i, 305 (1843-4).
Syntypes: Greece: in Macedonia et Thracia: prov. Salonichi, *Friedrichsthal*; prov. Carlova, *Frivaldsky* (?; BM!).

Prov. Istanbul: Chichli, 23.4.1900, *Aznavour*; Constantinople, *Noë* a. 1846. Byzantium: Kiaat Hane, *Parquet & Coumay*. Prov. Bursa: Ulu Dağ, 17.5.1944, *M. Başarman*; *ibid.*, 19.5.1944 (*M. Başarman*?). Asagi bey Kozak, 24.4.1950, *A. Heilbronn*. Prov. Bolu: Bolu Kaplica guncy tepeleri, 24.4.1947, *Hielbronn & Başarman*. Prov. Çannakale: Renkoei, in valle Dumbrek, *Sintenis* 88. Prov. Izmir: Smyrne, *Balansa* 124 (as *R. sprunerianus*). Prov. Odemiş: Bozdağ, 6.1946, *M. Başarman*; Bozdagh-köy, 23.5.1935, *E. Wall*. Prov. Adana d. Bahce (N. Amanus): Dumanli Dağ above Haruniye, 1100 m., 19.4.1957, *Davis & O. Polunin* (D. 26981: in fl.).

Except for one record from Amanus, the Balkan *R. rumelicus* is confined in Turkey to the W. and N.W. parts of the country (Map 5). Its occurrence in the Amanus needs confirmation: only one plant was in bloom at the time it was collected, but this certainly looks typical for the species.

Specimens of this species from the islands of Samos and Ikaria (known to me only from flowering material) approach *R. reuterianus* Boiss.

R. illyricus L., Sp. Pl. i, 552 (1753).
subsp. **illyricus**

Syn.: *R. meridionalis* Grossheim in Bot. Journ. U.S.S.R. xxxiii, 311 (1945).

R. scythicus Klokov in schedis (1947); Grossheim, l.c.—*nom. nud.*

Linnean specimens: In Oelandia, Hungaria, Narbona, Italia (Herb. Linn.!).

Widespread in Anatolia, though chiefly in the Irano-Turanian territory. The subspecies extends from Sweden to the Balkans, Turkey, S.W. Russia and N. Persia. *R. meridionalis* was described by Grossheim and said to replace *R. illyricus* throughout much of the southern part of its range (including Turkey); it is meant to differ in its narrow and more sericeous leaf segments and smaller flowers. These characters are poorly correlated, however, and it is often possible to match plants from Turkey with those from Sweden. *R. meridionalis* is therefore included in *R. illyricus* subsp. *illyricus* here.

subsp. **tenorii** (Jordan) P. H. Davis, **comb. et stat. nov.**

Syn.: *R. tenorii* Jordan, Diagn. d'esp. nuov. i, 62 (1864); Grossheim in Bot. Journ. U.S.S.R. xxxiii, 308 (1945).

Type: Italy: in regno neapolitano, Monte Vergine, *Gussone* (n.v.).

Lycia, *Forbes* (K).

Forbes' specimen from S.W. Anatolia is clearly distinguished from *R. illyricus* subsp. *illyricus* by its pinnatisect leaves with relatively short, lanceolate segments. It is equated here with *R. tenorii* Jord. from the west side of Southern Italy (Naples to Calabria) and subspecific rank assigned to it. *R. dalmaticus* Grossh., from both sides of the Adriatic, would appear to be a parallel subspecies.

R. paludosus Poiret, Voyage en Barbarie, ii, 184 (1789).

Syn.: *R. chaerophyllus* auct. non L., Sp. Pl. i, 554 (1753).

R. flabellatus Desf., Fl. Atl. i, 438, t. 114 (1798).

R. heldreichianus Jordan, Obs. vi, 14 (1847).

Type: Barbarie (Algeria), dans les lieux humides, *Poiret* (P, n.v.).

Occurring locally in the Mediterranean territory of W. and S. Turkey, usually not far from the sea. I have not seen type material of *R. heldreichianus* Jordan (described from material originating in Argos, Greece), a plant which was originally differentiated from *R. sprunerianus* Boiss., and which has been retained as a species in Greek Floras. I am in no doubt, however, after studying Jordan's original description and specimens labelled as *R. heldreichianus* in Boissier's herbarium, that this plant is no more than a variant of the polymorphic *R. paludosus* and does not deserve taxonomic recognition. In this species the basal leaves are very variable in form, but the swollen base of the stem, clad in almost reticulate fibres, is unique among Mediterranean buttercups. Attic specimens labelled as *R. heldreichianus* in the British Museum are depauperate plants of *R. sprunerianus*.

R. gracilis Clarke, Travels, ii (2), 336 (1814).

Syn.: *R. peloponnesiacus* Boiss., Diagn. Ser. I (1), 63 (1842).

R. granulatus Griseb., Spic. i, 306 (1843)!

Type: Dodecanese: Cos, *Clarke* (BM? n.v.).

Prov. Istanbul: Byzantium Hunkar iskelesi, *Parquet* a. 1864 (BM). Bithynia, *Grisebach* (type of *R. granulatus*!) Prov. Bursa: Olympus, *Forbes*;

Ulu Dağ, *M. Başarman*, 19.5.1944. Prov. Bolu: Weide, *Pinetum silvestris* am Aband-See, 14.5.1955, *H. & E. Walter* 4695; Abandgölu, a. 1947, *Heilbronn & Başarman*. Prov. Çannakale: Renkoei, Dardanelles, April 1856 (leg.?). Phrygia: Yachamichlar-keui, à 2 heures au nord d'Ouchak, 4.6.1857, *Balansa* (G).

Most of the Turkish material belongs to the variant originally described as *R. granulatus* Griseb. which differs from the typical form of *R. gracilis* (fig. in Kew Bull. 1954, 92: 1954) in having all, or nearly all, of its basal leaves dissected into narrower, oblong-linear lobes. It is, however, poorly differentiated, and intermediate plants occur within a single population (cf. Parquet's gathering and material from Greece).

R. pedatus Waldst. & Kit., Pl. Rar. Hung. ii, 112, t. 108 (1805).

subsp. **pedatus**

Type: Hungary: in clivis & collibus herbidis macris Budae . . . (BP, n.v.).

Prov. Ankara: Elma Dağ, 10.5.1936, *Gassner* 332 (ANK).

subsp. **trojanus** P. H. Davis, **subsp. nov.**

A typo foliis basalibus in lacinias breviores lanceolatas magis numerosas multisectis, floribus et acheniis paulo majoribus recedit.

Planta 13–30 cm. alta. *Radices* crassi oblongi vel oblongo-cylindrici. *Folia basalia* (extimis exclusis) ambitu rotundata, glabra, longe petiolata, pedatim palmatisecta, 2·5–5 cm. diam., segmentis primariis tri- vel multisectis; laciniae laminae 15–30, lanceolatae, 4–13 mm. longae, integrae vel paucidentatae; folia extima minora, profunde trifida, segmento mediano profunde et obtuse tridentato, segmentis lateralibus in segmenta paucidentata bilobis. *Caules* 1–5-flori. *Flores* 20–30 mm. diam. *Achenia* 3–3·5 mm. longa, in rostrum 1 mm. longum paulo curvatum subuncinatum angustata.

