# MATERIALS FOR A FLORA OF TURKEY: III

## RANUNCULACEAE: I

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## DELPHINIUM L.

Sp. Pl. i, 530 (1753), Gen. Pl. ed. 5, 236 (1754)

Huth's monograph of *Delphinium* (Bot. Jahrb. xx, 322–499: 1895) provides a useful basis for the study of this beautiful genus, but it has some serious shortcomings. A slackness about the citation of types and a carefree attitude to nomenclature detract considerably from the value of the work.

Though less difficult than *Aconitum*, *Delphinium* is by no means an easy genus. As with most genera highly specialized for insect pollination, geographical distribution is an invaluable aid to the elucidation of taxonomic problems in *Delphinium*. Nevertheless, the pattern of variation suggests that allopatric introgression sometimes occurs, particularly between certain members of the "*D. hybridum* Steph. ex Willd." group in the Levant.

In this account, Chowdhuri and Davis are responsible for the treatment of Subgen. *Delphinium*, and Hossain and Davis for Subgen. *Consolida*. Unless otherwise indicated, all specimens cited have been examined. We are much indebted to the Directors of the Kew, British Museum, Geneva, Vienna University and Uppsala herbaria for the loan of type material.

### Subgenus Delphinium

Syn.: Subgen. *Eudelphinium* (Huth) Dalla Torre & Harms, Genera Siphon. 165 (1901).

Except in the *D. peregrinum* L. group, the shape of the petals is seldom an important character for the separation of closely related species of Subgenus *Delphinium* in the Levant. The form of the bracts (and bracteoles) provides valuable specific criteria, but many species that usually have simple lower bracts may produce trifid or even leafy ones when growing in lush habitats. Failure to allow for this variation in the lower bracts has led to the wide separation of some closely related (or even synonymous) species in Huth's monograph, and the same applies to glabrous *versus* hairy carpels—many species are very variable in this respect, even within the same population (e.g. *D. albiflorum* DC.). Stressing the indumentum of the carpel, Huth has placed very closely related taxa of the "*hybridum*" group in different "tribes". On the other hand, the position of the bracteoles on the pedicels is (within limits) surprisingly constant in different species. The same applies to the shape of the sepal spur—as was well-realized by Huth—but perhaps still more to the form of the petal spur which

has received scant attention from taxonomists. Flower colour and the posture of the spur—whether horizontal or steeply ascending—provide useful (and often neglected) characters in the "*hybridum*" group, and the same applies to the shape of the stem. Whether this is terete and striate, or acutely angled and subsulcate (at least below) can give a useful and natural grouping of species in this critical alliance, separating a circumscribed *D. fissum* group (terete) from the *D. dasystachyum—D. micranthum* group (angled).

**Delphinium fissum** Waldst. & Kit., Descr. Pl. Rar. Hung. i: 83, t. 81 (1802).

The taxonomy and nomenclature of the species in the broad "*hybridum*" group (*sensu* Huth, Bot. Jahrb. xx, 341–343: 1895) are much confused. Both geographical differentiation and (we strongly suspect) hybridisation have played an important part in their evolution. *D. hybridum* L. (Amoen. Acad. iii, 37: 1756) was thought by Linnaeus to be a hybrid between *D. elatum* L. and *Aconitum Napellus* L. If this were true, the taxonomy of the group would no doubt be even worse than it is, but the specimen in the Linnaean herbarium (which must be accepted as the type) is the species later described as *Delphinium cuneatum* Stev. ex DC. (*fide* B. L. Burtt in Kew Bull. 1954: 68, in adnot.). The name *D. hybridum* Steph. ex Willd. was used by Huth and others for the plant centred in S.E. Europe, though, being a later homonym of *D. hybridum* L., Willdenow's name must be treated as illegitimate; *D. fissum* Waldst. & Kit. (first described from the Baths of Hercules in Hungary) has been correctly adopted by Hayek (Prodr. Pen. Balc. i, 311: 1924) for the European plant. As a matter of fact, the Caucasian *D. hybridum* Steph. ex Willd. belongs to another species—*D. Schmalhausenii* Alb.—which is distinguished from *D. fissum* by its angled stems, cauline leaves with short, broad, membranous-margined petioles, and dense inflorescence with the sepal spurs steeply ascending as in the closely related Caucasian *D. ochroleucum* Stev. ex DC. It seems advisable to drop the name *D. hybridum* L. as a *nomen confusum*, and to adopt *D. cuneatum* Stev. ex DC. as the correct name for the Linnaean plant.

The typical form of *D. fissum* (subsp. *fissum*) is widespread in S.E. Europe, but does not seem to occur in Turkey where it is replaced by the endemic subsp. *anatolicum* Chowdhuri & Davis and by the closely related *D. albiflorum* DC. (discussed below).

subsp. **anatolicum** Chowdhuri & Davis, **subsp. nov.**

Syn.: *D. leiocarpum* Huth in Bull. Herb. Boiss. i, 334 (1893), pro parte anatolica.

*D. amani* Post ex Huth in Engler, Bot. Jahrb. xx, 442, (1895).

A subsp. *fisso* caulibus crassioribus (3–6 mm. latis), foliis inferioribus semper glabris majoribus 7–18 cm. latis in laciniis latioribus linearilanceolatis vel oblongo-lanceolatis 2–8 mm. latis (raro obtusis) fissis, inflorescentia et sepalis et folliculis semper glaberrimis, floribus pallide caeruleis recedit.

TURKEY. Prov. Çannakale/Balikesir: Kaz Dağ [Mt. Ida] near Kareikos, 25 Jul. 1883, *Sintenis* 589 (holo. K; iso. E; syntype of *D. leiocarpum* Huth). Prov. Ankara: Kibris gorge near Kayaş, in lush herbage by stream, 6 Jul. 1947, *Davis* 13140. Prov. Antalya dist. Alanya: Han boğaz forest near

Geyik Dağ, 1600 m., 30 Jul. 1947, *Davis* 14703 (form with unusually broad obtuse laciniae). Amanus: Gaiour Dagh, a. 1892, *Shepard* (K—isotype of *D. amani* Post). Amanus, 1500 m., Jul. 1906, *Haradjian* 571; *ibid.*, 1670 m., Aug. 1906, *Haradjian* 552. Amanus on Kusliji Dağ, 1670–1980 m., Aug. 1908, *Haradjian* 2537.

*D. fissum* subsp. *anatolicum* looks at first sight better distinguished from the Balkan type than it actually is; the differences are entirely of a quantitative nature. The Turkish plant is, in fact, more uniform than the European one, and several of the diagnostic characters that are constant in the Turkish taxon are found individually in some specimens of European *D. fissum*. It therefore seems advisable to assign subspecific rank to the Turkish plant, whose synonymy requires some elaboration.

When Huth described his *D. leiocarpum* (1895) he based it on five specimens that we must now refer to three different taxa; of these, the two from S.E. Europe are no more than glabrous-carpelled forms of *D. fissum* Waldst. & Kit. (var. *dinaricum*—see below), the two Russian specimens belong to *D. Schmalhausenii* Alb. or possibly *D. Freynii* Conrath (if the latter is specifically distinct from the former), and only the Anatolian specimen (Trojan Ida) is the plant described here as *D. fissum* subsp. *anatolicum*. It is clear from Huth's description that he made no distinction between these entities, stressing their glabrous carpels above all else—and indeed described *D. leiocarpum* in a different "tribe" to *D. fissum*.

*D. leiocarpum* was cited by Hayek (Prodr. Pen. Balc. i, 312; 1924) as a synonym of *D. fissum* var. *dinaricum* (Beck & Szysz.) Beck. The latter, however, was described from Montenegro and is no more than a glabrous-fruited variant of *D. fissum*, agreeing with the typical form of that species in all other characters; as in other species of *Delphinium*, such variants are not uncommon, and are often collected together with hairy-fruited forms; they hardly warrant taxonomic recognition unless they have a distinctive geographical distribution.

In view of this confusion, we take advantage of a change in taxonomic rank to use a new epithet, subsp. *anatolicum*. The other specific synonym is *D. amani* Post ex Huth (1895). An isotype has been examined at Kew, and we feel sure that this is no more than a luxuriant shade form of *D. fissum* subsp. *anatolicum* in which the lower bracts are partite and leafy. Other gatherings from the Amanus (collected by Haradjian) have entire lower bracts but differ in no other way from *D. amani*.

*D. fissum* subsp. *anatolicum* has a very disjunct Anatolian distribution, and is probably confined to mesophytic habitats. It should be assigned to the Mediterranean element in Turkey's flora; even the gorge where it grows near Ankara supports many Mediterranean species near the stream.

**D. albiflorum** DC., Syst. Nat. i, 353 (1818); Delessert, Ic. Sel. i, t. 58 (1820).

Syn.: *D. hybridum* Steph. ex Willd. var. *albiflorum* (DC.) Koch in Linnaea, xv, 247 (1841).

*D. hybridum* Steph. ex Willd. var. *ochroleucum* (Stev. ex DC.) Boiss., Fl. Or. i, 89 (1867), quoad *D. albiflorum* DC. in syn., excl. typ.

*D. ochroleucum* sec. Nevski in Komarov, Fl. U.R.S.S. vii, 181 (1937), non Stev. ex DC.

*D. albiflorum* var. *Candolleanum* Huth in Bot. Jahrb. xx, 439 (1895).

*D. albiflorum* var. *eginense* Huth in l.c. 439 (1895).

TURKEY. In Armenia, *Tournefort* (holo. Paris, n.v.). Armenia, *Calvert & Zohrab*. Amasia, *Manisadjian* 675 (as *D. leiocarpum* Huth). Amasia: in rocky alpine places on Sana Dağ, 15 Jul. 1889, *Bornmüller* 972 (as *D. ponticum* Hausskn. & Bornm., ms.). Prov. Kastamonu: Tossia, in sub-alpine meadows, 29 Jul. 1892, *Sintenis* 4883 (as *D. hybridum* Steph. ex DC. var. *hirsutum* Freyn & Sint., m.s.).

