A revision of the species of Trifolium sect. Trifolium (Leguminosae) : III. Taxonomic treatment (sequel)

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A revision of the species of Trifolium sect. Trifolium (Leguminosae). III. Taxonomic treatment (sequel)

M. ZOHARY

RÉSUMÉ

Dans la troisième partie de sa révision du genre *Trifolium* sect. *Trifolium*, l'auteur achève la systématique de ce groupe. Il décrit 5 sous-sections dont 4 sont nouvelles (*T.* subsect. *Alexandrina, Squamosa, Urceolata* et *Echinata*) comprenant 20 espèces et 6 variétés.

SUMMARY

In the third part of his revision of the genus *Trifolium* sect. *Trifolium*, the author finishes the systematics of this group. He describes 5 subsections of which 4 are new (*T.* subsect. *Alexandrina, Squamosa, Urceolata* and *Echinata*). It includes 20 species and 6 varieties.

ZUSAMMENFASSUNG

Im dritten Teil seiner Revision der Gattung *Trifolium* sect. *Trifolium*, beendet der Verfasser die Systematik dieser Gruppe. Er beschreibt 5 Untersektionen von denen 4 neu sind (*T.* subsect. *Alexandrina, Squamosa, Urceolata* und *Echinata*). Sie enthalten 20 Arten und 6 Varietäten.

XIII. **Trifolium** subsect. **Alexandrina** Zoh., **subsect. nov.**

Annuae. Calyx 10-nervius; tubus cylindricus vel campanulatus, pubescens; faux aperta vel parce coarctata, nuda vel hirta, ciliatave; dentes in calycibus fructiferis recti vel patentes. Corolla alba vel ochroleuca, raro rosea, calyce usque duplo longior, caduca.

53. Trifolium salmoneum Mout., Fl. Djebel Druze: 128. 1953. **Typus:** Syria, El Ayoun, 5.6.1943, *Mouterde* (phototype in Mouterde, l.c.).

Hab.: Damp places; by water. Rather rare.
Gen. distr.: Syria, Palestine.

Selected specimens. Palestine: Hula Plain, env. of Gonen, slopes of basalt hills, swampy soil near spring 1963, *Zohary 11/6* (HUJ).

Varies very little, chiefly in colour of petals (from white-cream to pinkish); teeth of calyx usually with white tip, rarely with a purple one; throat usually glabrous, very rarely with some scattered hairs.

54. Trifolium apertum Bobrov in Komarov, Fl. URSS 11: 391. 1941; 258, t. 16. 1945, et in Act. Inst. Bot. Acad. Sci. URSS ser. 1, 6: 316. 1947. **Typus:** Caucasus, circa Maikop, 1.7.1924, *Pastuchow* (holo.: LE; iso.: HUJ).

Hab.: Meadows, among bushes.
Gen. distr.: Italy, Greece (probably introduced in these two countries), Turkey, Caucasus.

1a. Plant 40 cm or more. Stems few, erect. Lower tooth of flowering calyx twice or more as long as other teeth and tube; teeth of fruiting calyx never reticulately nerved. Fruiting head 2-3.5 cm long
54a. var. *apertum*

1b. Plant 10-30 cm. Stems many, ascending. Lower tooth of flowering calyx 1.5 times as long as other teeth and tube; teeth of fruiting calyx usually reticulately nerved at base. Fruiting head 1.2-1.5 cm long . . . . . *54b.* var. *kilaeum*

54a. T. apertum Bobrov var. **apertum.**
= *T. apertum* Bobrov, l.c.

Icon.: Fl. URSS 11: 258, t. 16, 1945.

Selected specimens. Italy: An campo Marzo, *Tommasini 475* (probably introduced) (W). **Greece:** Leucadia, in arvis Catunoe, 1951, *Mazyicri 432* (W). **Turkey:** Pr. Istanbul, bord de la route de Tache-Kichla à Dolmabaghtche, 19.6.1888, *Aznavour 663* (G). **Caucasus:** Pr. Krasnodar, Majkop, in vicinitate stationis experimentalis Majkopensis, in pratis inter frutices, 1949, *Bobrov 3725* (G).

54b. T. apertum Bobrov var. **kilaeum** Zoh. & Lern., Not. Roy. Bot. Gard. Edinb. 29: 322. 1969. **Typus:** Turkey, Pr. Istanbul, collines argileuses près de Kila (Kilyos) 29.6.1893, *Aznavour* (holo.: G).

Selected specimens. Turkey: Kilyos, hillsides 1936, *B. V. D. Post* (G).