Prov. Çannakale: Renkoei, in rupibus Montis Menderes Tepe 30.4.1883, *Sintenis* 85 (holo. K; iso. E).

Whereas subsp. *pedatus* is largely confined to the steppe regions of Hungary, Roumania, Russia and Turkey (being very rare in the latter), subsp. *trojanus* is only known from the Troad where it grows within the Mediterranean province. In the form of its outermost basal leaves, subsp. *trojanus* approaches *R. thasius* Hal., endemic to the island of Thasos in the N. Aegaean.

The following table gives the main differences between the two taxa. Russian material of subsp. *pedatus* usually has less dissected leaves than Hungarian specimens.

	subsp. *pedatus*	subsp. *trojanus*
Number of laciniae of basal leaves	3–9 (13)	15–30
Length of laciniae . . .	5–45 mm.	4–13 mm.
Diam. of flower . . .	14–22 mm.	20–30 mm.
Diam. of achene (excl. beak) .	2–3 mm.	3–3·5 mm.

R. cadmicus Boiss., Diagn. Ser. I (1), 64 (1842)

Syntypes: Turkey (Prov. Denizli: Caria): ad nivem deliquescentem in regione superiore Cadmi supra Aphrodisiam et supra Colossam, 6.1842, *Boissier* (G, n.v.; K! BM!).

Prov. Denizli: Cadmus, Konas Dağ, Westhang, Alptrift, Felsen, 1700 m., 3.6.1936, *Huber-Morath* 5040; *ibid.*, 2000 m., 3.6.1938, *Huber-Morath* 5381. Prov. Eskişehir d. Sivrihisar (Phrygia): Kalkschutt des Gökbel

westlich von Norto, *J. Romieux* (Herb. *Huber-Morath* 5865). Prov. Izmir: Nymph Dagh, E. of Smyrna, 1.5.1877, *G. Maw*. Prov. Isparta: Davras Dağı, 2000 m., *A. & T. Baytop* 4290. Antitaurus Cappadoc., Masmutli dağ, 2500 m., *Siehe* 172.

Gatherings kindly sent on loan by Dr. Huber-Morath show that even in Turkey this species can have trisect leaves with deeply dissected segments (with linear-oblong laciniae) as it always has in Cyprus. In their shorter cataphylls and smaller achenes, however, these plants agree with the other Turkish gatherings (in which the leaves are deeply tripartite with trilobed segments) and not with Cyprus material. The Cyprus plant has been distinguished as subsp. *cyprius* (Boiss.) Vierh. (Oest. Bot. Zeit. lxxxiv, 130: 1935), but until the species is better known in Turkey it seems unwise to recognise subspecific categories; other local races occur in the Dodecanese, Crete and Greece. *R. subhomophyllus* (Hal.) Vierh. must surely be included in *R. cadmicus*, a polymorphic species which is evidently in the process of geographical differentiation.

R. froedinii Rech. fil. in Symbol. Bot. Upsal. xi (5), 7, f.1 (1952).

This taxon, described from Turkish Kurdistan, was not related by Rechinger to any other species. The type sheet (sent on loan from Uppsala) shows that it is extremely closely allied to *R. myosuroides* Boiss. & Kotschy which grows in the same area (D. 24487a). Whether it is really specifically distinct remains to be seen. The differences between the two species (*R. froedinii* only known from flowering material) are tabulated below, and are mainly dimensional.

R. myosuroides	*R. froedinii*
Leaf segments linear or linear-oblong, 1–3 mm. broad.	Leaf segments oblong, 3–8 mm. broad.
Petals oblong, 5–7 mm. long.	Petals obovate, 8–12 mm. long.
Anthers 1–1·5 mm., shorter than filaments.	Anthers 3 mm. long, as long as or longer than filaments.
Fleshy roots 5–12 mm. long.	Fleshy roots 8–20 mm. long.

R. orientalis L., Sp. Pl. i, 555 (1753), non auct.

subsp. **orientalis**

Syn.: *R. millefolius* Banks & Sol. in Russ. Aleppo ed. 2, ii, 254 (1794)!

R. myriophyllus DC., Syst. Veg. i, 257 (1817).

Xiphocoma orientalis (L.) Stev. in Bull. Soc. Nat. Mosc. xxv (1), 538 (1852)!—*quoad typ., haud descr.*

"*R. myriophyllus* Russ." in Boiss., Fl. Or. i, 36 (1867).

R. malabailae Boiss., Fl. Or. i, 37 (1867)!

Holotype: In Oriente (Herb. Linn.!).

This well-known plant, which is common in southern Turkey from Cilicia to Mardin, has usually passed under the name of *R. myriophyllus*. There is no doubt, however, that this name (and its earlier synonym *R. millefolius* Banks & Sol.) must be replaced by *R. orientalis*, a name which has been wrongly applied by later botanists (cf. *R. isthmicus* Boiss. sen. lato). When Linnaeus described this species he gave no synonymy, and there is no reason why the specimen in the Linnaean herbarium, bearing

this name in Linnaeus's hand-writing, should not be accepted as the holotype. It is true that the phrase name describes the sepals as reflexed (whereas they are spreading in our plant), but when the Linnaean specimen was examined this feature was found to be caused by an accident of pressing.

It is a rather variable species, and I would assign all the Turkish material to subsp. *orientalis*. *R. malabailae* Boiss. is no more than a latisect variant; the type sheet from Misis in Cilicia, and my own gathering from the same place (D. 26076), show a complete transition from triangular-cuneate trifid segments to the typical leaf form of *R. orientalis*. The leaf character is not correlated with any difference in fruit shape as claimed by Boissier.

subsp. **hierosolymitanus** (Boiss.) P. H. Davis, **stat. nov.**

Syn.: *R. hierosolymitanus* Boiss., Fl. Or. i, 36 (1867)!

R. myriophyllus Russ. (sic) var. *hierosolymitanus* Post, Fl. Syr. Pal. Sin. 40 (1896)!

Syntypes: In collibus Palaestinae in monte Oliveto, *Boissier* (G; K!); circa Tripoli Syriae, *Blanche* (G, n.v.); in Libano supra Beyrout, *Gaillardot* (G, n.v.).

This replaces subsp. *orientalis* in Lebanon and Palestine, and differs in usually having a short beak to the achene and in often having its peduncles swollen in fruit. These characters are not always correlated, however, so that there seems no justification for assigning more than subspecific rank. Specimens from Jordan usually have hairy fruits (not to be confused with *R. myriophyllus* DC. var. *edumeus* Zohary which is synonymous with *R. macrorhynchus* Boiss. subsp. *trigonocarpus* (Boiss.) Davis).