GREECE (Athos Peninsula). Vlachani, 300 m., *Rev. & Mrs. Thompson* 934. Ravine above Strati, 31 July—9 Aug. 1947, *C. N. Goulimy* 7.

The taxonomic position of *D. albiflorum* DC. has been much confused by taxonomists. Nevski (in Komarov, Fl. U.R.S.S. vii, 181: 1937) treated it as a synonym of *D. ochroleucum* Stev. ex DC., as did Boissier when he reduced the latter (in our view unjustifiably) to a synonym of *D. hybridum* Steph. ex DC. (=*D. Schmalhausenii* Alb.). We have not seen the type of *D. albiflorum*, but Delessert's figure (evidently based on Tournefort's specimen) shows that it is quite distinct from *D. ochroleucum*—a yellowish flowered Caucasian species with a denser inflorescence, narrow bracts and steeply ascending spurs.

Huth recognized the specific distinctness of *D. albiflorum*. It is, in fact, very closely related to *D. fissum* Waldst. & Kit. (placed—as *D. hybridum* Steph. ex Willd.—in a different "tribe" by Huth), and might even be treated as a subspecies of the latter. The ovate-lanceolate, usually membranous-margined bracts and bracteoles are broader and more membranous in Calvert & Zohrab's Armenian gathering (a close match with Delessert's figure) than in specimens from further west. Nevertheless, *D. albiflorum* has a distinctive facies throughout its range, and possesses several other characters that separate it from *D. fissum*, as can be seen from the key below. We are therefore maintaining it as a separate species. The taxon is extremely variable in the indumentum of its inflorescence axis, sepals, spur and carpels, varying from densely pubescent to glabrous, even in the same gathering.

*D. albiflorum* has a disjunct distribution in Northern Anatolia. Two gatherings from the Athos peninsula in Greek Macedonia must also be referred to this species; although the bracts are scarcely membranous-margined, the plants are otherwise typical of this species. These Greek specimens apparently constitute the first records of *D. albiflorum* from Europe. The species is intermediate morphologically and geographically between *D. fissum* subsp. *fissum* and *D. ochroleucum*.

*Key to D. fissum and D. albiflorum*

1a. Bracts and bracteoles ovate-lanceolate, usually membranous-margined, stem 50–60 cm. tall, 2–3 mm. thick, simple; lower leaves 4–7 cm. across; median pedicels shorter than the sepals; flowers (incl. spur) 19–22 mm. long. Leaves adpressed pubescent, with oblong-linear or linear laciniae 1–3 mm. broad; inflorescence, sepals and follicles pubescent or glabrous. Flowers pale blue or whitish. (N. Anatolia; Athos peninsula) . . . . . *D. albiflorum*

1b. Bracts and bracteoles linear, not membranous-margined; stem 60–100 cm. tall, 3–6 cm. thick, simple or branched; lower leaves 7–18 cm. across; median pedicels as long as the sepals; flowers (incl. spur) 24–27 mm. long. Petioles with a less conspicuous sheath than in *D. albiflorum* . . . . . 2

2a. Stem 3–6 mm. thick, branched or simple; lower leaves glabrous, 7–18 cm. across with linear-lanceolate or oblong-lanceolate laciniae 2–8 mm. broad (rarely obtuse); flowers light blue; inflorescence, sepals and follicles always glabrous (Anatolia)
*D. fissum* subsp. *anatolicum*

2b. Stem 3–4 mm. thick, usually simple; lower leaves usually adpressed pubescent, 7–12 cm. across with linear laciniae 1–3 mm. broad; flowers usually deeper blue; inflorescence, sepals and follicles pubescent or sometimes glabrous. (S.E. Europe) . *D. fissum* subsp. *fissum*

**Delphinium carduchorum** Chowdhuri & Davis, **spec. nov.**

Affinis *D. micrantho* Boiss. sed inflorescentia minus paniculata, racemis densioribus indumento patente viscidulo vestitis, bracteis et plerumque bracteolis longioribus, pedicellis erectis recedit.

*Herba* perennis, 25–60 cm. alta, radicibus fasciculatis. *Caules* erecti, saltem inferne acute angulati et subsulcati, interdum in parte superiore ramosi, foliosi, inferne adpresse et crispe puberuli deinde glabrescentes, superne patentim pubescentes visciduli. *Folia* basalia et caulina inferiora longe petiolata, 7–14 cm. longa; lamina orbicularis, 3–6×3–5·5 cm. palmatim trisecta; segmenta laciniata, glabra, interdum parce ciliata crassiuscula, laciniis 2–4(–5) mm. latis lineari-lanceolatis vel linearibus vel etiam oblongo-lanceolatis; petiolus 4–8 cm. longus, tenuis, striatus, in juventute puberulus, basi subvaginatus; folia caulina superiora breviter petiolata, trisecta, segmentis integris linearibus vel fere ad basin fissis, petiolis planis glabris basi subvaginatis. *Racemus* terminalis 7–20-florus, laxiusculus vel subdensus, 8–15 cm. longus, 2·5–3·5 cm. latus, axe glanduloso-pubescente vel raro adpresse puberulo. *Bracteae* inferiores 2·5–5 cm. longae, profunde tripartitae vel raro integrae, adpresse pubescentes, pedicellis aequales vel longiores, bracteae superiores semper simplices, lineari-lanceolatae, ciliatae, basi anguste membranaceae, floribus breviores. *Pedicelli* 8–15 (infimi—30) mm. longi, inferiores sepalis longiores, ascendenti-erecti, stricti, deinde curvati. *Bracteolae* in parte superiore pedicello affixae, plerumque basin floris versus orientes; medianae 5–8 mm. longae, sepalis breviores, lineari-lanceolatae, acuminatae, basi membranaceae et ciliatae. *Flores* intense caerulei vel violaceo-caerulei. *Sepala* oblongo-ovata vel elliptico-obovata, acuta vel obtusa, 9–13×5–7·5 mm., intus glabra, extra ± adpresse pubescentia; calcar 11–16·5 mm. longum, attenuatum, acutum, strictum et horizontale vel paulum curvatum, sepala aequans vel sublongius. *Petala* inclusa; superiora bina glabra, superne falcata, limbo breviter bifido in calcare acuto sensim attenuato; inferiora bina 7·5–10 mm. longa, limbo late ovato (4–6×3·5—5 mm.) fere ad medium in lobos acutos raro obtusos bifido, facie barbata. *Filamenta* glabra. *Carpella tria*, pubescentia; stylus glaber. *Folliculi* oblongi, fere maturi 7×3 mm., patentim hirsuto-pubescentes. *Semina* triquetra, squamata.—Floret Jul.-Aug.

TURKEY (Kurdistan). Prov. Van, dist. Hoşap: Kepir Dağ, 2600 m., 30 July 1954, *Davis & O. Polunin* (D. 23325); *ibid.*, 2800 m., 30 July 1954, D. 23349; dist. Şatak: Kavuşşahap Dağ, 2700 m., 24 July 1954, *Davis & O. Polunin* (D. 23061); dist. Gevaş: Artos Dağ, 2850 m., 16 July 1954, *Davis & O. Polunin* (D. 22801); *ibid.*, 2550 m., D. 22734. Prov. Bitlis/Van: mt. 10 km. S.E. of Pelli, 2400 m., 8 July 1954, *Davis & O. Polunin* (D. 22593). Prov. Hakkâri: Cilo Dağ, above Diz deresi, 2400 m., 7 Aug. 1954, *Davis & O. Polunin* (D. 23954—holo. E; iso. K); Kara Dağ, 2700 m., 15 Aug. 1954, *Davis* 24370.

*Habitat*: Rocky mountain sides, 2550–2850 m., often on slopes above streams, usually on limestone.

This attractive species is evidently most closely related to *D. micranthum* Boiss. & Hohen. from Iraqi Kurdistan, from which it is readily distinguished by its less paniculate inflorescence with a spreading viscid indumentum, denser racemes, longer bracts and bracteoles, and erect pedicels. It often has larger flowers. Type material of *D. micranthum* has not been seen, but several recently collected sheets from Iraq show it to be rather variable in flower size (sepals 7–10 mm. long, spur 10–15 mm.) and in the form of its lower bracts; these are described as simple by Boissier and Huth, but in fact they are frequently trifid as they normally are in *D. carduchorum*.

It seems likely that Nábelêk's Turkish record of *D. micranthum* from Hakkari should be referred to *D. carduchorum*, which is the most widespread perennial Delphinium in the mountains of Turkish Kurdistan.

It is possible that *D. carduchorum* in the western part of its range has been "contaminated" by genes from *D. dolichostachyum* Chowdhuri & Davis. Two gatherings of *D. carduchorum—Davis* 22593 (Pelli) and *Davis* 23061 (Kavuşşahap Dağ)—have crisply adpressed indumentum in the region of the inflorescence, and part of *D.* 22593 also has exceptionally long and narrow bracts and bracteoles—variations that are in the direction of *D. dolichostachyum*.

In habit *D. carduchorum* resembles *D. cyphoplectrum* Boiss. from N. Iraq and Persia, but differs in the following important diagnostics: angled stems, nature of the indumentum, usually tripartite lower bracts, position of the bracteoles, slender pointed spur and shape of the pubescent follicles.