55. Trifolium berytheum Boiss. & Bl. in Boiss., Diagn. ser. 2, 2: 15. 1856. **Typus:** Lebanon, ad ostium riv. Sainib prope Sidonem, inter segetes, *Blanche* (lecto.: G; iso.: K, BM, E).
= *T. supinum* Savi var. *tuberculatum* Boiss., Fl. 2: 126. 1872.
= *T. alexandrinum* L. var. *tuberculatum* (Boiss.) Gib. & Belli, Mem. Accad. Sci. Torino ser. 2, 39: 390. 1889.
= *T. alexandrinum* L. var. *berytheum* (Boiss. & Bl.) Trab., Bull. Div. Agr. Serv. Bot. 48: 2. 1911; Opphr., Bull. Res. Counc. Israel D, 7: 212. 1959.
= *T. echinatum* M. B. var. *berythaeum* (Boiss. & Bl.) Dinsm., Repert. Sp. Nov. 30: 126. 1931, et in Post, Fl. Syr. Pal. Sin. ed. 2, 1: 338. 1932.
= *T. constantinopolitanum* Ser. var. *plumosum* Bornm., Beih. Bot. Centralbl. 31, 2: 203. 1914.

Icon.: Opphr., l.c.: 219, f. 4.
Hab.: Fields and damp places
Gen. ditr.: Turkey, Lebanon, Palestine.

Selected specimens. Turkey: Distr. Istanbul, collines entre Chichli et Kishathiani, 1893, *Aznavour* (G). **Lebanon:** Suq ul Charb 1900, *Post* (HUJ). **Palestine:** Esdraelon Plain, Qishon river, E of Mishmar Ha'emeq, field border, heavy soil 1963, *Plitmann 15/5* (HUJ, fairly common).

T. berytheum Boiss. & Bl., which is morphologically well distinguished from all other species of the subsection *Alexandrina,* has been wrongly reduced by Boissier to a variety of *T. supinum* (= *T. echinatum*), by Gibelli & Belli to a variety of *T. alexandrinum* and by Bornmüller to a variety of *T. constantinopolitanum.* It is the inadequate knowledge of the three respective species that could have led to such a procedure. It was Hossain (1961) who first returned the specific rank to *T. berytheum* as conceived by Boissier in his Diagnoses. As a matter of fact, *T. echinatum* and *T. constantinopolitanum* belong to other subsections. The nearest to *T. berytheum* are *T. alexandrinum, T. salmoneum* and *T. meironense. T. salmoneum* has a semi-closed calyx throat due to a protruding callose ring *T. meironense* has pink flowers. *T. berytheum* has an indurated fruiting calyx with coarse tufts of hairs, a long-ciliate calyx throat, while in *T. alexandrinum* the calyx is white-membranous, the open throat very sparingly appressed-hairy and the fruting heads do not disarticulate into individual calyces.

56. Trifolium meironense Zoh. & Lern. in Zoh., Fl. Palest. 2: 183, t. 263. 1972. **Typus:** Palestine, upper Galilee, Mt Meiron, Adatir (grown in 1965 from seeds collected by *Katznelson* from the above locality), *Katznelson 160* (holo.: HUJ).

Hab.: Batha and maquis.
Gen. distr.: Turkey, Palestine.

Specimens seen. Turkey: In planitie inter Urfa et Siverek 1841, *Kotschy 86* (W).

57. Trifolium vavilovii Eig, Bull. Appl. Bot. Leningrad ser. 7, 1: 108. 1934; Opphr., Bull Res. Counc. Israel D, 7: 208. 1959. **Typus:** Palestine, Nahalal to Harosheth-Hagoim 1927, *Eig* (lecto.: HUJ).

Hab.: Open places, abandoned fields, roadsides and semiarid batha.
Gen. distr.: Syria, Palestine, Iraq.

Selected specimens. Syria: Sueda, Jebel Druz 1931, *Zohary* (HUJ). **Palestine:** Upper Galilee, env. of Amiad, fallow fields and roadsides, basalt soil 1963, *Zohary 8/42* (HUJ). **Iraq:** Kurdistan and Mosul 1941, *Kotschy* (K).

T. vavilovii has long been overlooked by students of the flora of the Near East. This was partly due to the inadequate description by Eig and to the inaccessibility of the Russian periodical in which this binomial was originally published. It is a very common species in Palestine, and it grows in semiarid Mediterranean batha and other dry places. It is easily distinguished from *T. alexandrinum* and *T. berytheum* by the smaller flowers, by the lower calyx lobe which is often twice as long as the others, the feeble pubescence and leathery consistence of the calyx tube, the naked throat of the calyx, the purple tips of the calyx lobes, etc.