The shape of the nectary scale is quite different in *R. orientalis* L. to what it is in *R. isthmicus* Boiss. In the former the scale is a free cuneate flap as long as broad, whereas in *R. isthmicus* it forms a narrowly oblong pocket, being adnate to the petal for about $\frac{4}{5}$ of its length.

R. isthmicus Boiss., Diagn. Ser. I (6), 4 (1845).

Unfortunately the name *R. isthmicus* Boiss. must be adopted for the polymorphic species to which the name *R. orientalis* L. (syn. *R. millefolius* Banks & Sol., *R. myriophyllus* DC.) has been erroneously applied up till now (see p. 149).

Key to the subspecies

1a. Beak of achene lanceolate, c. 1·5× achene (incl. basal appendage); basal leaves 2–3-pinnatisect:

2a. Leaves 2–3-pinnatisect; laciniae oblong-linear, 1–2 mm. broad, densely canescent or subsericeous; stems usually 6-many-flowered, 10–25 cm. tall . . . . 2. subsp. *stepporum*

2b. Leaves always 3(–4)-pinnatisect; segments narrowly linear, 0·3–1 mm. broad, adpressed pilose, green, usually more numerous; stems 1–7-flowered, 7–12 cm. tall . 3. subsp. *tenuifolius*

1b. Beak of achene triangular-lanceolate or narrowly triangular, as long as the achene; basal leaves variable, 2–3-pinnatisect or the outer ones trisect or tripartite. Stems usually 1–3-flowered, simple or widely dichotomous, 4–10 cm. tall . 1. subsp. *isthmicus*

1. subsp. **isthmicus**

Syn.: *R. orientalis* L. var. *heterophylla* Boiss., Diagn. Ser. I (8), 2 (1849)! *Xiphocoma heterophylla* (Boiss.) Stev. in Bull. Soc. Nat. Mosc. xxv (1), 539, t. vii f. 2 (1852)! *R. marchesinii* Lojac. in Giorn. Com. agr. Pal. N.S. xviii, 79 (1886)!

Type: Greece: in declivibus Isthmi Corinthiaci paulo supra Calamathi ad Corinthum eundo, a. 1842, *Boissier* (G, n.v.; K!).

GREECE. Isthmus of Corinth, 60 m., dry hills under pines, *Atchley* 1186. In Isthmo Corintho, *Orphanides* 230. Isthmus of Corinth near Kalamaki (*Herb. J. Stuart Mill*). Attica: Hagios Andreas (near Marathon); pr. Marathon (St. André), *F. Guiol* 1437 (BM).

SICILY. In collibus arenosis siccis reg. inf. Caltanisetta, *Ross* 101.

TURKEY. Prov. Antalya (Pamphylia): in maritimis Adaliae Asiae minoris, *Heldreich* (type of *Xiphocoma heterophylla*); Manavgat—Kara point, white fore-dunes and sandy shore, in unfixed sand, 10.4.1956, *Davis & O. Polunin* (D. 25827); E. of Antalya, 40 m., *Tengwall* 106.

This is a predominantly littoral race. No trisect basal leaves have been seen in Greek material, but these occur in some Sicilian specimens, and are characteristic (though not constant) in S.W. Turkey. The plant was very distinctive on the sandy Pamphylian shore between Manavgat and Kara point, and has retained its characteristics in cultivation. The gatherings of Heldreich and Tengwall, however, suggest that it may interbreed with subsp. *stepporum* which grows further inland in Pamphylia.

2. subsp. **stepporum** P. H. Davis, **subsp. nov.**

Syn.: *R. orientalis* sec. Boiss., Fl. Or. i, 27: 1867 et auct., non L., Sp. Pl. i, 555 (1753)! *Icon*: Deless. Ic. i, t. 32 (1820).

Caules 10–25 cm. alti, 6-multi-flori. *Folia* basalia 2–3-pinnatisecta, segmentis oblongo-linearibus 1–2 mm. latis, dense canescentibus vel subsericeis. *Rostrum* lanceolatum, achenio c. 1·5–plo longum.

Type: Turkey: Prov. Maraş: Göksun—Kaleköy, 1300 m., eroded shaley banks, 4.5.1957, *Davis & Hedge* (D. 27569: holo. E!).

Prov. Izmir?: Bozdağ—Gölcük yolu, 1946, *M. Başarman*. Prov. Muğla: Yatağan—Çine, 100 m., *Davis & Hedge* (D. 25554). Prov. Antalya: Kümköy, between Antalya & Serik, 20 m., *Davis & Hedge* (D. 25736): Finiki–Elmali, *Gassner* 100; Antalya, *Heldreich* a. 1845 p.p.; Antalya, sea shore, *Forbes*. Prov. Çannakale: Renkioi, Dardanelles, March 1856 (*leg.*?). Prov. Kutahya: Uşak, *Kotte*: Ouchak, 910 m., *Balansa* 1128; Uşak, 17.5.1933, *Kotte*. Prov. Eskişehir (Phrygia) distr. Sivrihisar: Tal südöstlich von Memik, 22.4.1941, *J. Romieux* 5866; Aufstieg zum Pass an der Strasse zwischen Sivrihisar und Dinek, 12.5.1941, *Romieux* 5867. Prov. Ankara: Angora, *Aucher* 4007; between Angora and Kirşehir, Kirprukei, 800 m., *Balls* 230; Ankara–Koçhisar yolu, 137 km., 25.4.1953, *Birand* 1387. Prov. Amasya: Meziran, *Manissadjian* 247; Amasya, *Manissadjian* 252; Amasia, 3–600 m., *Bornmüller* 23, a. 1889. Prov. Kayseri: Kayseri, Tuzhisar, 7.5.1951, *A Heilbronn*; Kayseri, Hisarcik, *Krause* 5155; Bakir Dağ nr. Akoluk Yayla above Kisge, 1800 m., *Davis & Dodds* (D. 19371). Prov. Niğde/Kayseri: nr. Nevşehir, 1200–1300 m., *Davis & Dodds* (D. 19131). Prov. Elaziğ: Kharput, Witechmedbaba, *Sintenis* 234; Kharput

between Mezre and Miadun, *Sintenis* 233; Elaziğ—Kale (on Euphrates), 22 miles from Elaziğ, 1150 m., *Davis & Hedge* (D. 28901). Prov. Malatya: Doğanşehir—Sürgü, 1250 m., *Davis & Hedge* (D. 27712); Viranşehir to Sürgü–Maltya, 1540–1800 m., *Balls* 2306. Prov. Maraş: near Akpinar S. of Elbistan, 1400 m., *Davis & Hedge* (D. 27644). Armenia: Arabkir, Denislu baschi, *Sintenis* 195.

Subsp. *stepporum* is centred in the Irano-Turanian steppes of Anatolia, penetrating into Mediterranean territory in the West. It grows in a wide range of dry habitats: steep eroded igneous slopes, rocky limestone slopes, maquis near coast on sandy soil, granite hills in *Quercus coccifera* scrub, eroded shaley hillsides, etc., and extends into N.W. Persia (!).

A specimen has been seen from Greek Thrace (Kouyounkeuy, *Tedd* 175) that might be referred to subsp. *stepporum*, although the beak is exceptionally broad.