**Delphinium dolichostachyum** Chowdhuri & Davis, **spec. nov.**

Affinis *D. carduchorum* Chowdhuri & Davis sed racemo terminali multifloro denso spiciformi, bracteis et bracteolis etiam angustioribus valde prominentibus, indumento inflorescentiae crispe et adpresse puberulo floribus minoribus pallide caeruleis recedit. A *D. dasystachyo* Boiss. & Bal. caule elato ramoso, indumento crispe adpresso, forma foliorum glabrescentium, breacteis inferioribus haud multipartitis minus vaginantibus, bracteis superioribus angustissimis valde differt.

*Herba* perennis, 56–85 cm. alta, radicibus fasciculatis. *Caulis* erectus, acute angulatus, subsulcatus, ad medium plerumque conspicue ramosus, superne crispe ad appresse puberulus, inferne vix glabrescens; rami racemiferi 3–5, tenues, ascendenti-erecti, axe centrali breviores. *Folia* caulina inferiora et mediana palmatim 3–5-secta, 5–8 cm. lata, glabrescentia, longe petiolata; segmenta profunde 3–5-partita, laciniis linearilanceolatis vel lanceolatis 2–5 mm. latis acutis vel acuminatis; petiolus

striatus, basi sensim subvaginatus; folia caulina superiora pauca, minora, trisecta, parce et adpresse puberula vel glabrescentia segmentis angustioribus, petiolo 0·5–4 cm. longo basi parce ciliato subvaginato sed vix amplexicauli; folia basalia et caulina inferiora subanthesi emarcida. *Racemus* terminalis 13–23 cm. longus, densus, multiflorus (ad 45-florus), spiciformis, lateralibus longior. *Bracteae* (praesertim eae racemi terminalis) prominentes; infimae 1 vel 3 foliosae, plurisectae, pedicellis multo longiores, basi anguste vaginatae; inferiores et medianae tripartitae segmentis linearisubulatis flores aequantibus vel paulo superantibus; superiores simplices lineari-subulatae ut pedicelli et bracteolae crispe puberuli flores subaequantes. *Pedicelli* 9–25 mm. longi, ascendenti-erecti. *Bracteolae* linearisubulatae in parte superiore pedicelli affixae sepaļa subaequantes vel etiam superantes. *Flores* pallide caeruleae, parvae. *Sepala* 6–9 × 3–4 mm., oblongo-obovata vel elliptico-ovata, ad apicem obtusa vel rotundata, intus glabrescentia, extra dense adpresse puberula; calcar 9–12mm. longum, tenue, attenuatum, acutum, plerumque deorsum curvatum, interdum strictum. *Petala* inclusa; superiora bina, glabra, limbo parvo breviter bifido basi in calcar tenue acutum attenuata; petala inferiora bina 8–9 mm. longa, limbo late ovato (4–5 × 4–5 mm.) supra medium bifido facie barbato in stipitem puberulam vix longiorem angustato. *Carpella* tria, pubescentia; styli caerulescentes. *Folliculi* ovato-oblongi (5–)7–9 × 3–4 mm., subpatentim hirsuto-pubescentes. *Semina* triquetra, 1·5 mm. longa, squamata.—Floret Aug.

TURKEY. Prov. Bitlis, dist Kotum (Turkish Kurdistan): Karz Dağ above Kamer, 2200 m., in limestone ravine, 24 Aug. 1954, *Davis & O. Polunin* (D. 24566—holo. E; iso. K).

*D. dolichostachyum* is certainly very closely related to *D. carduchorum* Chowdhuri & Davis described above, a species that is common in the mountains to the East of it. The present species differs from the latter in the long, dense, spike-like inflorescence of the main stem, more prominent and even narrower bracts and bracteoles, smaller, pale blue flowers, and crisply adpressed puberulous indumentum of the inflorescence (see note under *D. carduchorum*).

In its dull inflorescence of small pale flowers, it shows some resemblance to *D. dasystachyum* Boiss. but differs markedly in the following characters: tall, branching stem, crisply adpressed indumentum of the inflorescence, almost glabrous leaves with fewer segments and a longer petiole with a less conspicuously vaginate base, tripartite (instead of multipartite) lower bracts with a much less vaginate base, and linear-subulate (instead of broadly ovate, membranous and acuminate) upper bracts.

On the Edinburgh sheet (holotype) the inflorescence is perfect but the median and lower stem leaves have withered away; these are present in the Kew specimen in which the top of the stem has been eaten off. More material is required of this rather critical species.

**Delphinium vanense** Rech. fil. in Symb. Bot. Upsal. xi (5), 8 (1952).

TURKEY. Prov. Van: Olsus am Vans-see, 20 km. O.S.O. von Tatvan, 1900 m., *Frödin* 328 (holo. Upsala!); dist. Gevaş; Artos Dağ, 2850 m., 16 July 1954, *Davis & Polunin* (D. 22753). Prov. Bitlis/Van: mt. 10 km. S.E. of Pelli, 2550 m., *Davis & O. Polunin* (D. 22542).

Additional material of this delightful species necessitates some amplification of the original description: Rechinger's description seems to cover only one of the two specimens on the type sheet. The inflorescence varies from hirsute and viscid to glabrous. Similarly the carpels are hairy or sometimes glabrous. The basal leaves vary from 3·6–6 cm. in diameter, the segments being oblong-linear and acute, whereas in the smaller cauline leaves they are linear, c. 1 mm. broad. The spur (figured by Rechinger as truncate at the tip) is broadly obtuse.

*D. vanense* is closely related to *D. cyphoplectrum* Boiss. var. *stenophyllum* Boiss. (Persia), and to the Kurdish *D. quercetorum* Boiss.

**D. peregrinum** L., Sp. Pl. 531 (1753), vix ed. 2, 749 (1762); Sibth. & Smith, Fl. Graeca, vi, t. 506 (1826).

Much confusion has surrounded the nomenclature and taxonomy of *D. peregrinum* L. and *D. halteratum* Sibth. & Sm. It is clear from the synonymy in the first edition of the Species Plantarum that *D. peregrinum* (despite the Sicilian and Maltese localities cited) should be typified by the specimen in the Herbarium Cliffortianum (BM). This is—most fortunately—the species with the blade of the lower petals attenuated into the stipe and generally accepted as *D. peregrinum* L. by most taxonomists. The fact that the specimen in the Linnaean herbarium is the plant later described as *D. halteratum* Sibth. & Sm. is interesting, but irrelevant.

*D. peregrinum* is common in Turkey. Though it penetrates into the Pontic and even Irano-Turanian regions, it is centred in the Mediterranean territory. Material from the Amanus (*Haradjian* 2158, 611, 690) and Mardin (*Sintenis* 1207) has unusually dense and many-flowered spikes (var. *densum* Post) and the petals are usually somewhat exserted. Nearly all the Turkish material has more or less hairy carpels (var. *eriocarpum* Boiss.), and the same applies to specimens from Cyprus, N. Iraq and the Lebanon. In Greece, Dalmatia and Albania glabrous-fruited forms predominate; both types occur in the Aegean islands.

In this account no attempt is made to recognise any infraspecific categories within *D. peregrinum* or *D. halteratum*. That will require a thorough morphological analysis on a geographical basis, and some experimental knowledge of the group.

**Delphinium halteratum** Sibth. & Smith, Prodr. Fl. Graeca i, 371 (1806), et Fl. Graeca, vi, t. 507 (1826).

TURKEY. Bithynia, *Grisebach* (K). Prov. Kastamonu: Kastambuli, near Kadi-Oglu-Chan in Karadere, *Sintenis* 4949 (*D. paphlagonicum* Freyn & Sint., ms.—ad *D. venulosum* vergens).

*D. halteratum* is evidently a rare plant in Turkey, most of the specimens cited by Huth being either *D. peregrinum* L. or *D. venulosum* Boiss.; he even cites the holotype of the latter (which he nevertheless maintains as a distinct species) under *D. halteratum*! In the only two Turkish gatherings of *D. halteratum* that we have seen at Kew, the carpels are glabrous. Of these, Grisebach's specimen is typical of Greek *D. halteratum*, but *Sintenis* 4949 approaches *D. venulosum* (which extends into the same province) in its often exserted petal limb and in the stems being glabrescent above; the thin, multifid leaves and relatively large follicles, however, are typical of *D. halteratum*. What has been going on at Kastamonu?

In its general distribution, *D. halteratum* is more western than *D. peregrinum*, being abundant in the Western Mediterranean (S. Europe) whereas *D. peregrinum* is rare—and possibly alien—west of Dalmatia. *D. halteratum* is absent from Cyprus; indeed, the Turkish records probably constitute the species' most eastern extension.

**Delphinium venulosum** Boiss., Fl. Or. i, 86 (1867).

Syn.: *D. halteratum* Sibth. & Sm. var. *venulosum* (Boiss.) Fin. & Gagnep. in Bull. Soc. Bot. France, li, 470 (1904).

TURKEY. In cultis Cappadociae circa Caesaream, a. 1856, *Balansa* (holo. G; iso. K!). Prov. Ankara: Ankara, *Uvarov* 98; Fursu deresi, 23 Aug. 1936, *Gassner* 701; Hacikadin, a. 1945, *Başarman*; Ankara, 7 Sept. 1933, *Krause* 4460; above Tuz gölu, 25 km. N. of Koçhisar, 900 m., 29 Jul. 1956, *McNeill* 336b (with *D. Raveyi* Boiss.). Yenişehir, 2 Aug., *Kotte* 143. Prov. Kayseri: Talas, a. 1941, *Heilbronn & Başarman*. Eskişehir, a. 1825, *Liston*. Prov. Amasya: Ak Dağ, 200–600 m., a. 1890, *Bornmüller* 1529; Sulu ova at Merzifon, a. 1890, *Bornmüller* 3093; at Merzifon, 600–700 m., a. 1890, *Bornmüller* 2674. Prov. Kastamonu: Tosya, *Sintenis* 4627.

