

MATERIALS FOR A FLORA OF TURKEY XXIII: ONOSMA

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ABSTRACT. New and critical taxa of *Onosma* in Turkey are described or discussed. Thirteen new species are described: *O. affine* H. Riedl; *O. araraticum* H. Riedl; *O. arcuatum* H. Riedl; *O. cappadocicum* H. Riedl; *O. nigricaulis* H. Riedl; *O. obtusifolium* H. Riedl; *O. papillosum* H. Riedl; *O. circinnatum* H. Riedl; *O. davisii* H. Riedl; *O. decorticans* H. Riedl; *O. linearilobum* H. Riedl; *O. microcalyx* H. Riedl; *O. stenolobum* H. Riedl. One new hybrid, *O. x hybridum* H. Riedl, is recognised.

INTRODUCTION

Among the herbarium material I had to revise in the course of preparing an account of *Onosma* for P. H. Davis, Flora of Turkey, there were several plants that could not be identified with any of the species hitherto described. Some of them had already been recognised and named by Haussknecht as distinct new species but were never described. All of them are published here with full Latin descriptions. Moreover, a small number of critical notes on species already known are included here. All species discussed belong to Section *Onosma*.

Subsection ONOSMA

Onosma affine [Hausskn. ex] H. Riedl, sp. nov.

Perennis. Rami(?) rhizomatis valde elongati, subverticales, tenues, 3 mm fere diametro crassi, a basi lignescentes, demum cortice fissa vestiti vel et decorticantes, lateraliter et terminaliter caules floriferos emittentes, etiam supra terram caules in axillis foliorum infimorum evoluti. Caules 22–30 cm alti, erecti, simplices, dense setis sursum versis appressis albis, tuberculis glabris manifestis insidentibus et pilis brevissimis densissimis vestiti, pallidi, prope basin 2–2.5 mm in diametro crassi. Folia infima florendi tempore exsiccata parvula, 14–25 × 4–6 mm, obtusa, in petiolum brevissimum attenuata, obovato-oblonga. Folia caulina media longissima, 30–40 × 8–11 mm, late obovato-lanceolata, obtusa vel acuminata, basin versus longius attenuata. Folia suprema 15–30 mm × 7–11 mm, late obovato-lanceolata, vel late lanceolata, acuta, basi angusta vel dilatata sessilia. Folia omnia supra subtusque setis appressis dense vestita, inter setas glabra. Inflorescentiae singulae vel complures congestae, scorpioideae, flos infimus interdum a ceteris remotus longius pedicellatus et forsitan inflorescentiam unifloram formans. Bracteae caudato-lanceatae, longe attenuatae, calyce multo breviores, usque ad 7–8 mm longae, basi lata sessiles. Pedicelli 1–3 mm longi, densissime setoso-strigosi. Calyx florifer 14–15 mm longus, prope basin densissime subappresse setosus setis demum (in sicco) flavescens, sursum laxius breviusque setulosus usque ad basin fere in lacinias 5 lanceolatas, usque ad 3–4 mm latas, acutas, divisus. Corolla (unica tantum nota iam evoluta) 16–17 mm longa, cylindrico-campanulata, gradatim ampliata, colore ignoto, lobis in statu juvenili quidem dense pilosis, triangulari-acuminatis, mox revolutis, prope basin 2.5 mm latis, 1.5 mm longis. Annulus

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nectarifer basalis glaber. Antherae 6-6.5 mm longae, lineares, basi haud sagittata, in statu juvenili interdum cohaerentes, mox inter se liberae, apice sterili connectivi basin sinuum inter lobos corollae attingente truncato, non bidentato. Filamentorum pars libera 4-5 mm longa, basin versus manifeste dilatata, 1.5 mm fere lata, basis infima corollae adnata. Stylus usque ad 20 mm longus, filiformis, stigma manifeste bilobum ferens. Nuculae non visae.

Species ex affinitate *O. sericei* Willd. indumento *O. trachytricho* Boiss. et *O. bodeano* Boiss. similis ab iis speciebus differt rhizomatis ramis elongatis subverticalibus caules complures partim ex axillis foliorum emittentibus, calycis laciniis sub anthesi quidem usque ad basin liberis latissimis. Calycis indumento imprimis *O. trachytricho* similis, praeterea *O. subsericeo* Freyn indumento in omnibus partibus tenuiore, canescente.

TURKEY. B7 Erzincan: Egin (Kemaliye), in declivibus saxosis supra Aergu (Ergü), *Sintenis* 2543b (holo. W).

Further collections of this interesting species are required to find out its exact relations to other species belonging to this very polymorphic group called section *Aponosma* by de Candolle. It would be especially valuable to have fruiting plants, as the character of the fruiting calyx is of primary importance. Nevertheless, the unusual form of ramification at the base of the stem is found in all specimens examined and seems to indicate that it is a good species closest related to *O. trachytrichum* Boiss. The name was well chosen by Haussknecht as there are more affinities recognized than are convenient for taxonomic work.

***Onosma araraticum* H. Riedl, sp. nov.**

Species perennis, caespites, pluricaulis, rhizomate saepe crasso, lignoso, atrobrunneo apice ramoso ramis brevissimis, primo anno rosulas steriles foliorum caespitem densum formantes, secundo anno caulem floriferum unicum ex omni rosula, raro rosulam secundam laxam e foliis paucis ferentibus. Basis caulium dense residuis foliorum emortuorum vestita. Caules 10-34 cm alti, erecti, rarius arcuatim ascendentes, pallide stramineo-viridescentes, saepe coeruleo- vel nigrescenti-suffusi, teretes, prope basin 2-3.5 mm crassi, dense patule setosi setis in caulibus tenuioribus 1.5 mm fere longis, vix rigidis, in caulibus crassioribus usque ad 3 mm longis, rigidis, subpungentibus, inter setas densissime patule brevi-pilosi, simplices vel in parte superiore parce ramosi. Folia rosularum manifeste petiolata, petiolo incluso 40-90 mm longa, sed petiolo vix umquam 22 mm longitudine superante, 3-6(-7) mm lata, lineari-oblongata vel linearia vel subspatulato-linearia, acuta. Folia caulina inferiora linearia vel lineari-spathulata, 22-30 mm longa (in typo caule tenuiore, in specimine *Davis* 43692 caule crasso usque ad 80 mm longa), 2.5-3 mm lata (in specimine *Davis* 43692 usque ad 10 mm lata), basin versus interdum attenuata, longissima etiam subpetiolata, obtusa, rarius acutiuscula. Folia caulina media inferioribus similia, sed basin versus vix vel paulo attenuata, interdum paulo dilatata, superiora in speciminibus tenuioribus vix breviora, in aliis manifeste breviora, semper basin versus dilatata, saepe apice acuto. Folia omnia subtus secus nervum medianum et in marginibus subrevolutis tantum setosa setis subpatentibus, basi indistincte tuberculatis, in ceteris partibus dense pilis

brevissimis, interdum papillis tantum tecta, supra dense setis appressiusculis antrorsis tuberculis glabris in foliis angustis minutis, e serie unica cellularum compositis, in latissimis solum majoribus e seriebus 2-3 concentricis cellularum compositis minoribus intermixtis insidentibus tecta, inter setas breviter pilosa. Inflorescentiae breves, densae, scorpioideae, singulae in apicibus ramorum vel geminatae, numero florum valde variabiles, post florendum vix elongatae. Bractae foliis similes sed minores, inferiores lanceatae, usque ad 16 mm longae, ad 3 mm latae, superiores lineares, basi lata sessiles, 8-10 mm longae, omnes acutae. Pedicelli quam 1 mm vix longiores. Calyx florifer 8-11 mm longus, usque ad basin in lacinias lineares, 1-1.5 mm latas, patule setulosas, in sicco interdum flavescenti-virides divisus, post florendum indistincte tantum elongatus. Corolla flava, clavato-campanulata, 18-25 mm longa, in statu compresso 7 mm fere lata, infra lobos constricta, extra intusque glabra, lobis 5, triangularibus interdum paulo revolutis, 1.5-1.8 mm longis, ad basin 3 mm latis. Nectarium basale annuliforme glabrum. Antherae 6.5-7 mm longae, lineares, basibus cohaerentes, tota longitudine inclusae, apice sterili 1 mm fere longo manifeste bidentato. Filamenta 9 mm fere longa, in dimidio superiore libera, a basi ad apicem gradatim attenuata, prope basin 2-2.5 mm lata. Stylus corollam maturam vix superans, raro ea 2 mm fere longior; stigma minutissimum, indistincte bilobum. Nuculae non visae.