3. subsp. **tenuifolius** (Stev.) P. H. Davis, **comb. nov.**

Syn.: *Xiphocoma tenuifolia* Stev. in Bull. Soc. Nat. Mosc. xxv (1), 540, t. vii f. 4 (1852)!, non *R. tenuifolius* Schleicher, Cat. Pl. Helv. ed. 4, 28 (1821), *nom. nudum.*

Ranunculus orientalis L. var. *tenuifolius* (Stev.) Boiss., Fl. Or. i, 27 (1867)!

R. orientalis L. subsp. *tenuifolius* (Stev.) O. Schwarz in Fedde, Rep. xxxvi, 82 (1934)!

Type: Turkey (Lydia): In pascuis circa Smyrna, *Fleischer* (H, n.v.; K! E!).

Smyrne, *Balansa*. Pr. Smyrnam a. 1883, *Pichler*. Prov. Izmir: Torbali—Ephesus, 50 m., in degraded *Paliurus aculeatus—Asphodelus fistulosus* scrub, sepals reflexed, fls. yellow, 22.3.1957, *Davis & O. Polunin* (D. 25153, BM).

Subsp. *tenuifolius* replaces subsp. *stepporum* in the Mediterranean coastal districts of Western Anatolia (Lydia), but is not always sharply delimited from it. I collected it on limestone hills on *terra rossa* soil.

Ranunculus unguis-cati P. H. Davis, **sp. nov.** (Pl. 10)

Affinis *R. isthmico* Boiss., sen. lat. (*R. orientali* auct. non L.) sed lamina omnium foliorum basalium trisecta subglabra, pedunculo patentim subvilloso, acheniis exappendiculatis piliferis rostro tenuiore inter alia differt.

Herba perennis, humilis, collo efibroso glabro vaginato. *Radices* crassae lineari-oblongae 1–2 cm. longae, 2 mm. latae; radices fibrosae filiformes simplices. *Folia basalia* longipetiolata, patentia, omnia trisecta; petiolus 1·5–3 cm. longus, glaber vel sparsim longipilosus, basi in vaginam albidam ovato-oblongam nervosam dilatatus; lamina trisecta subglabra, ambitu triangulari-orbicularis, 1–2·5 cm. longa; segmentum terminale breviter petiolulatum anguste cuneatum trifidum; segmenta lateralia saepe profunde bifida lobis obtuse bilobulata vel lobo infimo integra lineari-oblonga; folia extima ad vaginas latas eburneas reducta. *Caules* erecti, 1–3-flori, 2–6 cm. alti, sparsim foliosi, superne in pedunculo patentim subvilloso abeuntes. *Folia caulina* 1–3, glabra, inferiora breviter petiolata in lacinias lineares obtusas vel breviter bifidas trisecta, superiora sessilia laciniis integris 2–3 reducta. *Sepala* forte reflexa, ad pedunculum adpressa, anguste oblonga, extra sparsim at patentim pilosa. *Petala* 5, oblonga,

9–10×3–3·5 mm., verosimiliter aurea; squamae nectariferae cuneato-oblongae (1·8 mm. longae, 1·1 mm. latae), apice eroso-truncatae, ad ¾ petalum adnatae. *Torus* glaber in fructu vix elongatus. *Antherae* 2 mm. longae, oblongo-lineares. *Carpella* (juniora) c. 30, pilosa in rostrum tenue circinnato-falcatum paulo brevius sensim attenuata. *Achenia* late ovato-orbicularia, 2·5 mm. longa, compressa, disco acute tuberculato sparsim piloso, margine adaxiale acuta, margine abaxiale obtusa, basi exappendiculata, apice in rostrum angustissimum ensiforme semicirculariter falcatum apice subuncinatum achenio 2½-plo longius ± abrupte angustata, omnia in caput horridum c. 13 mm. latum congesta.

Prov. Maraş: Akher Dağ (above Maraş), 1540 m., 1.5.1934, *Balls & Gourlay* (*Balls* 933: holo. K; iso. E).

Despite the lack of a basal appendage to the achene, *R. unguis-cati* is evidently more closely allied to *R. isthmicus* Boiss. (which it resembles in its strongly reflexed sepals and narrow petals with the same type of nectary scale) than it is to *R. macrorhynchus* Boiss. In habit and leaf shape the new species comes nearest to the coastal *R. isthmicus* subsp. *isthmicus*, but differs from all forms of that species (hitherto wrongly referred to *R. orientalis* L.) in the following characters: basal leaves all trisect and glabrous or subglabrous, the outermost leaves reduced to broad sheaths that surround the collar of the plant, peduncles subvillous with long spreading hairs, and particularly in the form of its fruits: the tuberculate achene has no basal appendage and is pilose, and rather abruptly narrowed into a much more slender beak than is found in the other species. The specific name of this very distinct and rare plant refers to the beak of the fruit—like a cat's claw.

R. aucheri Boiss. in Ann. Sci. Nat. Sér. II, xvi, 351 (1841).

Syn.: *R. eriocarpus* Boiss. in Ann. Sci. Nat. Sér. II, xvi, 351 (1841)!

Type: Persia: Ispahan, *Aucher* 4006 (G, n.v.; BM!).

Prov. Bitlis: Kambos Dağ, above Hurmuz, 2250 m., by late snow, 30.6.1954, *Davis & O. Polunin* (D. 23465). Cappadocia: prope Ak Dagh, *Aucher* [20] (type of *R. eriocarpus*!).

The species has hitherto only been recorded from Persia. *R. elbrusensis* Boiss. is probably conspecific.

R. macrorhynchus Boiss., Diagn. Ser. I (6), 5 (1845).

subsp. **macrorhynchus**

Syn.: *R. dasycarpus* (Stev.) Boiss. var. *macrorhynchus* (Boiss.) Zohary in Pal. J. Bot., J. Ser. ii, 152 (1941).

Type: Prope Mustafui in deserto ad Tigrin, *Kotschy* 271 (G, n.v.; K!).

Prov. Malatya: above Reşadiye, between Doğanşehir and Pazarcik, 1300 m., rocky limestone slope facing north, 10.5.1957, *Davis & Hedge* (D. 27710). Armenia Turcica: Egin, Faltibaschi, 23.5.1890, *Sintenis* 2387; Arabkir, Denislu baschi, *Sintenis* 195 (fl.).