Whereas *D. halteratum* and *D. peregrinum* have their general distribution in Mediterranean territory, *D. venulosum* is endemic to inner Anatolia and belongs to the Irano-Turanian element. A key to these three critical species, as they occur in the Levant, is given below.

1a. Limbs of lower petals orbicular, truncate or cordate at base, abruptly contracted into a stipe; carpels usually glabrous:

2a. Limb of lower petals exserted; follicles c. 5 mm. long, 1·5–2 times as long as broad; stem leaves tripartite into broad segments, or subentire, the upper ones much reduced, those below the inflorescence deciduous at flowering time . . . *D. venulosum*

2b. Limb of lower petals ± included; follicles c. 8 mm. long, 2–3 times as long as broad; stem leaves multipartite, thinner, at least the upper and median ones persistent at flowering time *D. halteratum*

1b. Limb of lower petals elliptical, ovate, or obovate, gradually tapering into a stipe; carpels usually pubescent, c. 8 mm. long. Median and lower leaves divided, usually multipartite. Habit more virgate than *D. halteratum*, with more reduced (mostly simple) upper leaves, the lower and median ones mostly deciduous at flowering time. *D. peregrinum*

## SUNGENUS CONSOLIDA (DC.) DALLA TORRE & HARMS, Genera Siphon. 165 (1901)

The entirely annual Subgenus *Consolida* is distributed for the most part in Western Asia and adjoining parts of S. Europe and N. Africa. About half the total number of species occur in Turkey, where the group is centred in the Irano-Turanian provinces.

In this subgenus the form of the "petal" is of paramount importance as a specific criterion; shape of follicle, length and form of sepal spur, and (within limits) nature of indumentum provide other diagnostic

criteria for the separation of species. In particular, a group of species centred around *D. anthoroideum* Boiss. and another around *D. tomentosum* Aucher are taxonomically critical, and are discussed at some length below, where they are referred to as the "*anthoroideum*" and the "*tomentosum*" groups respectively. The flowers in this subgenus are obviously highly specialized and presumably visited by long-tongued pollinators. The pattern of variation, however, suggests that interspecific hybridisation may occur, and signs of it should be looked for in the field.

**Delphinium anthoroideum** Boiss. in Ann. Sci. Nat. Ser. ii, xvi, 369 (1841), non sensu Boiss., Fl. Or. i, 85 (1867). [Fig. 1,A.]

Syn.: *D. acutilobum* Turrill in Kew Bull. 1929, 223 (1929) et in Hook., Ic. Pl. Ser. V, ii, t. 3151 (1932).

*Lectotype*: Syria, *Aucher* 65 (G!).

TURKEY. Prov. Van: Zab gorge, 25 miles S. of Başkale, 2000 m., fallow fields, annual, fl. lavender, 2 Aug. 1954, *Davis & Polunin* (*D.* 23802).

IRAQ. Awiheng, 1520 m., a. 1867, *Haussknecht* (K); *ibid.*, in vineis pr. Sihna, 1830 m., *Haussknecht*.

PERSIA. Ispahan, *Aucher* 4032 (G, K). Distr. Tabriz, near Yam, 21 Aug. 1927, *Gilliat-Smith* 2086 (*D. acutilobum*); *ibid.*, mid-July 1928, *Gilliat-Smith* 2365 (*D. acutilobum*). S.W. Persia, *Sawyer* 13035.

This species has been widely misinterpreted. When Boissier first described *D. anthoroideum* (1841) he based it on three specimens from Aucher-Eloy's Orient collections. Examination of these gatherings (on loan from Geneva) shows that two of them, "N.65, Syria" and "4032, Ispahan", agree with the original description, while the third, "65 bis, ad Euphratem" (Cappadocia) does not. (The latter is, in fact, *D. sclerocladum* Boiss. var. *pseudoanthoroideum* Hossain & Davis described below). Aucher's specimen from Syria is, unfortunately, a much better one than his gathering from Ispahan, so that it must be chosen as the lectotype despite the doubt which must be attached to its localisation. No other specimen of this taxon is known from Syria, and Aucher's important collections are notorious for the muddle which surrounds them.

Boissier's subsequent description of *D. anthoroideum* in his Flora Orientalis (1867) differs from the original one, especially with regard to the relative lengths of the upper and intermediate "petal" lobes—characters of specific importance in this subgenus—but agrees with Aucher's specimen "65 bis, ad Euphratem". Boissier did not cite any of the original specimens with this second description, nor did he, in any way, account for the change in circumscription and content.

Turrill, when he described *D. acutilobum* from Tabriz, differentiated it from *D. anthoroideum* of Flora Orientalis, whereas it is, in fact, the true *D. anthoroideum* of 1841.

Of the specimens cited by Boissier in Flora Orientalis under *D. anthoroideum* none probably represents the true *D. anthoroideum*, which (unless we accept Aucher's Syrian record) is known with certainty only from Kurdistan and Persia (W. & S.W.). See remarks under *D. sclerocladum* on p. 411.

**Delphinium stenocarpum** Hossain & Davis, **spec. nov.** [Fig. 1,B,C.]

Affinis *D. Aconiti* L. et *D. anthoroideo* Boiss.; a primo ramis tenuissimis, indumento adpresse canescente, lobo superiore petali bifido, folliculo breviore abruptius rostrato differt; ab altero lobo superiore petali medianis sublongiore, sinu inter lobis medianis et inferioribus latissimo, folliculis longioribus et angustioribus attenuatis recedit.

*Planta* annua, gracilis, 25–40 cm. alta. *Caulis* dense et adpresse puberulo-canescens (indumento superne sparso), rigidus, 1·5–2 mm. latus, a basi in ramulos tenuissimos laxifloros divaricatim ramosus. *Folia* subanthesi ± emarcida, adpresse puberula, laciniata; inferiora petiolo 10 mm. longo laminam in segmenta laciniata (laciniis omnibus linearibus acutis) trisectam aequante; summa bracteis similia, sessilia, integra, 5–7 mm. longa, linearia, acuta. *Flores* pedicellati, axillares, sparsi, in vivo pallide lilacino-caerulei, in sicco sordide albidi. *Pedicelli* adpresse puberuli, 4–6 mm. longi (in floribus terminalibus ad 15 mm. longi). *Bracteae* subulatae, 3–4 mm. × 1 mm. *Bracteolae* breviter subulatae, 1·5–2 mm. × 0·5 mm., alternatae, in floribus axillaribus saepe ad basin pedicelli subverticillatae. *Sepala* 6–7 mm. longa, elliptica, latitudine duplo longiora, acuta, extra ad nervos medianos pubescentia et virescentia, marginibus membranaceis pallidis; calcar pubescens, 12–14 mm. longum, curvato-oblongum, paulum deorso flexum, apice rotundatum. "*Petalum*" quinquilobatum, 12–14 mm. longum (calcare incluso), basi subcordatum; lobus superior 1·5–1·75 mm. longus, caerulescens, ad medium in lobulos rotundatos bifidus; lobi intermedii anguste dentiformes, acuti, 1 mm. longi; lobi inferiores magni, basi rotundati a caeteris sinu latissimo sejuncti; calcar in calcare sepalino inclusum, apicem versus angustatum et circinatim involutum. *Stamina* c. 20, inaequalia; filamenta inferne parce pubescentia in duas partes superiores angustata setacea, superne glabra; antherae 0·5–1 mm. longae, purpureo-fuscae. *Carpellum* unicum; ovarium glabrum, 1·5 × ·05 mm.; stylus ovarium aequans. *Folliculus* lineari-oblongus, 10–13 × 1·5–2 mm. (rostro excluso), glaber, ad apicem rotundatus et abrupte rostratus, basi sensim attenuatus; rostrum 3–3·5 mm. longum. *Semina* subrhomboidea, squamis breviusculis praedita. Fl. Jul.—Sept.

TURKEY. Prov. Konya (Lycaonia): between Ağabeyli and Körkuyu, in *Artemisia* steppe, fl. pale lilac-blue, 8 Sept. 1949, *Davis* 16638 (holo. E; iso. K); Boz Dağ near Konya, 1300 m., fallow field, 8 Sept. 1949, *Davis* 16643 (K). Lycaonia: Vilayet Konia, Steppe bei Korasch, distr. Ereğli, Jun. 1912, *Siehe* 387 (BM). Prov. Kayseri: plaine de Caesarée (Cappadoce), 1200 m., 1856, *Balansa* 857 (K). Prov. Niğde: between Bor and Niğde, 1953, *Seton-Williams, du Platt Taylor & Munn-Rankin* (BM—depauperate specimen).

This delicate and distinctive new species is apparently confined to Central Anatolia, where it is found in the steppe of Lycaonia and Cappadocia. It is closely related to *D. aconiti* L. (from N.W. Turkey) and to the true *D. anthoroideum* Boiss., differing from both in the well-marked characters of flower and fruit cited in the diagnosis. Balansa's specimen of *D. stenocarpum* was placed under "*D. anthoroideum*" in Boissier's Flora Orientalis. It seems surprising that this distinctive new species has remained unrecognized in herbaria for a century.

**Delphinium sclerocladum** Boiss., Diagn. Ser. I (8), 8 (1849).

*Key to the varieties*

1a. Stem puberulous with interspersed spreading glandular hairs; racemosely branched, ± pyramidal, rigid up to the ultimate branches . . . . . var. *sclerocladum*

1b. Stem adpressed puberulous without glandular hairs, sometimes glabrescent:

2a. Branches (especially the basal ones) widely divergent; ultimate branches slender . . . . . var. *pumilum*

2b. Branches ascending:

3a. Stem usually repeatedly branched, ultimate branches ± slender var. *pseudoanthoroideum*

3b. Stem usually once or twice branched, ultimate branches rigid and thick . . . . . var. *rigidum*

var. **sclerocladum.**

Syn.: *D. anthoroideum* Boiss. var. *sclerocladum* (Boiss.) Boiss., Fl. Or. i, 85 (1867).