Species valde insignis forma corollae, calyce pro longitudine corollae brevi, caule saepe coeruleo-suffuso. Affinis imprimis *O. microcarpo* DC. a quo omnibus his characteribus differt, praeterea *O. chrysochaeto* Bornm. foliis etiam subtus setulosis, setis imprimis in regione inflorescentiae aureis diverso, sed imprimis ut videtur *O. zerizamino* Lipsky mihi e descriptione tantum noto eadem forma et longitudine calycis et corollae, sed diverso corolla demum rubescente, calyce fructifero valde elongato.

TURKEY. BIO Kars: in declivibus septentrionali-orientalibus montis Ağrı Da. infra Serdar Bulak, 2100 m, 27 v 1966, Davis 43793 (holo. E).

A collection from nearly the same locality, 600 m lower down, Davis 43692, is much stouter in habit with taller thicker stems but not different in any other respect. There are a few more collections that seem to match our species well, but come from different localities and also as a rule show minor differences. A plant collected by A. Takhtadjian and identified as *O. echioides* L. from Russian Armenia, basin of Lake Sevan, along the river Kamen, has much longer bristles especially along the stem and leaf-margins and is repeatedly branched from the base but otherwise not different from our species. There is practically no difference in plants collected by Bornmüller and distributed as number 767 under the name of "*O. microspermum* Stev." from Amasia, alpine region of Ak-Dagh, 1600-1900 m. Sintenis 6066 from Turkish Armenia, Sandschak Gümüşkhane, under the same name might be our species, but the specimens in the herbarium at W have only a single corolla left that is partly damaged and therefore not typical. The species seems to be rather widespread but has not been recognized until now.

Onosma arcuatum H. Riedl, sp. nov.

Perennis basi ignota. Caulis unicus lateralis tantum notus 37 cm fere altus ima basi lignescens, 5 mm in diametro crassus, arcuatim ascendens,

dense ramosus ramis lateralibus quam caulis validus multo tenuioribus, brevibus, ut caulis setis patentibus 3 mm longis rigidis basi tuberculatis, setis nonnullis brevioribus tuberculo parvulo insidentibus et pilis brevissimis densissimis deorsum versis obsitis. Folia caulina infima squamaeformia, 3 sequentia inferiora 25–50 mm longa, 4–6 mm lata, longiuscule petiolata, spatulata, media inferiora $\pm$ 8 cm longa, usque ad 1 cm lata, lineari-oblongolata, in petiolum haud manifeste distinctum attenuata, media superiora 55–70 mm longa, usque ad 10 mm lata, basi angusta vel dilatata sessilia, lanceolata, suprema usque ad 40 mm longa, usque ad 12–13 mm lata, ovato-lanceolata basi latissima, omnia supremis exclusis obtusa vel acuminata, suprema longe acuta. Margo foliorum non vel vix revolutus. Indumentum foliorum in facie superiore e setis rigidis, patentibus, longitudine valde diversis, tuberculis glabris saepe majusculis subplanis insidentibus, praeterea e pube brevi densissima compositum, in facie inferiore setae longiores tuberculis parvulis insidentes in nervo mediano tantum, praeterea setulae perpaucae tenuissimae, breviusculae in tuberculis minutis et pubis densissima evolutae. Inflorescentiae numerosae, inferiores breves, superiores longae et multiflorae, scorpioideo-involutae. Bractae 8–18 mm longae, lineari-lanceolatae, acutae, basi lata sessiles. Pedicelli brevissimi, usque ad 1 mm longi, floriferi tantum noti. Calyces floriferi breves, 8–10 mm tantum longi, patule longe setosi setis in sicco intense flavis, usque ad basin in lacinias 5 lineares subacutae $\pm$ 1 mm latas divisi. Corolla 18–21 mm longa, primo cylindrico-campanulata, demum clavata, in dimidio superiore valde inflata, in statu compresso usque ad 8–9 mm lata, infra lobos saepe revolutos, 1 mm fere longos, 2–2.5 mm ad basin latos abrupte attenuata, extra laxe pubescenti-pilosa, flava. Nectarium glabrum. Antherae lineares, $\pm$ 6–6.5 mm longae, basibus saepe cohaerentes, apice sterili attenuato breviter bidentato, inclusae. Filamenta 7–8 mm longa, pro maxima parte libera, basin versus vix vel paulo tantum dilatata. Stylus primo exsertus, in corolla matura demum inclusus, filiformis; stigma minutum obsolete bilobum ferens. Nuculae non visae.

Species ex affinitate *O. setosi* Ledeb., sed sequentia foliorum, indumento et calyce brevi valde insignis facileque diagnoscendum.

TURKEY A9. Erzurum: Horasan-Karaorgan, 17 milia ab Horasan, 2000 m, 13 vi 1957, *Davis & Hedge*, D. 29499 (holo E.)

This species is very well characterized within the group of species near to *Onosma setosum* Ledeb. The stem bears stiff, patent bristles of about 2.5–3 mm in length distributed rather loosely, and between them is densely covered with very short hairs looking almost velvety. Moreover, there are short bristles of about 1 mm length that are very rare. The bristles on the upper surface of the leaves are sometimes nearly appressed. The tubercles at their base consist of a complete circle of long, elongated cells, and at their outer end, partly between them, an incomplete circle of short cells. They are rather flat as a whole. Between the bristles are short hairs. On the lower surface, bristles are very rare and not arising from tubercles at all or from minute tubercles of a single circle of small cells, while short hairs are very numerous and give the leaves also a rather velvety appearance.

Onosma armeniacum Klokov in Not. Syst. (Leningrad) 14: 301 (1951).

This species seems to be very near to *O. setosum* Ledeb. and its value seems at least uncertain. For the time being, however, I have no definite arguments for regarding it as a mere synonym. I follow, therefore, Popov (1953) in his treatment of the genus, who maintains that *O. setosum* has glabrous corollas while there are hairs at least in the upper part of the corolla in *O. armeniacum*. The leaves, moreover, are very densely hairy in the latter and their colour therefore tends to become greyish-green. It is new for Turkey (as would be *O. setosum*) but has only been found between Van and Erzurum in East Turkey not very far from its previously known area.

Onosma cappadocicum [Siehe ex] H. Riedl, sp. nov. Fig. 1.

Syn.: *O. liparioides* DC. var. *leianthum* Hayek in Ann. Naturhist. Hofmus. Wien 28: 173 (1914).

Species perennis habitu caespitoso rhizomate iteratim ramoso ramis interdum 4–5 cm longis erectis vel obliquis, primo anno rosulam foliorum, secundo anno caules floriferos edentibus. Rosulae steriles foliorum et caules floriferi eodem tempore adsunt: rami hornotini plerumque nondum lignosi rosulas, vetustiores residuis foliorum emortuorum in basi tecti caules floriferos edunt. Caules erecti 10–17 cm alti irramosi vel interdum inflorescentias geminatas ferunt, infra dense foliati foliis subrosulatis dispositis, supra foliis $\pm$ laxis saepe iam florendi tempore deciduis, subteretes, tenui, vix ultra 1.5 mm in diametro crassi, in sicco brunnescentes, densissime pilis brevibus irregularibus, sed saepe deorsum versis subappressis canescenti-subhirsuti, setis longioribus carentes. Folia rosularia et caulina infima approximata anguste lineari-spathulata, 12–25 $\times$ 2–3 mm, acuta vel obtusa, basin versus longe attenuata, subpetiolata. Folia caulina media et superiora 10–12 $\times$ 1.5–2 mm lata, linearia, basi fere aequilata, obtusa vel acutiuscula. Omnia dense setulis vix 1 mm longis in margine subrevolutis tantum patentibus, in facie inferiore et superiore arcte appressis argenteo-incana. Setulae omnes longitudine fere aequalia, validiores tuberculis minutissimis insidentes, ceterae iis omnino carentes. Inflorescentiae scorpioideae, saepe geminatae, post florendum vix elongatae, densi- et multi-florae. Bractae anguste lineares, 7–13 mm longae, 1 mm fere latae, acutae. Pedicelli iam floriferi 2.5 mm fere longi, post florendum vix vel paulo elongati. Calyces floriferi (et fructiferi?) 9–10 mm longi, usque ad basin in lacinias 5 lineares, 7–8 mm latas divisi, dense patule setosi, setis 2 mm fere longis tenuibus, rigidis, albis, in sicco interdum paulo flavescentibus. Corolla tubulosa, 13–14 mm longa, in statu compresso 2–2.5 mm lata, extra intusque glabra, flava lobis 5 acutis, triangularibus, saepe revolutis, 1 mm longis latisque in basi, Annulus nectarifer basalis glaber. Antherae lineares, 4.5 mm longae, apicibus, 1.5–2 mm infra basin sinuum inter lobos corollae truncatis, basibus interdum cohaerentes. Filamenta 5 mm fere longa, basin versus paulo sed manifeste dilatata ibique 1 mm fere lata, in parte infima tantum corollae adnata. Stylus filiformis corollam paulo superans, 14–15 mm longus; stigma indistinctum, obsolete bilobum, quam styli diameter vix latius. Calyces fructiferi ut videtur facile decidui. Nuculae non visae.