Although Boissier treated *R. macrorhynchus*, *R. dasycarpus* and *R. trigonocarpus* as specifically distinct, recent material does not support this treatment. They are combined here within *R. macrorhynchus* (the earliest name for the species), and two subspecies recognised: subsp. *macrorhynchus* and subsp. *trigonocarpus* (*R. dasycarpus*) differing mainly in fruit characters; in subsp. *macrorhynchus* the beak is 1·5–3 times as long

as the achene and strongly flattened (1 mm. broad below), whereas it is more or less as long as the achene, rather slender and scarcely flattened in subsp. *trigonocarpus*. The nectary scales are similar in both taxa. In Turkey subsp. *macrorhynchus* appears to grow further north and in more mountainous areas than subsp. *trigonocarpus*; it has also been seen from Persia and Syria.

subsp. **trigonocarpus** (Boiss.) P. H. Davis, **comb. et stat. nov.**

Syn.: *Ranunculus trigonocarpus* Boiss., Diagn. Ser. I (8), 2 (1849)!
Xiphocoma dasycarpa Stev. in Bull. Soc. Nat. Mosc. xxv (1), 539, t. 7, f. 3 (1852)!
Ranunculus dasycarpus (Stev.) Boiss., Fl. Or. i, 28 (1867)!
Ranunculus dasycarpus (Stev.) Boiss. var. *leiocarpus* Zohary in Pal. J. Bot., J. Ser. ii, 152 (1941).
R. myriophyllus DC. var. *edumeus* Zohary in Pal. J. Bot., J. Ser. ii, 152 (1941).

Type: "Verosimiliter in Anatolia", *Aucher* (G!).

Prov. Gaziantep: Gaziantep—Nisib, 15 km. from Gaziantep, 850 m., disturbed steppe, marly soil, 14.5.1957, *Davis & Hedge* (D. 27890); Steppenhügel 11 km. östlich Gaziantep, 780 m., 20.5.1956, *Huber-Morath* 14287. Prov. Mardin: 5 km. E. of Mardin, 1200 m., rocky N. slopes under cliffs, 25.5.1957, *Davis & Hedge* (D. 28582); Mardin, in graminosis, *Haussknecht*. Prov. Urfa: Urfa—Hilva, 32 km. from Urfa, 700 m., disturbed steppe, 18.5.1957, *Davis & Hedge* (D. 28214).

The achene of subsp. *trigonocarpus* shows considerable variation. A basal appendage may be present or absent, and the disc may be either smooth and glabrous or tuberculate and hairy; indeed, plants with glabrous or hairy achenes were collected together in each of my three gatherings cited above, and also occur together in the type collection of *R. dasycarpus* which is glabrous in Boissier's herbarium (though he described it as hairy) and hairy at Kew! As the fruit forms do not have a population basis, there seems little use in distinguishing them by taxonomic names.

Material of subsp. *trigonocarpus* has also been seen from N. Iraq, Persia and Jordan (above Ein Musa, 1350 m., limestone ridge in *Artemisia herba-alba—Poa sinaica* association, 19.4.1945, *Davis* 8875). The latter is apparently the first record of this taxon from Jordan, but is the plant described from there by Zohary as *R. myriophyllus* DC. var. *edumeus*.

The remaining Turkish species in the *Grumosi* are *R. bullatus* L., *R. millefolius* Vahl, *R. asiaticus* L. (always red-flowered in Turkey), *R. sintenisii* Freyn, *R. heterorhizus* Boiss. & Bal. and *R. myosuroides* Boiss. & Ky., none of which need concern us here.

Group 4. LANCIFOLII

R. ophioglossifolius Vill., Hist. Pl. Dauph. iv, 731, t. xlix (1789).
Type: France: Dauphiné (n.v.).

Prov. Zonguldak: Quellsumpf bei Gerede, 18.5.1955, *Huber-Morath & E. Walter* 4793. Prov. Trabzon: Trebizonde dans les fossés, *Bourgeau* 10. Prov. Antalya: Phineka, *Forbes*; Kümköy, between Antalya & Serik, 5 m.,

Davis & O. Polunin (D. 25714); Manavgat—Kara point, 3 m., *Davis & O. Polunin* (D. 25835). Prov. Muğla: Kizilkaya, between Muğla and Köyceğiz, *Davis & O. Polunin* (D. 25403).—Edge of pools and in ditches, in shallow water when in flower.

I have seen no material of *R. ophioglossifolius* Vill. var. *byzantinus* Azn. (Bull. Soc. Bot. Fr. xlvi, 136: 1899), described from the Bosphorus area and said to differ from the type in its taller habit and more numerous minutely hairy carpels. Variants with hairy carpels do, however, turn up elsewhere within the range of the species (France! Persia!). *R. fontanus* Presl (treated as a subspecies of *R. ophioglossifolius* by Hayek in his Prodr. Fl. Pen. Balc. i, 335: 1927) is surely specifically distinct, differing in its trailing stems, longer subuncinate beak, and smooth carpels and pedicels. It grows in Italy, Sicily and the N. Balkans.

Other species in Group *Lancifolii* recorded from Turkey are *R. flammula* L., *R. lingua* L., *R. strigillosus* Boiss. & Huet, *R. thracicus* Azn. (n.v.) and *R. lateriflorus* DC.; but I have seen no Turkish material of *R. lingua.*

Group 5. Annui

Key to species in the R. sardous–R. cornutus *complex in Europe and the Orient*

1a. Beak of achene 1–5 mm. long, triangular-lanceolate, recurved, confluent with the broadly winged (or sometimes very narrow) keel; pollen grains 2-colpate. Disc ovate- orbicular, 3(–4) mm. long, densely muriculate (tubercles slender and pointed), very rarely smooth. Upper leaves dissected into linear segments. Flowers usually 1·5–2 cm. across . . . . *cornutus* (p. 156)

1b. Beak less than 1 mm. long, or if 1 mm. then subincurved or straight (except for the subuncinate tip), keel always narrow and thereby appearing grooved on either side; pollen grains 3-colpate or pancolpate with 12 colpi.

2a. Beak 1 mm. long (rarely a little longer), usually directed slightly upwards, narrowly triangular; disc of achene 3 mm. long, ovate-orbicular, covered with prominent blunt tubercles, or smooth, or sometimes muriculate. Upper leaves simple or divided into 2–3 linear-oblong segments. Flowers usually less than 1·5 cm. across. Pollen grains 12-colpate. (Habit resembling *R. sardous*) *marginatus* (p. 158)

2b. Beak less than 1 mm. long; achene smaller (disc 2–3 mm. long):

3a. Disc densely muriculate, ovate-orbicular; beak ± recurved, 0·5–0·75 (–1) mm. long, triangular-lanceolate; at least the upper leaves much dissected into linear laciniae. Flowers 1–1·5 cm. across. Pollen grains 3-colpate. (Habit approaching *R. cornutus*) . . . . . *scandicinus* (p. 156).

3b. Disc tuberculate or smooth; beak seldom exceeding 0·5 mm.; leaves less divided. (Habit approaching *R. marginatus*):

4a. Beak recurved, narrow and rising abruptly from the margin, scarcely 0·5 mm. long; disc ovate-orbicular, densely tuberculate (tubercles conical-hemispherical); flowers less than 1 cm. across; pollen grains 12-colpate . *trilobus* (p. 160)

4b. Beak upcurved or sticking straight out, 0·5 (–0·75) mm. long; disc orbicular, smooth or with very weak tubercles usually confined to the periphery of the disc; flowers more than 1 cm. across; pollen grains 3-colpate . *sardous* (p. 159)

R. cornutus DC., Syst. i, 300 (1817).

Syn.: *R. lomatocarpus* Fisch. & Mey., Ind. Sem. Petrop. 36 (1835)!