*Holotype:* in montibus demissioribus Syriae borealis inter Latakieh et Aleppum, *Boissier* (G!).

TURKEY. Prov. Mersin: ruines de Pompeiopolis, au S.O. de Mersina, Oct. 1855, *Balansa* 730 (as *D. anthoroideum*; K).

var. **rigidum** (Freyn & Sint.) Hossain & Davis, **comb. nov.**

Syn.: *D. anthoroideum* Boiss. var. *rigida* Freyn & Sint. in Oest. Bot. Zeitschr. xli, 363 (1891).

*Type*: Armenia Turcica: Chama ad Euphratem, Ichtik prope Tuzla, 15 Jul. 1890, *Sintenis* 2969 (Vienna & Frankfurt, n.v.).

TURKEY. Prov. Sivas: in ditione oppidi Divriki, 1000 m., Jul. 1893, *Bornmüller* 3221 (as *D. anthoroideum*, E). Prov. Konya: Kasa Ereğli; Steppe bei Korasch, June 1912, *Siehe* 387 p.p. (as *D. anthoroideum*, E).

var. **pumilum** (Huth) Hossain & Davis, **comb. nov.**

Syn.: *D. anthoroideum* Boiss. var. *pumilum* Huth in Engler, Bot. Jahrb. xx, 366 (1895).

*Type*: Not designated.

SYRIA. Circa Zebdaine prope Damascum, in arvis supra Bludan, 1680 m., 6 Jun. 1855, *Kotschy* 103 (as *D. anthoroideum*, K).

LEBANON. Inter Bekfaya et Biskinta, in regione media, 1300 m., 15 Jun. 1897, *Bornmüller* 32 (as *D. anthoroideum*). In declivitatibus subalpinis, in aridis prope Ain Zahalta, 1200–1300 m., 13–20 Jun. 1910, *Bornmüller* 11324 (as *D. anthoroideum* var. *sclerocladum*).

This variety is centred in the subalpine zone of the Lebanon and Anti-Lebanon, and no Turkish specimens of it have been seen.

var. **pseudoanthoroideum** Hossain & Davis, **var. nov.** [Fig. 1,D.]

A typo caule adpresse puberulo ramis tenuibus divergit. Rami ascendentes, saepe crebre ramosi.

*Type*: Syria: Yebrud, 1370 m., edge of vineyards, 8 Aug. 1945, *Davis* 10030 (holo. E; iso. K, E).

TURKEY. Cappadocia, ad Euphratem, *Aucher* 65 bis (G).

SYRIA (Anti-Lebanon). Between Nebk and Falita, at Sahel, fallow fields, 21 June 1943, *Davis* 6477. Yebrud, in marly vineyards, 1370 m., 9 Aug. 1945, *Davis* 9992. Nebk, near Sahel, fallow fields, fl. mauve with a long erect pouch, 21 June 1943, *Davis* 6477A.

In his Flora Orientalis Boissier reduced *Delphinium sclerocladum* to a variety of *D. anthoroideum* which (as has already been mentioned in our account of that species) is not conspecific with the true *D. anthoroideum* of 1841, and for which a new name must therefore be found. *D. sclerocladum* agrees with "*D. anthoroideum*" of Flora Orientalis in floral characters, but differs from it in branching and indumentum. Nevertheless there is no doubt that the two plants belong to the same species, and that *D. sclerocladum* Boiss. is the correct specific name.

*D. sclerocladum* is distinguished from the true *D. anthoroideum* in having the intermediate lobes of the "petal" triangular, acute and slightly shorter than the upper lobe, and in its geographical distribution. The species grows in Syria, Lebanon and Anatolia, whereas *D. anthoroideum* is found in Kurdistan and Persia.

The specimens referred to "*D. anthoroideum*" in Flora Orientalis (1867) are diverse: *Balansa* 857 is *D. stenocarpum* and *Kotschy* 103 is *D. sclerocladum* var. *pumilum*. We have not seen Haussknecht's specimen from Aintab nor Boissier's from between Antioch and Aleppo, though their geographical position suggests that they belong to *D. sclerocladum* sens. lat.

*Aucher* 65 bis (ad Euphratem), one of the original syntypes of *D. anthoroideum*, is in fact *D. sclerocladum* var. *pseudoanthoroideum*. *D. sclerocladum* var. *pumilum* and var. *rigidum* were originally described as varieties of *D. anthoroideum*. We have not seen type material of either of these, but have examined other specimens referable to them. The varieties of *D. sclerocladum* need further collecting and collateral cultivation before their status can be satisfactorily decided.

**Delphinium Hohenackeri** Boiss., Fl. Or. i, 85 (1867). [Fig. 1,E.]

*Lectotype*: Prov. Gümüşane: in Armenia prope Baibout [in pascuis aridis montis Ceek prope Baibout, 12 Jul. 1862], *Bourgeau* 7 (G! E! K!).

TURKEY. Prov. Gümüşane: inter Ardas et Besch-klissa, 19 Jul. 1889, *Sintenis* 1336; Gümüşane, 1000 m., steep non-lime sandy banks and rocks, 28 June 1924, *E. K. Balls* 1441A; Gümüşane, Nuvena-deresi, in campis, 19 Jul. 1894, *Sintenis* 7110. In Armenia prope Erzeroum, *Calvert*; Erzeroum *Zohrab* 787. Prov. Artvin: Artvin, Berta, 800 m., July 1912, *Holmberg* 2408; Artvin, in decliv. aridis circa P. Lomaschen prope Artvin, 24 Jun. (7 Jul.) 1907, *Andronaki* 178. Between Kayseri and Sivas, waste ground, hot dry plains with *D. orientale*, 1280 m., 20 June 1934, *E. K. Balls* 1441.

Boissier cited four specimens with his original description of *D. Hohenackeri*. Of these, Aucher's Cappadocian specimen (no. 65, on loan from Geneva) is not only at variance with the original description, but is also

a syntype of the earlier *D. anthoroideum* Boiss. where it is cited as "65 bis"; it is referred by us to *D. sclerocladum* Boiss. var. *pseudoanthoroideum*.

We have examined the syntypes collected by Bourgeau (Baybury) and Calvert (Erzurum), both of which agree with the type description, but we have been unable to find Hohenacker's specimen from Talysch. Nevertheless, there is a specimen of *D. Hohenackeri* (as *D. Aconiti*) in the Boissier Herbarium labelled as "Talusch, *Meyer* a. 1842", and at Kew a sheet collected by Hohenacker in 1838 from "Kaelaechan in ditione Swant Georg. Cauc."; one of these may possibly be syntype material. In view of this ambiguity, it seems best to choose Bourgeau's representative gathering as the lectotype of *D. Hohenackeri*.

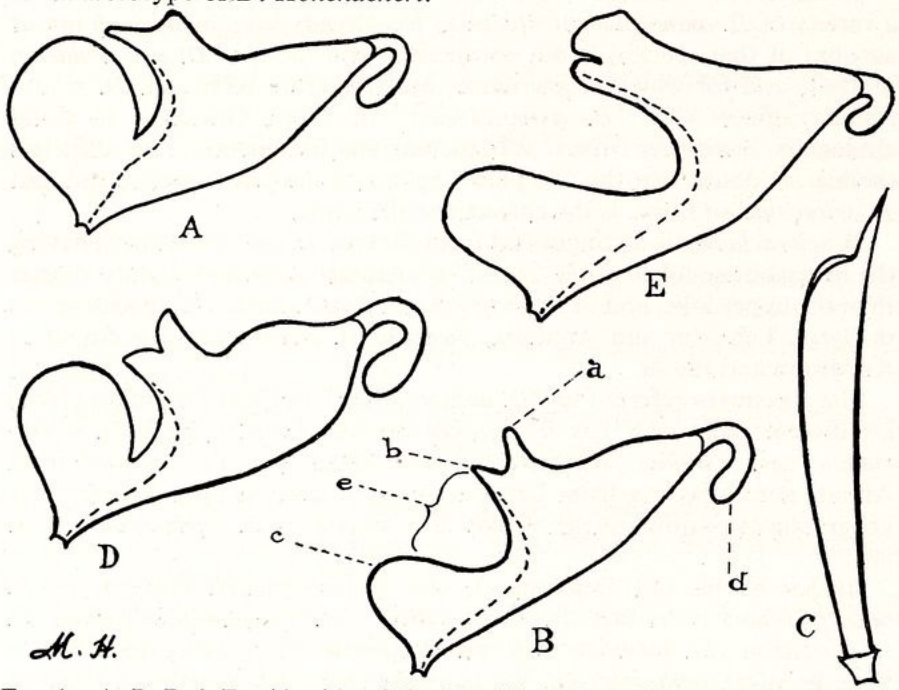


FIG. 1. A, B, D & E—side view of the "petal". A, *D. anthoroideum* Boiss. (*Davis* 23802); B, *D. stenocarpum* Hossain & Davis (*Davis* 16638); C, follicle of same; D, *D. sclerocladum* Boiss. var. *pseudoanthoroideum* Hossain & Davis (*Davis* 10030); E, *D. Hohenackeri* Boiss. (*Balls* 1441A). a, upper lobe; b, one of two intermediate lobes; c, one of two lower lobes; d, circinately involute spur-apex; e, sinus between the intermediate and lower lobes. All ×4.