Species vix ullae comparanda proxima esse videtur *O. sintenisii* Hausskn.

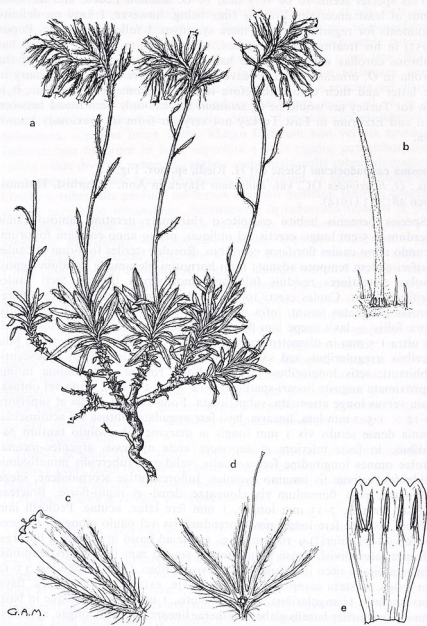


FIG. 1. *Onosma cappadocicum* H. Riedl: a, habit $\times \frac{2}{3}$; b, hair $\times c. 50$; c, corolla $\times 2.5$; d, calyx $\times 2.5$; e, corolla opened out $\times 2.5$. Drawn from the holotype—Siehe 1907: 107.

ex Bornm. multo altiore caulibus ramosis, sed habitu et imprimis setis appressis tuberculis basalibus omnino carentibus inter se aequalibus etsi multo laxioribus eae simili. Forsan sectio vel subsectio proxima?

TURKEY C5 Niğde: Masmutli-Dagh, (Ala Da.), 1800 m, vii 1907, *Siehe* (holo. W.; iso. E., GE.)

As far as I understand from Hayek's original description of his var. *leianthum*, the identity was either maintained or confirmed by Bornmüller and Javorka. It seems, that neither of these authors had seen true *O. liparioides* DC. or the combination would not have been suggested, as there is no similarity between this species and our new one whatsoever. The most interesting feature is the almost total absence of tubercles at the base of all but the stoutest hairs on leaves and stems. *O. sintenisii* Hausskn. ex Bornm. has similar short bristles but they are much more loosely scattered and thicker, forming short white commas on the rather dark leaves and stems (though I only can judge from herbarium material). The bristles show, however, the rough surface typical for *Onosma*. As the subsections are defined according to the cells of the basal tubercles it will, perhaps, be necessary in future to describe a new subsection for the species in which the tubercles are almost lacking. Such a proceeding would be justified by the great number of other characters these species have in common and by which they can easily be separated from others.

Onosma frutescens Lam., Ill. 1: 407 (1792).

O. frutescens is extremely variable in growth habit as well as in its indument, leaf-shape and many other characters. The specimens from Turkey usually have relatively short and broad leaves that are densely covered with hairs so that their colour is often greyish to whitish. Plants from Palestine are sometimes stouter, have lanceolate leaves and, in some instances, fewer bristles than the Turkish material, but there is no distinct correlation between the occurrence in a certain area and certain characters. A subdivision therefore is not possible. While the bristles are nearly always soft and appressed in the basal and subbasal leaves, the upper leaves sometimes bear spreading, stiff bristles, though in other cases the indumentum is uniform all over the plant. The soft, at least partly appressed, bristles are the main difference between this species and *O. strigosissimum* Boiss. which has stiff, spreading bristles throughout.

Onosma macrophyllum Bornm. var. *angustifolium* Bornm. in Beih. Bot. Centralbl. 28B: 470 (1911).

Species and variety both have been described from Persia; the variety has later also been found in northern Iraq. The collection from Hakkari: Yüsekova, 1950 m, Davis 44956, is the first one from Turkey and very characteristic with its numerous narrow stem-leaves that are, however, much fewer in number than in the plants known until now. The bristles on stem and leaves are more densely distributed all over the plant and are more spreading than usual. The loose panicle-like inflorescence with long flexuous pedicels and an axis growing always thinner towards the apex that reminds one of a branched pedicel, the length of calyx and corolla and the very distinctly protruding, anastomosing nerves on the lower surface

of the leaves, nevertheless, form sufficient evidence for the specific identity of this single gathering with *O. macrophyllum*. It might represent a local race if the characters prove constant in that area. The collector indicated that no basal rosettes of leaves were found. This also suggests a slightly different habit which may be due to the different habitat. The plant was found in an old cemetery.

***Onosma nigricaula* H. Riedl, sp. nov. Fig. 2.**

Herba perennis, 20–35 cm alta rhizomate tenui 3 mm fere in diametro crasso brunneo, primo anno rosulam foliorum, secundo anno rosulam foliorum centralem et infra rosulam caules complures primo subhorizontales, demum arcuatim ascendentes emittens. Caules simplices vel subsimplices, teretes, vix ultra 1.5(–2) mm in diametro crassi, tota longitudine intense nigrescentes, setis nonnullis patentibus longitudine caulis diametrum subaequantibus haud numerosis basi tuberculis insidentibus interdum deciduis tuberculis albis minutis permanentibus praeterea pilis brevissimis sub lente tantum visibilibus tecti. Folia basalia rosulata, 30–60 mm longa, 2.5–5.5 mm lata, lamina petiolo sesqui vel duplo-longiore, rarius eum aequante, lineari-spathulata, obtusiuscula vel subacuta, margine manifeste vel indistincte tantum revoluta, uninervia. Folia caulina omnia vel supremis interdum exclusis inter se fere aequalis, 18–40 × 2.5–3 mm, lineari-oblonga usque linearia, inferiora interdum subpetiolata vel basin quidem versus attenuata, superiora haud attenuata, suprema plerumque manifeste dilatata, acuta vel acutiuscula. Folia omnia supra in tota facie setis subpatentibus vel imprimis in margine manifeste patentibus, basi tuberculis paulo tantum elevatis, e seriebus cellularum membrana calcareo-incrustata convexa ornatarum albarum 2–3 compositis insidentibus, inter setas pilis brevibus patentibus dense obsita, subtus in nervo mediano tantum setosa, in tota facie dense brevissime canescenti-pilosa. Inflorescentiae scorpioideae, singulae vel geminatae, densae, e floribus numerosis compositae, post florendum paulo tantum sed manifeste elongatae, in axilla inter duas inflorescentias saepe flos singulus longius (usque ad 4–5 mm) pedicellatus evolutus, interdum et flos infimus inflorescentiae a ceteris remotus, longissime pedicellatus, saepe bractea carens et forsitan inflorescentia lateralis uniflora est. Bractee infimae (an folia inflorescentiam unifloram in axilla ferentia?) foliis similes, paulo tantum minores, ceterae lineari-lanceatae, 5–12 × 1–1.5 mm, basi lata sessiles. Pedicelli floriferi infimis supra descriptis exclusis 1(–2) mm longi, fructiferi vix vel paulo elongati. Calyces floriferi 9–10 mm longi, patule albo-setosi, usque ad basin in lacinias 5 lineares, 7 mm fere latas, acutas divisi, post florendum ut videtur vix elongati. Corolla cylindrico-campanulata infra lobos late triangulares plerumque revolutos modice constricta, 11–13 mm longa, in statu compresso usque ad 5 mm lata, crenea, extra intusque glabra. Nectarium basale annuliforme glabrum. Antherae lineares 4 mm tantum fere longae, inclusae, basibus cohaerentes, eorum apice 2–3 mm infra lobos corollae situs, pars sterilis connectivi 1 mm fere longa, brevissime bidentata. Filamenta 5–5.5 mm longa, a basi usque ad apicem gradatim attenuata, linearia, in dimidio superiore tantum libera. Stylus corollam longitudine subaequans, semper inclusus. Stigma minutum, indistincte tantum bilobum. Nuculae in speciminibus nostris nondum evolutae.