R. rhynchocarpus Boiss., Ann. Sci. Nat. Sér. II, xvi, 355 (1841)!

Type: In Oriente, *Labillardière* (FI)!

This species, widespread in the Levant (including Turkey), has generally passed under the name of *R. lomatocarpus* Fisch. & Mey. described from cultivated material. Examination of the type of *R. cornutus*, however (kindly sent on loan from Florence) shows that *R. lomatocarpus* cannot be separated from it, so that the earlier name must be adopted for the species. Boissier in his Flora Orientalis misinterpreted *R. cornutus* as possessing achenes with a keel so narrow as to appear grooved on either side—a feature which is not shown in Labillardière's type specimen which has the wing-like keel of trypical *R. lomatocarpus*. The plant with grooved achenes, described under the name of *R. cornutus* by Boissier, does occur in the Levant but must be included within the range of variation found within this extremely polymorphic species. The beak of the achene varies from 1–5 mm. long, and the keel—though usually wide and winged—can be so narrow as to give the achene the grooved appearance found in *R. marginatus*. A smooth-achened variety occurs in the vicinity of Lenkoran (var. *leiocarpus*).* The dissection of the leaves is also exceptionally variable. It seems possible that some of this variability may be due to hybridisation with *R. marginatus* Urv. var. *trachycarpus* (Fisch. & Mey). Azn. and *R. scandicinus* (Boiss.) Davis. The distinction between these three species are given under *R. scandicinus*. *R. cornutus* is remarkable in having dicolpate pollen grains.

R. scandicinus (Boiss.) P. H. Davis in Arkiv för Botanik, Ser. II, v (1), 143 (1959).

Syn.: *R. trachycarpus* Fisch. et Mey. var. *scandicinus* Boiss., Fl. Or. i, 35 (1867)!

R. marginatus Urv. var. *trachycarpus* (F. & M.) Azn. subvar. *scandicinus* (Boiss.) Azn. in Magy. Bot. Lap. i, 297 (1902)!

Affinis *R. cornuto* Boiss. sed foliis plerumque magis decompositis, floribus minoribus, achenio margine anguste bisulcato rostro brevissimo recedit. A *R. marginato* Urv. var. *trachycarpo* (Fisch. & Mey.) Azn. foliis laciniatis, laciniis foliorum superiorum anguste linearibus, acheniis paulo minoribus disco tuberculis magis asperis praedito, rostro subrecurvo plerumque breviore differt. Ab ambobus granis pollinis tricolpatis recedit.

Planta annua, 10–50 cm. alta, caulibus gracilibus ramosis saepe flexuosis

* *Ranunculus cornutus* DC. var. **leiocarpus** (Boiss.) P. H. Davis, **comb. nov.**
Syn.: *R. lomatocarpus* F. & M. var. *leiocarpus* Boiss., Fl. Or. i, 56 (1867).

parce hirsutis vel glabris. *Folia* basalia longe petiolata, trisecta, parce pilosa, segmento medio manifeste petiolulato; segmenta in lacinias oblongas vel lanceolatas profunde dissecta. *Folia* caulina mediana et superiora breviter petiolata (summa subsessilia) in lacinias lineares acutas decomposita. *Pedunculi* foliis longiores. *Flores* 1–1·5 cm. lati. *Sepala* reflexa extra pilosa. *Petala* 5, aurea, late obovata, saepe c. 7 mm. longa; squamae nectariferae cuneatae, fere ad basin liberae. Grana pollinis tricolpata. *Torus* pilosus. *Achenia* 15–30, in caput globosum 5–7 mm. latum conferta, plano-compressa, ovato-orbicularia, 2–3 mm. longa, disco dense tuberculato (tuberculis tenuiter conicis asperis), carina angustissima utrimque anguste bisulcata, rostro 0·5–0·75 (–1·0) mm. longo breviter triangulari-lanceolato subrecurvo utrimque uninervio.

Lectotype: Palestine: Askalon [in humidis prope Askalon], *Kotschy* 423 (G! K!).

PALESTINE. Moab: Hesban, 800 m., 26.4.1911, *Meyers & Dinsmore*. Between Petah-Tikwa and Herzlia, N. of Tel-Aviv, field inundated in winter, 12.4.1935, *Eig & Grizi* 322. Ex regione depressa Palaestinae juxta lacum Tiberiadis, a. 1877, *J. Ball*. Jaffa, damp places, 17.5.1908, *Dinsmore* 6335; *ibid.*, low ground, 20 m., *Meyers & Dinsmore* B. 1501b. Saron: Ramleh to Yebneh, 50 m., sandy places, *Dinsmore* B. 1501. Circa Bethlehem, *Kotschy* 485. Ramleh, 50 m., *Dinsmore* B. 3501b. Ex collibus Palaestinae juxta Bireh, 30.4.1877, *J. Ball*. Koulonieh, damp places, 31.1.1903, *F. Meyers* 335. Sileh, 500 m., wet places, 18.5.1911, *Meyers & Dinsmore* B. 8335.

SYRIA (W.): Lataquia int.: Bhamra, c. 350 m., *Haradjian* 2657.

TURKEY: In Cilicia ad Mersina, *Kotschy* exs. 1859 n. 40. Tarsous, *Kotschy* 41. Prov. Seyhan: Haruniye, 14.4.1951, *Duzici Enstitüsü*; Bostanlar—Haruniye, 18.4.1951, *Duzici Enstitüsü*. Adana, 2.1942, *Orman Mektebi*; Adana, 3.1942, *M. Başarman*. Prov. Mersin: Kuyalak, 10 km. W. of Mersin, 2 m., weed in lush broad bean field, 7.4.1957, *Davis & Hedge* (D. 26518).

This plant, originally described as a variety of *R. trachycarpus* Fisch. & Mey., is recognised here as specifically distinct. Despite the short beak of its achene, it is probably more closely related to *R. cornutus* DC. (*R. lomatocarpus* Fisch. & Mey.). It differs from the latter in usually having more finely dissected leaves, in its somewhat smaller flowers, in the very short beak of its smaller achene, and in the keel of the achene being always so narrow as to appear grooved on either side. From *R. marginatus* Urv. var. *trachycarpus* (Fisch. & Mey.) Azn. it is distinguished by its more finely divided leaves (the segments of its uppermost leaves being narrowly linear as in *R. cornutus*), and in the slightly shorter and recurved (instead of incurved) beak of the smaller achene; the disc bears more slender, sharper tubercles.* *R. trachycarpus* var. *minor* Zohary (Pal. J. Bot., J. Ser. ii, 152: 1941) must be considered as a local race of *R. scandicinus*.

Specimens of *R. scandicinus* have only been seen from Palestine (Israel and Jordan), W. Syria and Turkey in the region of Cilicia; it seems likely, however, that it will be found in the intervening Lebanon. Some Palestine

* *R. scandicinus* differs further from its two allies in its less specialised pollen grain—zonicolpate and tricolpate, instead of dicolpate (*R. cornutus*) or pancolpate and 12-colpate (*R. marginatus var. trachycarpus*).

sheets in the Kew herbarium suggest that it may hybridise with *R. cornutus* and perhaps even with *R. marginatus*.