Typical *D. Hohenackeri* is apparently confined to Turkish Armenia, Transcaucasia and Persia. However, there are at Kew two specimens from Lebanon (and possibly Syria), both labelled as *D. anthoroideum* Boiss., that seem to belong to *D. Hohenackeri*. These are: Syria, *Pinard* a. 1846; Syria, prope Eden, *Boissier* a. 1846. They are not typical of *D. Hohenackeri*, but in floral morphology come closer to it than to any other species. The spur is as short and involute as in *D. Hohenackeri*; the intermediate "petal" lobes are rather obtuse, and, together with the upper lobe, form a short, tube-like body. But the upper and intermediate lobes are not as approximate as in this species, and the habits of the two specimens are atypical. Nevertheless, these specimens cannot be assigned to a variety of *D. sclerocladum* which is the common species of this affinity in Lebanon and Syria.

A key to those species of the "*anthoroideum*" group which are found within the limits of Turkey is given below.

1a. Spur apex uncinate-saccate; lower lobes of "petal" triangular. Follicle 14–17×3–4mm. (Mardin) . . . *D. saccatum* Huth.

1b. Spur apex circinately involute; lower lobes of "petal" not triangular and acute:

2a. Intermediate lobes of "petal" protruding and longer than the shortly bifid upper lobe. Follicle semi-ovate, 8–10×3–4 mm. (Kurdistan) [Fig. 1,A.] . . . . . *D. anthoroideum* Boiss.

2b. Intermediate lobes of "petal" shorter than the upper lobe or more or less equal:

3a. Intermediate lobes of "petal" acute:

4a. Lower lobes of "petal" ± approximate to the intermediate lobes, ovate; intermediate lobes broadly triangular; follicle semi-ovate, 6–9×2–3 mm. (Anatolia). [Fig. 1,D.] *D. scleroclad um* Boiss.

4b. Lower lobes of "petal" separated from the intermediate lobes by a broad sinus; intermediate lobes narrowly triangular, sharply acute; follicle linear or linear-oblong:

5a. Follicle linear-oblong with attenuated base and rounded, abruptly rostrate apex, 10–13×1·5–2 mm.; stem adpressed canescent (Central Anatolia). [Fig. 1,B.] *D. stenocarpum* Hossain & Davis

5b. Follicle linear with gradually rostrate apex, 15–22×1·5–2 mm.; stem velvety with whitish spreading hairs. (Dardanelles) . . . . . *D. Aconiti* L.

3b. Intermediate lobes of "petal" obtuse:

6a. Ultimate branches rigid; stem velvety with whitish spreading hairs interspersed with glandular hairs (Thrace to Galatia) *D. Thirkeanum* Boiss.

6b. Ultimate branches rather slender; stem adpressed pubescent, with glandular hairs only at the top of branches and pedicels (Armenia). [Fig. 1,E.]. . . *D. Hohenackeri* Boiss.

**Delphinium oliganthum** Boiss., Fl. Or. i, 80 (1867). [Fig. 2,C.]

*Lectotype*: Ad segetes prope Aintab, Syriae bor., *Haussknecht* p.p. (G! K!).

TURKEY. Prov, Mardin: Deir Zafran, 19 Jun. 1888, *Sintenis* 1131; Mardin, *Post* a. 1899. Prov. Diyarbakir: a. 1867, *Holmes*; Diyarbakir—Silvan, fallow field, fls. violet blue, 24 June 1954, *Davis* 22106. Urfa—Diyarbakir, Jul. 1936, *Gleisberg* 105. Anatolia, a. 1844, *Noë* 325.

The original description of this species (a member of the "*tomentosum*" group) was based on three syntypes. Haussknecht's gathering, which we have chosen as the lectotype, contains specimens of both *D. oliganthum* and *D. hellesponticum* Boiss. under the former name. However, with the help of the original description it is not difficult to pick out the specimens of *D. oliganthum*. Of the two other syntypes, *Aucher* 77 (Persia) appears to be a variant of *D. tomentosum* Aucher; this specimen had, in fact, been one of the original syntypes of *D. tomentosum* Aucher (apud Boiss. in Ann.

Sci. Nat. Ser. II, xvi, 365: 1841). The third syntype of *D. oliganthum*, collected by Blanche between Hama and Palmyra (Syrian Desert), does not appear to be in the Boissier Herbarium. It is evident that at least two different taxa were originally included under *D. oliganthum* by Boissier.

*D. oliganthum* is very closely related to *D. tomentosum* [Fig. 2,D.] and has been differentiated from it on the basis of its spur being shorter than the sepals and in the lateral lobes of the "petal" being horizontal. While all Turkish specimens so far examined show these characters and are morphologically uniform, some Syrian specimens must be classed as intermediate between the two taxa, the diagnostic characters varying in different degrees. Further studies may reveal that *D. tomentosum* and *D. oliganthum* belong to a single polytopic species, and that it might be advisable to treat the latter as a subspecies of the former. *D. oliganthum*, maintained here as a species, has only been seen from the Mesopotamian region of Turkey and N. Iraq. *D. tomentosum* is apparently confined to Syria, and possibly Persia; it should be typified by *Aucher* 75 (Syria!). The closely-allied *D. hellesponticum* (revised below) is centred in Anatolia.

**Delphinium hellesponticum** Boiss. in Ann. Sci. Nat. Ser. II, xvi, 366 (1841).

*Key to the subspecies*

1a. "Petal" 13–15 mm. long, 12–13 mm. broad; plants usually 25–40 cm. tall; flowers rather laxly arranged in the racemes. (N. Greece, Paphlagonia, Galatia, etc.) . . . . subsp. *macedonicum*

1b. "Petal" 9–12 mm. long, c. 10 mm. broad; plants usually 10–20 cm. tall; flowers rather closely arranged in the racemes:

2a. Bracteoles 10–15 mm. long; lowest pedicel 25–40 mm. long; terminal raceme (on the main stem) pyramidal, prominent (Aintab, Aleppo) . . . . . subsp. *aintabense*

2b. Bracteoles 4–7(–8) mm. long; lowest pedicel usually 15–20 mm. long; terminal raceme seldom prominent:

3a. "Petal" yellowish when dry, often with pinkish shades, 10–11 mm. long; sepals violet inside (Lycia, Caria, Phrygia). [Fig. 2,A.] subsp. *campylopodum*

3b. "Petal" usually light blue when dry, often pinkish white, 9–10 mm. long; sepals violet-blue inside (mainly Central Anatolia) subsp. *hellesponticum*

subsp. **hellesponticum.**

*Type*: Ad Hellespontum, *Aucher* 67 (G; K!).

TURKEY. Prov. Kayseri: Hissardschik near Kayseri, 13 June 1927, *Kadri Ahmed.* Prov. Ankara: Çubuk, 2 Jul. 1937, *Krause* 5126; Ankara, Bergsteppe, 6 Jul. 1932, *Kotte*. Ankara, *Uvarov* 22; above Tuz Gölu, 25 km. N. of Koçhisar, 925 m., 29 Jul. 1956, *McNeill* 3364. Elaziğ, a. 1944, *F. Sayi.* Prov. Niğde: between Taşpinar and foot of Hasan Dağ, 100–1100 m., flowers dark violet, 15 June 1952, *Davis* 18878; near Niğde, 22 June 1927, *Kadri Ahmed.* Amasya, 19 Jul. 1892, *Manisadjian* 261.

subsp. **macedonicum** (Hal. & Charrel) Hossain & Davis, **comb. et stat. nov.**

Syn.: *D. macedonicum* Hal. & Charrel in Abdur Rahman Hadji Effendi, Empire Ottoman Geogr. Bot., Faits Nouv. relatifs à la prov. Salonique, 8 (1892); Turrill in Hook. Ic. Pl. Ser. V, ii (3), tab. 3152 (1932).

*D. paphlagonicum* Huth in Bull. Herb. Boiss. i, 328 (1893).

*D. holopetalum* Boiss. var. *paphlagonicum* (Huth) Huth in Engler, Bot. Jahrb. xx, 381 (1895).

*Type*: Macedonia, *Frivaldsky* (G!).

GREECE. Thrace: Zanthie (Souné Mahalla), rocky hill slopes, 90 m., 11 Jul. 1930, *H. G. Tedd* 476.

TURKEY. Prov. Kastamonu: Tossia, in montosis, Jul. 1892, *Sintenis* 4547 (type of *D. paphlagonicum*.). Çankiri, 800–900 m., 28 Jun.—3 Jul. 1929, *Bornmüller* 13695. Amasya, a. 1891/1892, *Manisadjian* 652. Prov. Ankara: Ankara steppe, July-Aug. 1931, *Uvarov* 4; *ibid.*, *Uvarov* 13; ditionis oppidi Angora in valle Kawakli-dere, 900 m., 3–13 Mai. 1929, *Bornmüller* 13693. Pontus galaticus australis: Soulouserai, in apricis, 1000 m., 4 Aug. 1889, *Bornmüller* 970. Prov. Konya, distr. Ereğli: Braachen bei Perinde, 1600 m., Jul. 1912, *Siehe* 432 (atypical).

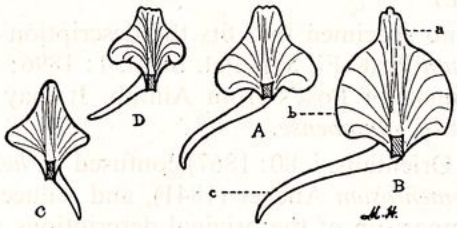


FIG. 2. "Petal" spread open. A, *D. hellesponticum* Boiss. subsp. *campylopodum* Freyn (*Pichler*); B, *D. armeniacum* Stapf (*Balls* 1756); C, *D. oliganthum* Boiss. (*Davis* 22106); D, *D. tomentosum* Aucher (*Bornmüller* 11326). a, upper lobe; b, lateral lobe; c, spur. All natural size.

subsp. **campylopodum** (Freyn) Hossain & Davis, **comb. et stat. nov.** [Fig. 2,C.]

Syn.: *D. campylopodum* Freyn in Denkschr. Acad. Wiss. Wien, Math. Naturw. Cl. li, 358 (1886).