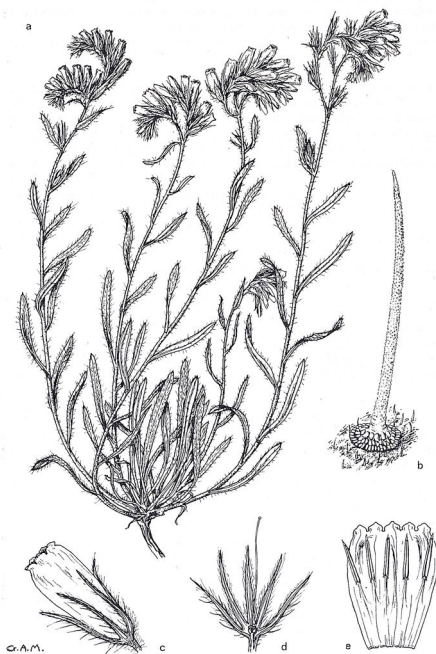


FIG. 2. *Onosma nigricaula* H. Riedl: a, habit x $\frac{2}{3}$; b, hair x c. 50; c, corolla x 2.7; d, calyx x 2.7; e, corolla opened out x 2.7. Drawn from the holotype—Davis & Hedge, D. 29538 A.

Species nova valde distat ab omnibus notis: rosula foliorum centralis, caules nigrescentes, antherae brevissimae profunde in corolla sitae, stylus corollam haud superans qualitates in genere Onosmate rarissimae sunt ut impossibile esse videatur species affinis nominare.

TURKEY A9 Kars: Sarikamış-Selim, 1900 m, 13 vi 1957, Davis & Hedge, D. 29538A (holo. E).

It is impossible to indicate any close relation of our new species. In general habit, it shows a close similarity to species like *O. limitaneum* I. M. Johnston, from Afghanistan and a few other eastern species, but most of its characters are peculiar to itself. It is a pity that more material is not available as its total distribution remains unknown. With distributional data, the position of *O. nigricaulis* might be better understood as the distribution pattern is one of the most important clues for understanding the evolution of the genus and often for explaining the intricate net of affinities. There are, however, a number of species just in the same position, such as *O. sieheanum* Hayek or *O. cappadocicum* H. Riedl, the connections of which cannot be defined.

***Onosma obtusifolium* [Hausskn & Sint. ex] H. Riedl, sp. nov.**

Perennis rhizomate lignoso, dilute brunneo, caules floriferos 3-4 ferente, haud ramoso. Caules 12-28 cm alti, ima basi residuis foliorum emortuorum vestiti, pallidi, in statu compresso $\pm$ angulosi, in basi usque ad 4 mm in diametro crassi, densissime foliati, saepe ex axillis foliorum superiorum ramosi ramis valde abbreviatis inflorescentias paucifloras ferentibus, setis albis tenuibus longitudine valde diversis patentibus usque ad 2.5(-3) mm longis, praeterea pilis brevibus deorsum versis dense tecti. Folia basalia florendi tempore iam emarcida, caulina 20-50 $\times$ 4-8 mm, plerumque late rotundata, rare subacuta, spathulato-oblonga vel oblonga, rare tantum oblongo-lanceolata, supra et subtus secus nervum medianum dense setis albis inaequilongis tuberculis albis calcareis saepe sub lente tantum distinctis glabris insidentibus, patentibus vel subappressis tecta, inferiora petiolata vel subpetiolata, basin versus longe attenuata, media indistincte tantum attenuata, superiora basi $\pm$ lata sessilia. Inflorescentiae scorpioideae, terminales saepe plurimae capitatum congestae. Bractae lineares, rare lineari-lanceolatae, acutae, usque ad 17 $\times$ 1-2.5 mm, quam calyce vix vel paulo breviores. Pedicelli floriferi usque ad 2 mm longi. Calyces longissime albo-barbati setis pungentibus densis, 15-17 mm longi, usque ad basin in lacinias 5 lineares acutas divisi, floriferi tantum noti. Corolla 17-18 mm longa, flavida (e sicco!), subcylindrica, apicem versus paulo gradatim ampliata, extra imprimis infra lobos, ceterum laxissime tantum brevi-pilosa, lobis latis, 2-2.5 mm ad basin latis, 1-1.5 mm longis, plerumque revolutis. Annulus nectarifer basalis glaber. Antherae lineari-subsagittatae, basibus interdum cohaerentes, 5-6 mm longae, apice sterili tenui manifeste profunde bidentato, 1 mm fere infra basin sinuum inter lobos corollae sito, pars libera filamentorum antheris aequilonga, 1 mm fere lata, basi corollae adnata. Stylus quam corolla 2 mm fere longior, tenuiter filiformis. Stigma bilobum, minutum. Nuculae non visae.

Species habitu *O. bulbotrichi* DC., sed nectario glabro manifeste diversa, valde insignis caulibus numerosis foliis basalibus florendi tempore iam

omnino carentibus, ramis abbreviatis lateralibus, synflorescentia terminali e cincinnis paucifloris numerosis subcapitatum congestis, calyce pro longitudine corollae longo ut in *O. stenolobo* [Hausskn. ex] H. Riedl laciniis quam in hac specie multo latioribus. Affinis esse videtur *O. armeniaco* Klok. corollis majoribus.

TURKEY B7 Gümüşane: Moaldas (Maghaldas Da.), in pascuis lapidosis, 20 vi 1894, *Sintenis* 6000 (holo. W.)

This species was named by Haussknecht, but the name has never been published with a description. It seems to be similar to *O. armeniacum* Klok., formerly *O. hispidum* Steven, a younger homonym of *O. hispidum* Wallich. This species, however, has much longer corollas compared to the calyx. In outer habit it resembles *O. bulbotrichum* DC., but has a glabrous nectary at the base of the corolla and shorter corollas.

***Onosma papillosum* H. Riedl, sp. nov.**

Species perennis rhizomate crasso, ramoso ramis aut abbreviatis aut elongatis, horizontalibus collo densissime residuis foliorum emortuorum vestito. Caules 1-3 arcuatum ascendentes vel suberecti, 15-25 cm alti, usque ad 3 mm prope basin in diametro crassi, pallidi, simplices vel in regione inflorescentiae tantum furcati, densissime setis rigidis, 2-3 mm longis, albis, patentibus tecti, inter setas papilloso papillis raro tantum ad pilos brevissimos elongatis. Folia basalia saepe florendi tempore iam emarcescunt, sed interdum viridia, lineari-spathulata, petiolo usque ad 20 mm longo incluso 35-70 × 2.5-6 mm, margine revoluti, in petiolum gradatim attenuata, apice obtusa, rotundata, rarius acutiuscula. Folia omnia caulina fere aequalia petiolo inflorescentiam versus gradatim decrescenti, interdum in foliis nonnullis infra petiolum ad vaginam indistinctam iterum dilatata, supremis interdum exclusis numquam laminae basi dilatata sessilia, omnia lineari-spathulata vel linearia, raro lineari-oblonga, 20-70 × 2-5.5 mm, obtusa vel acutiuscula, margine ut in basalibus revoluti. Folia omnia supra et imprimis in margine ad petiolum dense patule setosa setis tuberculis calcareis, 0.3-0.4 mm in diametro latis e seriebus 2 cellularum convexarum concentricè dispositarum compositis, in parte exteriori subplanis, glabris insidentibus, inter setas densissime albo-papillosa papillis ut in caule raro tantum ad pilos brevissimos elongatis, subtus secus nervum medianum tantum setosa, in tota facie densissime papillosa. Inflorescentiae scorpioideae, multiflorae, singulae vel duae approximatae, post florendum ut videtur paulo elongatae. Bractae 8-20 mm longae, inferiores lanceato-lineares, prope basin usque ad 2.5 mm latae, omnes acutae, basi lata sessiles. Pedicelli 1-2.5 mm longi. Calyces floriferi 13-16 mm longi, dense patule setosi, usque ad basin in laciniis 5 lineares, usque ad 1 mm latas, acutas vel obtusiusculas, interdum in statu exsiccato pallescentes divisi. Calyces fructiferi non visi, sed paulo post florendum immutati. Corolla 24-25 mm longa, alba, campanulata vel cylindrico-campanulata, in parte superiore saepe inflata et in statu compresso 6-8 mm lata, extra dense breviter pilosa, intus glabra, lobis triangularibus, plerumque revolutis, 1.5-2 mm longis, ad basin 2.5 mm fere latis, acutis. Antherae lineares, 8-9 mm longae, apice sterili horizontaliter truncato, plerumque paulo indistincte tantum emarginato, usque ad basin sinuum inter lobos pertinente, basibus cohaerentes. Filamenta usque ad 10 mm longa, linearia,