R. marginatus Urv. in Mém. Soc. Linn. Paris, i, 318 (1822).
var. **marginatus**

Syn.: *R. trachycarpus* Fisch. & Mey. var. *leiodiscus* Boiss. & Huet in Boiss., Diagn. Ser. II (5), 9 (1856)!

Type: Turkey: in collibus circa Trapezum, *Urville* (P, n.v.)

Prov. Istanbul: Rumeli Hisar, 5.1943, *Mete*. Soğuksu-Küçükçe kmece yolu, 9.5.1953, *A. Heilbronn*. Dikili, 23.4.1950, *A. Heilbronn*. Prov. Tekirdağ; Hayrabolu, 11.5.1932, *Hilmi* (?). Armenia, *Calvert & Zohrab*. Armenia [inter Trapezuntum et Baibout], *Huet*.

The type variety of the species (with smooth achenes) has a more northern distribution in Turkey than var. *trachycarpus* (with strongly tuberculate fruits). Aznavour (Magy. Bot. Lap. i, 297: 1902), however, records both taxa from the Bosphorus, as well as an intermediate variant (var. *transiens* Azn.). Specimens of var. *marginatus* have been seen from Dalmatia, Croatia, Montenegro, Bulgaria, Albania, Macedonia, Greek Thrace, Is. Thasos, N. Turkey & N. Persia.

var. **trachycarpus** (Fisch. & Mey.) Azn. in Magy. Bot. Lap, i, 297 (1902).

Syn.: *R. trachycarpus* Fisch. & Mey., Ind. Sem. Hort. Petrop. iii, 46 (1837)!

R. troodi Lindberg in Acta Soc. Sci. Fenn. n.s. B. ii, No. 7, 16 (1946)!

Type: Russia: In Tauria, in regionibus transcaucasicis et in provincia Lenkoran, *Meyer* (LE!).

Prov. Antalya: Antalya, 30 m., *Tengwall* 237; Aksu–Serik, 5 m., *Davis & Hedge* (D. 25671); Aksu çay, between Antalya and Serik, 2 m., *Davis & Hedge* (D. 25679). Prov. Muğla: Marmaris, 2 m., *Davis & Hedge* (D. 25293). Lycia, *Forbes*. Prov. Izmir: Germencik, 50 m., *Davis & Hedge* (D. 25227). Ankara, *M. Başarman*. Prov. Çannakale: Thymbra, Scamanderthal, *Sintenis* 151; Obaköy, *Gassner* 1280.

Specimens of var. *trachycarpus* have been seen from Thessaly, Greek Thrace, Is. Thasos, Dodecanese, Cyprus, Palestine, Transcaucasia and N. Persia.

Four other taxa should be included within *R. marginatus*:

1. *R. angulatus* Presl (Delic. Prag. 7: 1822), a robust Sicilian variant with usually smooth achenes, mostly 3-lobed and stout peduncles, which may deserve varietal status.

2. *R. sardous* var. *pseudo-trachycarpus* Halácsy (Consp. Fl. Graecae, i, 24: 1901), described from Greece and evidently a short-beaked variant of *R. marginatus* var. *trachycarpus*. *R. marginatus* is not always clearly separated from *R. sardous* in the Balkans.

3. *R. guilielimi-jordani* Asch. (in Verh. Bot. Brand. xxi, 64: 1880) described from Lower Egypt. This is probably best treated as a geographical variety of *R. marginatus* with muriculate achenes associated with very small flowers. Specimens have been seen from Egypt and Moab. *R. marginatus* var. *trachycarpus*, however, can sometimes have very small flowers in Turkey and Cyprus, although these are associated with the usual tuberculate (not muriculate) achenes.

4. *R. sosnowskyi* Kem.-Nath. (in Not. Syst. Geogr. Inst. Tphilis. fasc. 10, p. 25, f.: 1941). There are 6 West Caucasian sheets determined as this taxon at Leningrad, including an isosyntype, but many of the specimens appear to be depauperate. It differs from *R. marginatus* var. *trachycarpus* only in having typically smaller flowers and smaller slightly narrower carpels with a slightly shorter beak (in some species the tubercles are more slender and pointed than in var. *trachycarpus*, but this character varies considerably). There is some overlap with other material determined at Leningrad as *R. trachycarpus*, and I very much doubt if *R. sosnowskyi* merits more than varietal rank within *R. marginatus*. Typical *R. marginatus* does not occur in the Caucasus.

R. sardous Crantz, Stirp. Austr. ii, 84 (1763).

The original description, based on Austrian material, does not specify whether the achene is smooth or tuberculate. The photograph at Kew of Crantz's specimen (probably not the type) is in flower. The species is centred in West and Central Europe, and in the S.E. part of its range is largely replaced by the plant described as *R. pseudo-bulbosus* Schur. This differs in having a slightly longer beak (up to 0·75 mm.) directed outwards (instead of being upturned), and the disc always smooth. It is probably best treated as a subspecies of *R. sardous*, for which the name subsp. *laevis* (Schmalh.) N. Busch* must be adopted, but is *not* the same as the smooth-achened variant of that species which is otherwise identical with the tubercled form. Allegations that *R. pseudo-bulbosus* is perennial are not borne out by specimens seen, and are probably due to confusion with *R. bulbosus* L. subsp. *aleae* (Willk.) Rouy & Fouc.

Material of *R. sardous* subsp. *sardous* (with achenes tubercled or smooth) has been seen from Britain, Sweden, Denmark, Holland, Belgium, France, Spain, Switzerland, Germany, Austria (mostly tuberculate), Corsica, Sardinia, Balearic Is., Italy, Sicily, Dalmatia, Istria and Algeria. Specimens of subsp. *laevis* have been examined from Hungary, Roumania, Albania, Bosnia, Dalmatia, Ukraine and Crimea. The buttercup from Transcaucasia, referred to *R. pseudo-bulbosus* in the Fl. U.R.S.S., is *R. bulbosus* subsp. *aleae*, the South European race of *R. bulbosus* with fleshy roots and the stock not corm-like. Records of *R. sardous* from Turkey are almost certainly erroneous.

* *R. sardous* Crantz subsp. *laevis* (Schmalh.) N. Busch in Fl. Cauc. Crit. iii (3), 138 (1903). Icon.: Jávorka & Csapody, Icon. Fl. Hung. 171, f. 1346 (1934)—as *R. sardous*.

Syn.: *R. sardous* Crantz var. *laevis* (Čelak. ex) Schmalh., Fl. Yogo.-Zap. Ross. 11 (1886).