A subsp. *hellespontico* floribus submajoribus colore sepalorum et petali diverso recedit; a subsp. *aintabensi* Hossain & Davis bracteolis brevioribus et colore floris diverso differt.

*Caulis* fere 10–20 cm. altus, vix altior, simplex vel dichotome divaricatim ramosus. *Racemi* plerumque ± oblongi. *Pedicelli* infimi 15–20 mm. longi, superiores sensim diminuto. *Bracteolae* 4–7 (rarissime –8) mm. longae. *Flores* bicolores: sepala intus violacea; "petala" in sicco flavida vel saepe puniceo-flavida, 10–11 mm. longa, e basi saepe manifeste subcordata et ad apicem plerumque longitudinaliter distincte violaceo-nervosa; calcar sepali 12–16 mm. longum.

*Lectotype*: Lycia: ad Owadjik, 1 Aug. 1882, *Luschan* (WU!).

TURKEY. Lycia: in arvis ad imum montem Ak-dagh, 4 Jul. 1860, *Bourgeau* 7; Elmalu, Jul. 1883, *Pichler*; auf Brache akern bei Soile, nächst Elmali, Jul. 1883, *Pichler*; ad Gilwegy Jaillassy, 16 Aug. 1882, *Luschan*;

in monasteri ruinis supra Owadjik, 2 Aug. 1882, *Luschan*. Prov. Denizli: planities Cariae ad meridiem Cadmi, Jun. 1841, *Boissier*. Prov. Kutahya: Ouchak (Uşak), c. 910 m., bord des sentiers, 16 Jul. 1857, *Balansa* 1132. (All these specimens, with the exception of those collected by Luschan, were found labelled as *D. tomentosum* Aucher).

subsp. **aintabense** Hossain & Davis, **subsp. nov.**

A subsp. *hellespontico* floribus majoribus et bracteolis manifeste longioribus differt.

*Caulis* 10–20 cm. altus, simplex vel e basi parce ramosus. *Racemus* terminalis pyramidalis, lateralibus multo major. *Flores* longe pedicellati. *Pedicelli* infimi 25–40 mm. longi, superne sensim diminuti. *Bracteolae* 10–15 mm. longae. *Sepala* intus caeruleo-violacea. "*Petala*" ex sicco lilacino- vel puniceo-albida, 11–12 mm. longa. *Calcar* sepali 12–14 mm. longum.

TURKEY. Prov. Gaziantep: Aintab (Gaziantep), June 1889, *Post* (holo. BM, as *D. tomentosum* Aucher); Mt. Dulluk Baba au N. d'Aintab, 910–1220 m., *Haradjian* 1415 (K).

SYRIA. In agris pr. Aleppum, 20 Mai. 1841, *Kotschy* (K, BM, as *D. tomentosum* Auch.)

We have seen no specimen that fits the description of *D. tomentosum* var. *longicalcaratum* Post (Fl. Syr. Pal. Sinai, 1: 1896; ed. 2, i, 22: 1932), based on a specimen of Post's from Aintab. It may be a form of *D. hellesponticum* subsp. *aintabense*.

Boissier (Flora Orientalis, i, 80: 1867) confused *D. hellesponticum* Boiss. (1841) with *D. tomentosum* Aucher (1841), and reduced it to a synonym of the latter. Comparison of the original descriptions and type materials (on loan from Geneva and Kew) of both taxa shows that *D. hellesponticum* differs specifically from *D. tomentosum* in its "petal" shape, larger flowers, and spur always longer than the rest of the flower. But the description of *D. tomentosum* given in Flora Orientalis agrees with the original description and type specimen of *D. hellesponticum* (*Aucher* 67), and not with the original *D. tomentosum* (lectotype: *Aucher* 75).

As interpreted here, *D. hellesponticum* is a polytypic species centred in Turkey where it is represented by four geographical subspecies. Of these, subsp. *macedonicum* remains very distinct in the northern part of its range (Macedonia, Thrace, Paphlagonia), but where it overlaps in Galatia with the Central Anatolian subsp. *hellesponticum* it is less clearly differentiated. Intermediate specimens have been seen from the neighbourhood of Ankara, so that it seems advisable to treat *D. macedonicum* as a subspecies of *D. hellesponticum*. All four subspecies, in fact, are linked by intermediate specimens, mainly where their ranges overlap.

*D. campylopodum* was based on three Lycian gatherings collected by Luschan, and was never seen by Huth who maintained it as a distinct species on the evidence of Freyn's description. Examination of the type material kindly sent on loan from Vienna University shows that Freyn inaccurately described the petal shape and exaggerated the length of the spur. It cannot be treated as more than a subspecies of *D. hellesponticum*, and is confined to S.W. and W. Anatolia; an emended description is given

above. The distribution of the four subspecies, and of the closely allied *D. armeniacum* Stapf ex Huth, is shown on the map (fig. 3): atypical or intermediate specimens have been omitted.

**Delphinium armeniacum** Stapf ex Huth in Engler, Bot. Jahrb. xx, 380 t. vii, f.9 (1895). [Fig. 2,B.]

TURKEY. Armenia turcica: Sipikordagh versus Bendola, a.1890, *Sintenis* 3177 (holo. W; iso. K!). Prov. Gümüşane: Tekki to Baibout, 1100 m., stiffly branching, stems 3–18 in., fls. deep blue with purple centre, spur $\frac{1}{2}$ in. long, curved downwards, steep hot, non-lime screes, 19 July 1934, *E. K. Balls* 1756; Kiesaedagh, 18 Jul. 1889, *Sintenis* 1320.


FIG. 3. Map to show the distribution of *D. armeniacum* Stapf and the subspecies of *D. hellesponticum* Boiss. in Turkey.

● *D. hellesponticum* subsp. *hellesponticum*
▼ ,, ,, *aintabense*
▲ ,, ,, *campylopodum*
✠ ,, ,, *macedonicum*
♦ *D. armeniacum*

Turrill (in Hook. Ic. Pl. Ser. V, ii, tab. 3152: 1932) treated *D. armeniacum* as a synonym of *D. macedonicum* Halácsy & Charrel (see discussion under *D. hellesponticum* above). However, we prefer to follow Huth in regarding it as a separate species. It is certainly very close to *D. hellesponticum* subsp. *macedonicum* but can be distinguished by its dome-shaped "petal" with a narrow upper lobe, even longer spur, deep blue flowers and the pattern of stem branching. There is, however, a specimen from Lycaonia (Vil. Konia, distr. Ereğli, Braachen bei Perinde, 1600 m., Jul. 1912, *Siehe* 432—BM) which is somewhat intermediate between the two taxa though nearer to *D. armeniacum*. More material from this region is required, and signs of introgression should be looked for in the field.

A key to the Turkish species in the critical "*tomentosum*" group is given below; *D. tomentosum* is included, although it does not occur in Turkey.

1a. "Petal" ± entire and semicircular . . *D. olopetalum* Boiss.

1b. "Petal" subtrilobed:

2a. Flowers sulphur-coloured . *D. sulphureum* Boiss. & Hausskn.

2b. Flowers blue or violet:

3a. Spur shorter than the posterior sepal (about half as long, 5–6 mm.). "Petal" striped inside, lateral lobes ± triangular, horizontal [Fig. 2,C.] . . . . . *D. oliganthum* Boiss.

3b. Spur ± equal to the posterior sepal or longer:

4a. Spur ± equal to the posterior sepal, usually 6–8 mm. long. [Fig. 2,D.] . . . . *D. tomentosum* Aucher

4b. Spur longer than the posterior sepal:

5a. "Petal" abruptly narrowed at the tip into a beak-like upper lobe (4×2–3 mm.); rest of "petal" dome-shaped when spread out, c. 12 mm. broad and 9 mm. long; spur 18–24 mm. long. [Fig. 2,B.] . *D.armeniacum* Stapf ex Huth

5b. "Petal" either gradually narrowed towards the apex or the upper lobe ± equal to the lateral lobes; whole petal often obtusely triangular when spread out; spur 12–16 mm. *D. hellesponticum* Boiss.

**Delphinium cruciatum** Hossain & Davis, **spec. nov.** [Fig. 4,C,D.]

Valde affinis *D. axillifloro* DC. sed "petalo" cruciato lobis lateralibus oblongo-orbiculatis magis nervulosis imprimis divergit.

*Planta* annua, erecta, 16–40 cm. alta. *Caulis* adpresse pubescens, paulo flexuosus, simplex vel ad basin sursum curvato-ramosus (ramis 2–5), fere ex toto floriferus. *Folia* caulina petiolata; petiolus 10–15 mm. longus laminam ternatam segmentis laciniati aequans; laciniae lineares actuae adpresse pubescentea ciliatae. *Inflorescentia* longe et laxe spicata. *Flores* axillares subsessiles, in vivo verisimiliter lilacini vel rosei, in sicco sordide albidi, 10–15 mm. longi. *Pedicellus* brevissimus, crassus. *Bracteae* foliis similes, subsessiles, superne sensim diminutae. *Bracteolae* binae trisectae flores aequantes; segmenta glanduloso-ciliata, in bracteolis inferioribus linearia bifida, superiora integra. *Sepala* pubescentia; postero-lateralia consimilia, 10–13×5–6 mm., rhomboideo-spathulata, apice obtusa, inferne in unguem subaequilongum attenuata; calcar pubescens, 5–7 mm. longum, sepalo posteriore 10–12 mm. longo brevius, subcurvatum et deorsum directum. "*Petalum*" trilobatum, cruciatum, 11·5–12·5×9·5–11 mm., purpureo-nervosum, basi ± abrupte attenuatum; lobus superior oblongus, longitudinaliter nervosus, 3–5×3·5 mm., apice in lobulos rotundatos 0·75–1 mm. longos bifidus; lobi laterales oblongo-orbiculati paulo deorsum flexi, nervis medianis superne distincte nervulosis; calcar in calcare sepalino inclusum, apicem versus sensim attenuatum. *Stamina* inaequalia; filamenta inferne oblonga, superne linearia leviter pubescentia; antherae 1–1·5×0·75 mm., purpureo-fuscae. *Carpellum* unicum, 3·5–4× 1–1·5 mm., albo-velutinum; stylus brevissimus. *Folliculus* in pedicello brevissimo crasso 2–3 mm. lato erectus, ad caulem adpressus, cylindricus, 12–17×2–3 mm. (rostro excluso), adpresse puberulus, ± longitudinaliter rugulosus, apice rotundato ciliato abrupte rostratus; rostrum c. 3–1·5 mm.; pericarpium rigidum; semina ignota.