in parte infima paulo dilatata corollae adnata. Stylus usque ad 27 mm longus, filiformis, stigma minutissimum, subcapitatum obsolete emarginatum ferens. Nuculae non visae.

Species subsectionis *Onosmatis* interdum *Asterotrichis* adnumeranda videtur, quod papilli vel pili minutissimi inter setas foliorum densissimi tuberculis basalibus setarum approximati sunt ut ex iis oriri videantur. Habitu, imprimis collo crassissimo basali *O. nanum* DC. in mentem vocat, a quo praeter longitudinem caulium imprimis papillis foliorum et caulium et corollae colore immutato differt.

TURKEY C5 Niğde: inter Thyana et Tursuk, 1400 m, 9 vi 1898, sub nomine *O. nano* DC. f. *major*, Siehe 101. C5 Konya: in stepposis ad Korasch, vi 1906, Siehe 155, sub nomine *O. stellulato*, (holo. W; iso. K, E).

This species is very near to *O. nanum* DC. which, however, is well characterized by its corolla turning to a faint, very peculiar tinge of blue; this feature it has in common with no other species except, maybe *O. qandilicum* Rech. f. & H. Riedl in the subsection *Asterotricha*. The minute papillae between the bristles and on the lower surface of the leaves are the best distinguishing character of our new species. Crowded as they are round the basal tubercles of the bristles, they sometimes imitate those radiating hairs arising from the tubercles that have led to the separation of subsection *Asterotricha*.

Onosma trachytrichum Boiss., Diagn. Pl. Or. Nov. Ser. I, 11: 103 (1849).

This species was described by Boissier in 1849, but later on cited as a synonym of *O. sericeum* Willd. in *Flora Orientalis* (1879). A re-evaluation of the type showed that it is a good species (Riedl, 1962). Turkish material had never been identified with this species until now. It now seems that it is scarcely less common in Turkey than *O. sericeum*, the silky appearance of which it utterly lacks. The tubercles at the base of the appressed hairs are distinct and consist of 2-3 circles of slightly elevated cells. There is also a very hispid specimen with patent bristles, not different from the type in any other way; it is similar to the plants originally called *O. cephalanthum* by Haussknecht and Bornmüller which do not differ in any other respect from *O. elwendicum* Wettst. It has been labelled as *O. kharputanum* by Aznavour but the name has never been published as far as I know; I do not think the Turkish plants represent a taxon separate from *O. trachytrichum*. Differences among the several collections are also found regarding the ratio calyx-length/corolla-length and in the indumentum of the calyx; when fruiting the calyx-lobes are sometimes nearly glabrous and light green, in other cases greyish like the angular base.

Onosma xanthotrichum Boiss., Diagn. Pl. Or. Nov. Ser. I, 11: 109 (1849).

As far as I know there is no earlier record of this species from Turkey. The gathering *Sintenis* 1052 grew in a desert habitat similar to that in which it usually occurs but is situated much farther to the north than all specimens hitherto collected. It is impossible to use earlier literature for finding out the exact distribution of *O. xanthotrichum* as it has usually been cited as a synonym of *O. aleppicum*, from which it is easily distinguished by its long fruiting pedicels. For further details see Riedl 1962 and 1965.

Subsection ASTEROTRICA (Boiss.) Gürke

Onosma circinnatum H. Riedl, sp. nov.

Species perennis rhizomate ramoso ramis elongatis, obliquis vel subhorizontalibus decorticantibus caules 1-2 floriferos et rosulas steriles foliorum emittentibus. Caules floriferi 15-35 cm alti, erecti vel arcuatim ascendentes, simplices vel in parte suprema parce ramosi, setis subpatentibus basi subtuberculatis tuberculis minutis pilis stellatim dispositis cinctis, 2 mm longis, inter setas pilis brevioribus deorsum versis densiusculis vestiti, ima basi residuis foliorum emortuorum ut videtur anni praecedentis subrosulatim congestis tecti. Folia caulina inferiora iam exsiccata parva, approximata, lineari-lanceolata vel lineari-spathulata, gradatim in petiolum laminam longitudine interdum subaequantem vel etiam superantem, rarius ea manifeste breviora attenuata, 25-55 $\times$ 1.5-5 mm, acuta vel obtusiuscula, margine revoluta, supra subtusque densissime setis patentibus vel subappressis albis tecta ideoque facies foliorum canescens vel albescens; setae tuberculis albis pilis stellatim dispositis ornatis insidentes. Folia media 40-60 $\times$ 6-10 mm, indistincte breviter vel haud petiolata, lanceolata vel oblongo-spathulata vel oblonga, subacuta vel obtusiuscula, margine non vel indistincte tantum revoluta, setis subappressis vel subpatentibus quam in inferioribus laxius dispositis, tuberculis stellatim pilosis insidentibus pilis usque ad tertiam partem longitudinis setarum attingentibus. Folia suprema caulina mediis similia sed petiolo semper carentia, lanceolata acuta, in suis axillis ramulos steriles foliatis longitudinem foliorum vix superantes ferentia. Inflorescentia 6-12-flora, scorpioidea, circinnata. Bractae 8-15 mm longae, lanceolatae, basi subcordatae. Flores infimi interdum a ceteris remoti bracteis foliis caulinis similibus, quam ceterae manifeste majoribus, pedicellis usque ad 2 mm longis insidentes. Pedicelli ceteri brevissimi, usque ad 1-1.5 mm ad summum longi. Calyces floriferi 15-16 mm longi, imprimis prope basin dense albo-barbati pilis (vel potius setis) subpatentibus, in parte superiore laciniarum appressis. Lacinae usque ad basin liberae, lineares, apicem versus $\pm$ abrupte attenuatae, subacutae, 1-1.2 mm latae, post florendum non vel vix mutatae. Corolla 21-24 mm longa, pallide flavescens, in statu compresso usque ad 7 mm lata, anguste campanulata, in dimidio superiore dilatata, infra lobos $\pm$ abrupte paulo constricta, extra breviter pilosa, intus glabra, lobis revolutis late triangularibus, 1 mm fere longis acutis. Antherae 8 mm longae, usque ad basin sinuum inter lobos corollae pertinentes, sagittatae, basibus interdum cohaerentes, apice sterili bidentato. Filamenta antheris subaequilonga, in dimidio inferiore corollae adnata, basin versus paulo tantum dilatata. Annulus nectarifer basalis glaber. Stylus quam corolla 3-4 mm longior; stigma minutum, bilabiatum. Nuculae maturae ignotae.

Species nova ex affinitate *O. amasiani* Lacaita, ab eo differt imprimis foliorum longitudine et forma (in *O. amasianum* folia etiam media et superiora spathulata), calyce in sicco opace canescenti-viridi, nec stramineo-pallescenti et imprimis corolla dense pilosa nec glabra. Ab *O. ambigenti* Lacaita praeterea differt foliis inter setas glabris. Habitus *O. amasiano* simillimum.