R. philonotis Ehrh. var. *mediterraneus* Griseb. ex Heuffel in Verh. Zool. Bot. Ver. Wien, viii, Abhandl. 46 (1858).

R. pseudo-bulbosus Schur. in Verh. Siebenb. Ver. Naturw. x, 84 (1859); Öst. Bot. Zeitschr. x, 250 (1860), xi, 82 (1861), xviii, 153 (1868); Verh. Naturw. Ver. Brünn, xxv (2), 52 (1876).

R. mediterraneus (Griseb. ex Heuffel) Schur, Enum. Pl. Transs. 22 (1866), in syn.

R. sardous Crantz var. *pseudo-bulbosus* (Schur) Grossheim, Fl. Kavk. ed. 2, iv, 64 (1950), quoad typ. haud pl. cauc.

Subsp. *laevis* should be typified by Ukraine material in Kiev on which Schmalhausen evidently based his description. Although he validated Čelakovsky's epithet (of which I can find no earlier description), I do not know if Schmalhausen saw Čelakovsky's specimens; it is therefore desirable to drop Čelakovsky's name from the authority.

R. trilobus Desf., Fl. Atlant. i, 437, t. 113 (1798).

The species has a somewhat Atlantic distribution in W. Europe and N.W. Africa. Specimens have been seen from France, Portugal, Spain, Sardinia, Balearic Is., Corsica, Italy, Sicily, Crete, Morocco, Algeria, Libya, Tunisia, Canary Is. and Azores. It does not occur in Turkey.

R. pinardii (Stev.) Boiss., Diagn. Ser. II (5), 10 (1856)

Syn.: *Gampsoceras pinardi* Stev. in Bull. Soc. Nat. Mosc. xxv (1), 542, t. vii f. 6 (1852)!

Type: Syria, *Pinard* (H, n.v.; K!).

Prov. Maraş: Akher Dagh, Marash, 1600 m., 1.5.1934, *Balls* 940; Ahir Dağ above Maraş, 1500 m., rocky limestone slope, 2.5.1957, *Davis & Hedge* (D. 27380). Prov. Malatya: distr. Besni, Surgu–Perveri, Felsschutt Urgestein 2 km. südlich Surgu, 1280 m., *Huber-Morath* 14279; Mt. above Reşadiye, between Doğanşehir & Pazarcik, 1300 m., rocky limestone slopes, 10.5.1957, *Davis & Hedge* (D. 27714).

Also seen from Syria (Kurd Dağ, *Haradjian* 1165), Iraqi Kurdistan and Persia.

This very distinct and beautiful annual, having extraordinarily large tuberculate hairy achenes with a long circinate beak, was first described as a monotypic genus, *Gampsoceras* Steven, which has since been re-established by J. Hutchinson (Kew Bull. 1923, 84: 1923) on the grounds that it differs from *Ranunculus* in having a single series of carpels and only 10 stamens. I am unable to support this view. *R. pinardii*, extremely distinct though it is, is allied to and surely congeneric with *R. arvensis* L. The latter species has a single series of carpels and a relatively low, but variable number of stamens. Sixteen flowers of *R. arvensis* have been dissected from a range of Continental localities, and in these the number of stamens varies from 7–16 and the carpels from 2–7 (being never as many as the stamens). In my gatherings of *R. pinardii* the stamens vary from 6–9 and the carpels from 8–9 (stamens and carpels being usually equal in number). Though the achenes are strikingly different, we must not forget that achenial sculpturing in *R. arvensis* shows a great range of variation in the Near East, and that a variant with a tuberculate disc is not uncommon. The mature achenes of the two species are much more different than the developing carpels because the beak of *R. pinardii* elongates more rapidly than that of *R. arvensis*; the difference in form is controlled by allometry. *R. pinardii* is to be regarded as a highly specialised species of *Ranunculus* in which the achene has become extremely large and elaborated. The trend of reduction in number of carpels and stamens, already well-pronounced in *R. arvensis*, has become stabilised in *R. pinardii* so that the number of stamens equals the number of carpels.

Since the publication of De Candolle's Prodromus the annual buttercups with tuberculate or muricate fruits have usually been assigned to Sect. *Echinella* DC. (Subgen. *Pachyloma* (Spach) Ovcz.). (*R. sardous* is sometimes included here, or referred to Sect. *Ranunculus* because of its very weak tubercles and close affinity with R. *bulbosus* L., cf. pages 108 and 159). This seems to be an untenable position. Tuberculate achenes occasionally occur in the perennial Sect. *Ranunculus* (Group *Praemorsi* —cf. p. 117), and it is possible to trace a line of achenial elaboration from

R. bulbosus to *R. cornutus* by way of *R. sardous*, *R. marginatus* and *R. scandicinus*. These species, in fact, are very closely allied. The only annual in Sect. *Echinella* that stands well apart from Sect. *Ranunculus* is the type of the section, *R. arvensis*, and it is to this that the specialised *R. pinardii* is most closely allied. Both species share a persistent hypocotyl resembling a taproot, adpressed sepals, very similar leaves and a single whorl of carpels—features that are not shared with any other species referred to Sect. *Echinella*. The pollen grains of the two species, however, though large and specialised in both, are strikingly different—panporate, with 20–30 pores in *R. arvensis*, and pancolpate, with 15 (rarely 18) colpi in *R. pinardii*. It is suggested here that Sect. *Echinella* should be confined to *R. arvensis*, and that *R. pinardii* should either be associated with it (in a separate subsection) or made the type of an allied monotypic section. The other species that have been referred to Sect. *Echinella* should probably be transferred to Sect. *Ranunculus* where they might constitute a separate annual subsection. There is no doubt that a thorough study of the group's pollen morphology will be of considerable assistance in establishing a natural classification and confirming evolutionary trends.

Other Turkish species in the *Annui* are *R. chius* DC. (the closely allied *R. parviflorus* L. does not occur in the Orient), *R. muricatus* L., *R. arvensis* L. (extremely variable in fruit sculpturing, even in the same population) and *R. sceleratus* L.

SUBGEN. FICARIA (Huds.) L. Benson
Amer. J. Bot. xxvii, 807 (1940)

R. ficarioides Bory & Chaub., Fl. Pélop. 34, t. xvi. f. 2 (1838).
Type. Greece: les hautes régions du Taygete, *Chaubard* (P, n.v.).

Prov. Maraş: E. side of Armut Dağ, between Maraş and Göksun, 1200 m., in stony places under *Juniperus excelsa*, 4.5.1957, *Davis & Hedge* (D. 27528). Cilicia: Gullek Gusgutathal, 1300 m., *Siehe* a. 1896 n. 88 (as *R. fascicularis*); bei Mersin, *Siehe* n. 160.

Closely allied to *R. kochii* (*Ficaria fascicularis* C. Koch), from which it differs in its deeply cordate, crenately lobed leaves, more slender pedicels and smaller flowers. Specimens have been seen from Greece, Karpathos, Lebanon and Transcaucasia. *Siehe* 88 is unusual in having pubescent achenes.

The other Turkish species in Subgen. *Ficaria* are *R. ficaria* L. var. *grandiflorus* (Rob.) Strobl (*Ficaria ledebourii* Grossh. & Schischk.) and *R. kochii* Led.