TURKEY. Prov. Adana (Cilicia): Bozanti, 750 m., a. 1896, *Siehe* 362 (as *D. axilliflorum* DC.; holo. E). Prov. Mersin: bei Mersin, *Siehe* 403 (Ankara).

*D. cruciatum* is very closely related to *D. axilliflorum* DC., [Fig. 4,A,B.] common in S.E. Anatolia, and differs from it only in floral characters. The new species is distinguished by its cruciate "petal" with nervulose, oblong-orbicular lateral lobes—instead of the kite-shaped petal of *D. axilliflorum*. In addition, *D. cruciatum* differs from the latter in the shape of its posterolateral sepals which are more or less clawed with a rhomboid blade.

The new species is known only from Cilicia, at the western extremity of the range of *D. axilliflorum*.

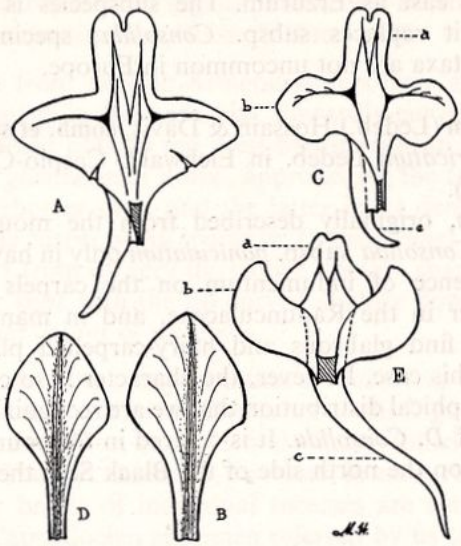


FIG. 4. A, C, & E—"petal" spread open. A, *D. axilliflorum* DC. (*Balls* 2243); B, postero-lateral sepal of same; C, *D. cruciatum* Hossain & Davis (*Siehe* 403); D, postero-lateral sepal of same; E, *D. cornutum* Hossain & Davis (*Calvert & Zohrab*). a, upper lobe; b, lateral lobe; c, spur. All ×2.

**Delphinium Consolida** L., Sp. Pl. 530 (1753).

*Key to the subspecies*

1a. Flowers (excl. spur) 12–15 mm. long, rather close to each other on the inflorescence, usually light violet-blue; stem usually once or twice branched; follicle usually thrice as long as broad, glabrous subsp. *Consolida*

1b. Flowers (excl. spur) 9–11 mm. long, rather widely scattered on the inflorescence, deep blue; stem repeatedly branched; follicle usually twice as long as broad:

2a. Follicle glabrous . . . . . subsp. *paniculatum*

2b. Follicle adpressed pubescent . . subsp. *divaricatum*

subsp. **Consolida.**

Boissier and Huth have both recorded this plant (as *D. Consolida*) from Turkey, but it seems most improbable that it occurs there. The only record which we have not been able to check is Pestalozza's specimen from Bithynia; other specimens from the same area, however, belong to subsp. *paniculatum*. Subsp. *Consolida* is found in Central and N.W. Europe.

subsp. **paniculatum** (Host) Busch in Kuznetzow, Fl. Cauc. Crit. iii (3), 44 (1902); Turrill in Bot. Mag. clxix, t. 9435 (1936).

Syn.: *D. paniculatum* Host, Fl. Austr. ii, 65 (1831).
*D. Consolida* var. *micranthum* Boiss., Fl. Or. i, 78 (1867).

This is probably the only subspecies of *D. Consolida* to occur in Anatolia, where it is widespread in the Irano-Turanian and Mediterranean provinces, extending as far east as Erzurum. The subspecies is common in S.E. Europe, where it replaces subsp. *Consolida*; specimens intermediate between the two taxa are not uncommon in Europe.

subsp. **divaricatum** (Ledeb.) Hossain & Davis, **comb. et stat. nov.**

Syn.: *D. divaricatum* Ledeb. in Eichwald, Caspio-Cauc. (2) 16, t. 16 (1831).

*D. divaricatum*, originally described from the mouth of the Volga, differs from *D. Consolida* subsp. *paniculatum* only in having hairy carpels. Presence or absence of indumentum on the carpels is a notoriously variable character in the Ranunculaceae, and in many species of *Delphinium* we can find glabrous and hairy-carpelled plants in the same population. In this case, however, the character is so closely linked with a different geographical distribution that we are recognizing *D. divaricatum* as a subspecies of *D. Consolida*. It is centred in the countries surrounding the Caspian and on the north side of the Black Sea; there are no Turkish records.

**Delphinium cornutum** Hossain & Davis, **spec. nov.** [Fig. 2,E.]

Affinis *D. pubescenti* DC. et *D. glanduloso* Boiss. sed lobis petali lateralibus sursum curvatis apice acutiusculis imprimis differt.

*Planta* annua, erecta, 15–40 cm. alta. *Caulis* (1·5–3 mm. diam.) parce ramosus, inferne adpresse canescens, superne patule hirtulus aureo-flavidus. *Folia* puberula; inferiora lamina 12–15 mm. longa biternata petiolata provisa, petiolo 7–9 mm. longo; superiora lamina 20–25 mm. longa ternata subsessilia provisa; laciniae omnes lineares acutae. *Racemi* terminales et axillares pauciflori, laxi. *Pedicelli* 12–25 mm. longi floribus multo longiores, dense pubescentes. *Bracteae* pedicellis multo breviores, lineares, acutae; inferiores 9–12 mm. longae, simplices vel in lacinias lineares acutas partitae, superiores sensim diminutae integrae. *Bracteolae* 2–3 mm. longae, sub flore remotae alternatae. *Flores* in sicco bicolores, calcare excluso 8–10 mm. longi. *Sepala* caerulescentia, extra ad nervos medianos pubescentia et virescentia; sepala postero-lateralia consimilia, 8–9×4–4·5 mm. ovata, obtusa; calcar pubescens, 10–13 mm. longum, apicem versus sensim attenuatum et ad apicem paulo deorsum curvatum. "*Petalum*" trilobatum, 9–10×11–12 mm., pallide flavidum; lobus medianus lobis lateralibus paulo longior, ad basin latissimus et ad apicem angustato-

cylindricus in lobulos rotundatos 0·5 mm. longos bifidus; lobi laterales semilunati, 5–6 mm. longi, basi late rotundati sed superne in cornua 2–2·5 mm. lata acuta sursum curvati; calcar in calcare sepalino inclusum apicem versus sensim attenuatum, rectum sed ad apicem paulo deorsum curvatum. *Stamina* inaequalia; filamenta leviter pubescentia, superne angustata et inferne dilatata; antherae purpureo-fuscae. *Carpellum* unicum, erectum; ovarium 2·5–3×1·5 mm., dense et longe pubescens; stylus 1·5–2 mm. longus. *Folliculus* longissime pedicellatus, erectus, dense et adpresse pubescens, subcompressus, semiovato-oblongus, 9–10×3·5–4 mm. (rostro excluso), ad apicem rotundatus et ± abrupte rostratus; rostrum c. 2 mm. longum.

TURKEY. Armenia, *Calvert & Zohrab* (holo. E, as "*Delphinium* near *Ajacis*"). Circa Erzeroum, inter segetes, 1800–1900 m., Jun. 1853, *Huet du Pavillon* (K, as *D. ramosissimum* Boiss. & Huet, ms.).

The new species from Turkish Armenia differs from all other members of Subgenus *Consolida* in the horn-like, upwardly curved lateral lobes of the "petal". It is allied both to the West Mediterranean *D. pubescens* and to the Turkish *D. glandulosum* Boiss., approaching the former in its small flowers and even shorter spur, and the latter in its densely hairy follicle (the vestiture of the carpel being sparse in *D. pubescens*) and geographical distribution. Apart from its very distinctive "petal" shape, it differs from both in its shorter spur with the tip curved slightly downwards, and apparently in the bluer colour of its sepals.

It has not been generally recognized that *D. pubescens* and *D. glandulosum* are extremely closely related. The latter is distinguished only by its longer, more flexuous spur, more densely hairy follicle and constantly undivided bracts. The last character, however, is an unreliable diagnostic, because the lower bracts of individual racemes are sometimes entire in *D. pubescens*. A Cappadocian specimen referred by us to *D. glandulosum* (*Bornmüller* 1724; BM) approaches *D. pubescens* in its short spur and in having partite as well as simple lower bracts.

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**Background to Gardening** (review)*.—This book, by a noted plant physiologist and Fellow of the Royal Society, is another attempt to relate science to gardening practice. It differs from many, however, in being an eminently satisfactory attempt. It is reminiscent of Salisbury's *The Living Garden*, but whereas Salisbury's work is more ecological in approach, James' is more physiological. However, the scope of the present book is nevertheless very wide and a great variety of gardening matters are discussed with authority and clarity. Included are chapters on such subjects as—Seeds;

* Background to Gardening, by W. O. James. London, George Allen & Unwin, 1956. Price eighteen shillings.