TURKEY A8 Çoruh (Artvin): supra Artvin, 900 m, 19 vi 1957, Davis & Hedge, D. 29750 (holo. E).

The species is especially well characterized by its sterile rosettes of leaves

on rather long branches arising directly from the rhizome with leaves similar to the middle stem-leaves and by the sterile, leafy branches from the axils of the upper stem-leaves.

***O. davisii* H. Riedl, sp. nov.**

Perennis, pluricaulis; pars subterranea ignota. Caules erecti vel nonnulli exteriores arcuatim ascendentes, 22–30 cm alti, pallide virides, teretes, prope basin 2.5–3 mm in diametro crassi, dense patule setosi setis sursum versis caulis diametrum subaequantibus vel eo paulo brevioribus, basi subtuberculatis, inter setas dense pilis brevibus, deorsum versis vel irregularibus tecti, in regione inflorescentiarum subramosi vel omnino simplices. Folia basalia sub anthesi iam exsiccata, emarcida, subpetiolata, ovato-oblongo, usque ad 40×12 –13 mm lata, apice late rotundata, basin versus longe attenuata. Folia caulina inferiora superioribus minora 20 – 40×2.5 –7 mm, infima manifeste petiolata petiolo laminam subaequante vel ea paulo brevior, sequentia sessilia vel subsessilia, lineari-spathulata vel lineari-lanceolata, acutiuscula. Folia caulina media 35 – 50×7 –8 mm, oblongo-lanceolata vel lineari-lanceolata, sessilia, acuta vel obtusiuscula. Folia suprema usque ad 35 mm longa, usque ad 9(–10) mm lata, oblonga, acuta, basi lata sessilia. Omnia supra subtusque setulis appressis, 1.5 mm fere longis, supra densioribus, antrorsis, basi interdum indistincte tantum tuberculatis, tuberculis pilos 5–6 breves stellatim dispositos ferentibus, inter setas pilis brevibus tecta. Inflorescentiae breves, scorpioideae, e floribus 4–6, praeterea flos singulus interdum in axilla folii supremi haud bracteiformis vel inter ramos 2 inflorescentias ferentes verosimiliter inflorescentiam unifloram formans evolutus. Bractae infimae interdum a foliis supremis vix diversae, remotae (forsan et folia in axilla inflorescentiam unifloram ferentia), ceterae abrupte minores, 10–12 mm longae, usque ad 2.5 mm latae, basi lata sessiles, longe attenuatae, acutae, lineari-lanceolatae. Pedicelli brevissimi, indistincti, usque ad 1 mm longi. Calyx floriger ± 16 mm longus, basi setis albis densissimis subappressis, barbatus, laciniis 5 usque ad basin fere liberis, linearibus vel lineari-lanceolatis, 1.5–2.5 mm latis, obtusis, rare acutis, laxius setis brevibus subpatentibus vel appressiusculis, praeterea pilis brevissimis tectis, viridibus. Calyx fructifer fructibus valde immaturis accrescens laciniis usque ad 18 mm elongatis, ad 3.5(–4) mm dilatatis. Corolla campanulata, 23–24 mm longa, in statu compresso usque ad 7 mm lata, primo rosea, dein violacea (e collectore), sed in sicco imprimis flores valde juveniles violacei, extra imprimis secus nervos medianos loborum densius, ceterum laxius pilosa, lobis 5 revolutis late triangularibus, 1.5 mm fere longis, 3–3.5 mm prope basin latis. Annulus nectarifer basalis glaber. Antherae 8 mm longae, sagittatae, basibus cohaerentes, tota longitudine inclusae, apice sterili connectivi brevi, manifeste bidentato. Filamenta 10 mm fere longa, usque ad medium libera, in dimidio inferiore imprimis dilatata, ceterum linearia. Stylus corollam paulo superans, 25 mm fere longus. Stigma minutum, manifeste bilobum. Nuculae valde immaturae paulo post florendum tantum notae.

Species vix ullae subsectionis affinis proxima *O. isaurico* Boiss. & Heldr. esse videtur, a quo indumento asperiore, characteribus calycis, corollae colore et multis aliis facile distinguitur. Species nostra nonnullas subsectionis *Onosmatis* in mentem vocat, imprimis *O. polioxanthum* Rech. f., *O. elwendicum* Wettst. et forsan *O. bodeanum* Boiss., sed ab omnibus corollae colore

valde distat. Corolla rosea, demum violascente ad *O. albo-roseum* Fisch. & C. A. Mey. accedit.

TURKEY C9 Siirt: inter Cizre et Şirnak, 28 km a Şirnak, 7 v 1966, Davis 42584 (holo. E.)

This species is similar to others in general appearance, but easily distinguished from all by some very peculiar features. The number of stellate hairs on the minute, sometimes nearly lacking, tubercles of the bristles is unusually low, but seems to be nearly invariable. While the bristles of the leaves are closely appressed, those of the stem are rather stiff and patent. Moreover, the calyx-lobes are rather wide even in flower and are nearly lanceolate in outline. They remind one of those of a group of species without stellately arranged hairs at the base of the bristles sometimes united as section *Aponosma* DC., but they do not become dry and somewhat paper-like after flowering and, especially, are not coherent at base, though becoming broader and slightly lengthened. The most uncommon character is the colour of the flowers that rather suggests a closer affinity to *O. albo-roseum* Fisch. & C. A. Mey., though this species is very different in growth-habit and indumentum. It seems to be a link between the groups of *O. albo-roseum* and its allies on one side and *O. isauricum* Boiss. & Heldr. on the other. With the latter it shares most of its features apart from flower colour. *O. isauricum* seems to be connected with *O. bilabiatum* Boiss. & Buhse and a lot of species with irregularly hairy or glabrous tubercles at the base of the bristles such as *O. elwendicum* Wettst., *O. polioxanthum* Rech. f. and others.

***Onosma decorticans* H. Riedl, sp. nov.**

Species perennis rhizomate crassissimo, lignoso, ramoso, ramis elongatis, horizontalibus, decorticantibus, caules floriferos et rosulas steriles foliorum emittentibus. Caules floriferi 12–20 cm alti, simplices vel parce ramosi, dense setis patentibus vel ima basi etiam retrorsis subappressis, tuberculis interdum indistinctis, mox glabris, mox pilis nonnullis stellatim dispositis vel deorsum versis tectis insidentibus, praeterea pilis brevibus deorsum versis vestiti. Folia rosularum sterilium obovata vel obovato-spathulata vel obovato-lanceolata, petiolo longitudine laminam subaequante vel ea paulo breviora incluso 30–75 × 6–22 mm, uninervia, apice late rotundata vel subacuta, supra subtusque setis subpatentibus usque ad 2 mm longis tuberculis calcareis basalibus e seriebus plurimis cellularum concentricis dispositarum pilos biseriatim stellatim dispositis ferentibus majusculis, paulo tantum elevatis insidentibus ± dense tecta, asperima. Folia caulina inferiora lanceolata vel spathulato-lanceolata, manifeste longiuscule petiolata, quam sequentia paulo minora; media spathulata vel oblongo-spathulata, breviter vel indistincte petiolata; superiora oblongo-lanceolata, sessilia; omnia 18–35 × 3–11 mm, obtusa vel acutiuscula, indumento folia rosularum aequantia. Inflorescentiae scorpioideae, interdum geminatae. Flores infimi a ceteris saepe remoti, post florendum pedicellis 2–7 mm longis instructi. Pedicelli superiores 1–2(–3) mm longi. Bracteae plerumque diminutae, a pedicellis saepe paulo remotae, 8(–15) × 1–1.5(–2.5) mm latae, lineares, acutae, basi lata sessiles. Calyces floriferi 11–13 mm longi, patule hispidi, imprimis

prope basin albo-barbati, laciniis usque ad basin liberis, linearibus, apicem versus abrupte vel gradatim attenuatis, acutis, post florendum vix mutatis, nervo mediano prope basin valde prominente. Corolla 17-18 mm longa, flava (e collectore), extra densiuscule pilosa, intus glabra, lobis acutis, 1 mm fere longis, 1.5-1.7 mm prope basin latis, saepe revolutis. Antherae 7 mm longae, lineares, vix sagittatae, basibus cohaerentes, apice sterili bidentato basin sinuum inter lobos corollae paulo superantes. Filamenta 9 mm fere longa, 1 mm lata, linearia, basin versus haud dilatata, ultra medium corollae adnata. Annulus nectarifer basalis glaber. Stylus quam corolla 3-4 mm longior; stigma minutum, obsolete bilobum. Nuculae juveniles tantum notae obtusae, stylum versus angulato-carinatae, ad minimum 2.5 mm altae.

Species forsan affinis *O. latifolio* Hausskn. & Bornm. cui habitu similis, sed indumento asperrimo maxime diversa, ceterum calycis longitudine, forma et indumento laciniarum et nervatura foliorum haud reticulata ab ea specie valde distat. Ab *O. hebebulbo* DC. indumento simili differt pilis inter setas foliorum deficientibus, calycibus brevioribus, corolla multo longiore. Species nostra vix ulla specie merito comparanda.

TURKEY B5 Nevşehir: Göreme, 10 km fere occidentem versus ab Ürgüp, circ. 1000 m, 3 viii 1956, McNeill 405 (holo. E)

There is also a collection from Persia, (Kurdistan, Nawa Kuh, 24 km NW of Karind, J. C. Archibald 1770), that is similar to our plant in every respect but has short hairs between the bristles on the lower surface of the leaves and reticulate nervation sometimes seems to occur. As long as there is no more material, I include this plant in *O. decorticans*. More material may prove that it represents at least a local race that has to be described as a new taxon probably at subspecific rank.

Some of the characters described for the Turkish plants may vary slightly, as the specimens examined have all lost one or more of their main stems and especially in their vegetative qualities may have acquired some peculiarities as a consequence of this damage. It is not likely, however, that in the ratio calyx length/corolla length or in the length of the pedicels and other distinctive characters of the species, important changes have taken place because some of the stems have been trodden down.

Onosma isauricum Boiss. & Heldr., Diagn. Pl. Or. Nov. Ser. 1, 11: 101 (1849).

In his description of the species Boissier (1849) writes: "corolla . . . calycem paulo superanti." This is true only in part of the specimens examined. I found the length of the calyx-lobes varying from 10 to 16 mm, the length of the corolla from (15-)17-24(-25) mm. Where the calyx is near its maximum length the corolla may be short and *vice versa*, but long calyces with long corollas and short calyces with short corollas also occur. The species is closely related to *O. bilabiatum* Boiss. & Buhse (see Riedl 1962) from NW Persia, but differs from it mainly by its calyx-lobes not or scarcely growing wider after flowering except in one case where the main stems have been cut and the fruiting calyces in the lateral cymes have broad lobes.

***Onosma linearilobum* [Hausskn. ex] H. Riedl, sp. nov.**

Species perennis rhizomate ramoso ramis partim quidem subhorizontalibus et verosimiliter rosulas steriles foliorum et caules floriferos emittentibus; ramus unicus lateralis subhorizontalis caulem floriferum ferens tantum notus. Caulis 20–25 cm altus, in basi residuis foliorum emortuorum anni praecedentis vestitus, arcuatim ascendens, pallidus, 3 mm in diametro crassus, simplex, in parte inferiore laxius, supra medium densissime setis rigidis albis patentibus, 2.5(–3) mm longis, interdum reflexis, basi subtuberculatis, praeterea pilis brevibus deorsum versis tectus. Folia basalia ignota; folia caulina inferiora florendi tempore iam exsiccata, lineari-spathulata, 20–25 × 3–3.5 mm, apice late rotundata, basin versus gradatim attenuata, subpetiolata, folia media 25–35 × 10–12 mm, obovato-oblonga, rotundata, subpetiolata vel tantum angustata; folia superiora densissime disposita, longitudine decrescentia, oblonga, basi plerumque lata sessilia, apicem versus modice attenuata; omnia supra densius, subtus laxius setis patentibus vel subappressis, tuberculis albis calcareis stellatim pilosis majusculis insidentibus, pilis in tuberculis supra numerosioribus quam in facie inferiore folii vestita, inter setas supra glabra, subtus parce pilosa. Inflorescentia densa, capitato-scorpioidea, ut videtur singula terminalis. Bractae inferiores foliis caulinis similes, sed lineari-lanceolatae, basi lata sessiles, usque ad 18 mm longae, superiores decrescentes, lineares, omnes acutae. Calyces subsessiles, dense setis albis rigidis vestiti, 13–14 mm longi, usque ad basin in lacinias lineari-lanceolatas, ± 1.5 mm fere latas, acutas divisi, paulo quidem post florendum immutati. Corolla tubuloso-campanulata, ± 17 mm longa, sursum gradatim ampliata, infra lobos late triangulares prope basin 3.5 mm latos, 1 mm fere longos, revolutos in statu compresso 8–9 mm lata, in sicco crenea, ad lobos tantum et paulo infra parce pilosa. Annulus nectarifer basalis glaber. Antherae lineares, ± 7 mm longae, basibus arcte cohaerentes, apice sterili connectivi brevi, obsolete bidentato. Filamenta 8 mm fere longa, 1–1.5 mm lata, paulo ultra medium libera. Stylus filiformis, ± 20 mm longus, stigma minutum, subcapitatum, obsolete bilobum ferens. Nuculae non visae.

Species inter omnes subsectionis indumento asperrimo, *O. strigosissimum* Boiss. in mentem vocante insignis, praeterea foliis caulinis mediis et superioribus latissimis, late rotundatis, foliis inferioribus quam cetera multo minoribus facile diagnosenda.

TURKEY A5 Kastamonu: Tossia (Tosya), in montosis, 13 vi 1892, *Sintenis* 4221 p.p., Hb. Khek, (holo. W).

Though this species can very easily be distinguished from all others, Haussknecht did not publish the name. It is an inappropriate epithet since nowhere are typical linear lobes developed. Haussknecht seems to have derived it from the shape of the calyx-lobes but even they are more typically linear in many other species. In spite of these reasons I have not changed the name as the plants of *Sintenis* have been distributed to herbaria all over the world and are certainly kept under the name applied by Haussknecht & *Sintenis*. No other species of subsection *Asterotricha* has long, dense and even pungent bristles on the leaves and stems.

Under the same number and on the same sheet of *Sintenis* there is a second plant that is intermediate between *O. linearilobum* and *O. stenolobum* [Hausskn. ex] H. Riedl from the same locality. There seems to be no doubt that it is a hybrid between these two species (p. 322).

***Onosma x hybridum* H. Riedl, hybr. nov.**

O. stenolobum [Hauskn. ex] H. Riedl x *O. linearilobum* [Hauskn. ex] H. Riedl

Ab *O. stenolobo* differt foliis paulo latioribus subtus laxius setosis, calyce 8–10 mm, nec 15–16 mm longo, longitudine valde variabili, corolla 11–12(–13) mm longa, calyce manifeste longiore, antheris 4–5 mm, nec 7 mm longis. Ab *O. linearilobo* differt foliis manifeste angustioribus, indumento caulis et foliorum molliore, inflorescentia valde ramosa, calyce, corolla et antheris brevioribus, calycis laciniis manifeste angustioribus.

TURKEY A5 Kastamonu: Tossia (Tosya) in montosis, 13 vi 1892, *Sintenis* 4221 p.p., Hb. Khek (holo W).

The plant shows closer affinities to *O. stenolobum* but mainly the type of the indumentum on the broader leaves suggests introgression of genes from *O. linearilobum*. The small calyx and corolla give a hint of the reduced vitality maybe combined with partial sterility of the hybrid.

***Onosma microcalyx* H. Riedl, sp. nov. Fig. 3.**

Species perennis rhizomate ramoso ramis interdum subhorizontalibus tenuibus, rosulas steriles foliorum et ramos floriferos ferentibus, saepe decorticante, opace brunneo. Caules floriferi 5–15 cm tantum alti, e rosulis foliorum anni praecedentis orientes, pallide stramineo-viridescentes (e sicco!), teretes, 1–1.5 mm in diam. crassi, simplices vel in regione synflorescentiae bifurcati, densissime setis patentibus 2 mm fere longis obsiti, inter setas pilis brevibus numerosissimis subtomentosi. Rosulae foliorum florendi tempore e ramis lateralibus rhizomatis evolutae, praeterea minores lateraliter e rosulis exsiccatis anni praecedentis nunc caules floriferos edentibus orientes. Folia rosularum sterilium 35–65 × 7–10 mm, oblongo-oblancoolata, basin versus longius attenuata interdum breviter petiolata petiolo semper quam 10 mm brevior, apice acutiuscula, rare subobtusata, margine non vel indistincte tantum revoluta. Folia caulina rosularibus multo minora, 10–20 × 2.5–3.5 mm lata, oblongo-linearata, acuta vel subobtusata, omnia sessilia suprema interdum basi paulo dilatata. Folia omnia supra densius, subtus paulo laxius setis tenuibus patentibus vel subappressis, rigidis, tuberculis pilis ± 6-stellatis dispositis obsitis insidentibus vestita, inter setas supra tantum laxe breviter pilosa vel saepius glabra. Inflorescentiae breves, pauciflorae e floribus plerumque 3–5, singulae vel geminatae, post florendum elongatae. Bractae 6–10 mm longae, ovato-lanceolatae, lanceatae usque ad lineares, basi lata sessiles. Pedicelli infimi usque ad 2.5 mm longi, ceteri breviores. Calyces 7–9 mm longi, toti setis subpatentibus, in sicco flavescentibus densissime tecti, usque ad basin in lacinias 5 lineares, acutiusculas divisi, post florendum immutati. Corolla 18 mm fere longa, cylindrico-campanulata, flava, extra dense breviter pilosa, intus glabra, lobis triangularibus acutis 1 mm fere longis, prope basin 2.5 mm fere latis, plerumque ut videtur suberectis. Antherae 6–6.5 mm fere longae, anguste lineares, basibus cohaerentes, apice sterili connectivi 1–1.5 mm longo 2 mm fere infra basin sinuum inter lobos corollae sito. Filamenta 8 mm longa, parte inferiore longitudine variabili, et in una corolla inaequali corollae adnata, linearata, prope basin usque ad 1 mm lata, in sicco brunnescentia. Annulus nectarifer

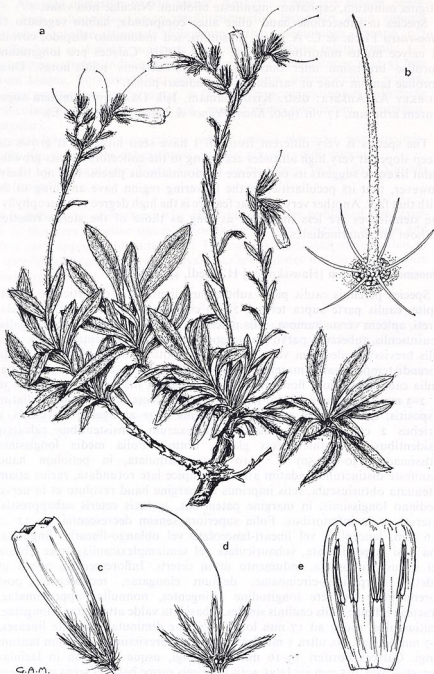


FIG. 3. *Onosma microcalyx* H. Riedl: a, habit $\times \frac{2}{3}$; b, hair $\times$ c. 50; c, corolla $\times 2.5$; d, calyx $\times 2.5$; e, corolla opened out $\times 2.5$. Drawn from the holotype—Khan, Prance & Ratcliffe 717.

basalis glaber. Stylus filiformis, 18–20 mm longus, corollam paulo superans. Stigma minutum, capitatum, manifeste bilobum. Nuculae non visae.

Species in subsectione haud ullae aliae compranda, habitu vegetatio *O. albo-roseo* Fisch. & C. A. Mey. subsimilis, sed indumento hispido, corolla et calyce multo minoribus maxime ab ea differt. Calyces pro longitudine corollae brevissimi inter omnes species subsectionis mihi notas. Duae corollae tantum visae ut variabilitas vix indicari possit.

TURKEY A4 Ankara: distr. Kizilcahamam, Işık Da., supra limitem superiorem arborum, 17 viii 1960, Khan, Prance & Ratcliffe 717 (holo E).

The species is very different from all I have seen hitherto. It grows on steep slopes at very high altitudes according to the collectors and its growth-habit likewise suggests its occurrence in mountainous places. It is not likely, however, that its peculiarities in the flowering region have anything to do with that fact. Another very peculiar feature is the high degree of heterophylly; the stem-leaves are less than half as long as those of the sterile rosettes without any intermediates.

***Onosma stenolobum* [Hausskn. ex] H. Riedl, sp. nov.**

Species perennis caulis parte subterranea lignosa, $\pm$ decorticante, pluricipite, caulis parte supra terram 25–30 cm alta, in sicco quidem pallida, tereti, apicem versus ramosa, setis patentibus albis 2 mm fere longis, rigidis, densiusculis, tuberculo parvo plerumque haud piloso insidentibus, praeterea pilis brevissimis deorsum versis laxiuscule vestita. Folia basalia rosulata florendi tempore iam emarcida suisque residuis basin caulis amplectentia. Folia caulina inferiora florendi tempore exsiccata, lineari-spathulata, 20–30 $\times$ 2–3 mm, margine revoluta, setis patentibus tuberculis albis pilis stellatim dispositis, quintam fere partem longitudinis setae attingentibus vestitis, e seriebus 2 concentricis cellularum convexarum consistentibus calcareis insidentibus tecta, inter setas glabra, obtusa. Folia media longissima latissimaque, 30–45(–50) $\times$ 5–10 mm, spathulata, in petiolum haud manifeste distinctum gradatim attenuata, apice late rotundata, rarius etiam attenuata obtusiuscula, setis imprimis in margine haud revoluta et in nervo mediano longissimis, in margine patentibus, in locis ceteris subappressis, ceterum ut in inferioribus. Folia superiora sensim decrescentia, 20–32 $\times$ 2–6 mm, lanceolata vel lineari-lanceolata vel oblongo-linearia, lingulata, ima basi saepe dilatata, subauriculata vel semiamplexicaulia, apice obtusa vel rarius acutiuscula, indumento ut in ceteris. Inflorescentiae primo ut videtur scorpioides-circinnatae, demum elongatae, rectiusculae, post florendum 7 cm fere longitudine attingentes, nonnullae approximatae. Bractae intimae foliis caulinis similes, e basi lata valde attenuatae, elongatae, acutiusculae, usque ad 17 mm longae, ceterae diminutae, anguste lineares, 5–7 mm longae, vix ultra 1 mm latae. Pedicelli brevissimi, 1–1.5 mm tantum longi. Calyces floriferi 15–16 mm fere longi, usque ad basin in lacinias angustissimas, 0.5 mm vix latas, setis imprimis prope basin et secus marginem patentibus, 2–3 mm longis vestitis divisi, fructiferi usque ad 22 mm elongati, lacinii ima basi cohaerentibus, usque ad 1 mm dilatatis. Corolla calyce vix longior, 16 mm fere longa, extra in lobis 1 mm fere longis subtriangularibus et secus nervos medianos loborum hirsuta, ceterum glabra, subcylindrica

vel cylindrico-campanulata, in statu compresso 5 mm fere lata, intus glaberrima. Annulus nectarifer basalis glaber. Antherae 7 mm fere longae, sagittatae, basi cohaerentes, apice sterili connectivi bidentato basin sinuum inter lobos corollae attingente. Filamenta antheris aequilonga, linearia, 0.7 mm fere lata, in dimidio superiore tantum libera. Stylus quam corolla 2-3 mm longior; stigma indistinctum, minutum. Nuculae maturae 2(-2.5) mm tantum longae, bipyramidatae, acutae, dilutissime brunnescentes, nitidae, in ventre (stylum versus) carinatae, in facie exteriori vix carinatae, indistincte scrobiculato-punctatae, areola pro magnitudine nucularum permagna, triangulari.

Species inter omnes subsectionis calycis laciniis elongatis, angustissimis, corolla pro longitudine calycis brevi, nuculis minutis valde insignis.

TURKEY A5 Kastamonu: Tossia (Tosya) in montosis, 30 vi 1892, *Sintenis* 5270 (holo. W.)

It is difficult to understand why Haussknecht never published a description of this very peculiar species, though he had recognized it as new and gave a very appropriate name to it. The calyx length compared to that of the corolla and the very narrow calyx lobes are features unique in subsection *Asterotricha*.

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