Hossain (1961: 427) synonymizes *T. vavilovii* with *T. carmeli,* what means that this author was not sufficiently familiar with both species concerned. The latter is quite different from the former by its foliage, its broadly lanceolate calyx lobes, its calyx throat closed by a callosity and its not disarticulating heads. Hossain was probably misled by the purple ("black") tips of the calyx lobes that occur both in *T. carmeli* and *T. vavilovii,* but this character also occurs in *T. plebeium* and *T. constantinopolitanum.*

T. vavilovii varies slightly in the proportion of the calyx lobes, the pubescence of the calyx and also in dimensions of the leaflets. Future experimental studies will decide upon the taxonomic value of these forms.

58. Trifolium alexandrinum L., Cent. Pl. 1: 25. 1755, et Amoen. Acad. 4: 286. 1759. **Typus:** Hb. Linn. 930/49. Described from Egypt.

Hab.: cultivated in many countries, especially in SW Asia, as a forage plant. Wild races and progenitors not known.

Subspontaneous in Palestine and in some neighbouring countries.

Of the many cultivars known of the Egyptian clover, the most common are the "fahli" and "muscavi". The first is a spring form unable to regenerate after reaping and therefore grown for seeds only. The second is an early summer

crop and regenerates after harvest, producing 4-6 crops seasonally. Apart from this physiological property, the variety muscavi differs from the fahli by some other characters, namely the ability of the stem to branch profusely from base, the configuration of the lower calyx tooth, etc.

After examining these cultivars also for some other morphological characters, we have decided to rank these agriculturally very important strains as varieties, to name and describe them tentatively as follows:

58a. T. alexandrinum L. var. **alexandrinum.**
= *T. alexandrinum* L., l.c.; Boiss., Fl. 2: 127. 1872, excl. syn. et var. β; Opphr., Bull. Res. Counc. Israel D, 7: 204. 1959.

Plants not or only slightly branched at base. Stems slender, solid. Free parts of stipules on the upper leaves mostly triangular. Involucre of bracts at base of head O or rudimentary. Teeth of calyx almost equal; lower tooth not oblique, with a more or less regular apex. Fruiting calyx with lower tooth as long as or shorter than tube; tube of fruiting calyx whitish, with prominent nerves. Fruiting head ovoid, somewhat prickly in touch. Fl. March-April. Local name: "fahli".

Widely cultivated as a single harvest clover in the Mediterranean countries and elsewhere. Linné's specimen of this species in Linnaean Herbarium London represents the above variety.

58b. T. alexandrinum L. var. **serotinum** Zoh. & Lern. in Zoh., Fl. Palest. 2: 185. 1972. **Typus:** Palestine, lower Galilee, env. of Meskha, about 1.5 km west of the settlement, field border, alluvial basalt soil, 10.3.63, *Zohary 2104/9* (holo.: HUJ).

Plants profusely branching at base. Stems mostly thick and fistulous. Upper free part of stipules in the uppermost leaves long-subulate. Base of heads mostly with a distinct involucre of bracts, sometimes very short. Lower tooth of calyx conspicuously longer than the rest, and those of the lower flowers mostly irregular at apex (oblique, bifid or eroded with a unilateral lobe...), mostly one and a half times as long as tube of fruiting calyx, which is herbaceous, greyish, with less prominent nerves; teeth less spreading, often erect. Fruiting head conical, more prickly in touch. Fl. May-June. Local name: "muscavi".

Mouterde (1970) published some additional binomials related to *T. alexandrinum.* We have not seen the specimens concerned but from the descriptions and the distribution of the published taxa it seems to us that all these should be put into synonyms of some of the species recorded here within the subsection *Alexandrina.*

XIV. Trifolium subsect. **Squamosa** Zoh. **subsect. nov.** Stirp. **Maritima** Gib. & Belli, Mem. Accad. Sci. Torino ser. 2, 39: 362. 1889, p.p.

Annuae. Calyx 10-nervius; tubus obconicus vel campanulatus, albus, glaber vel glabriusculus; faux callositate bilabiata clausa; dentes calycini triangulares vel late lanceolati, tubo plerumque breviores, 3-nervii, fructiferi patentes. Corolla alba vel rosea, caduca.

59. Trifolium squamosum L., Amoen. Acad. 4: 105. 1759. **Typus:** Hb. Linn. Described from England.
= *T. maritimum* Huds., Fl. Angl.: 284. 1762; Godr. in Gren. & Godr., Fl. Fr. 1: 408. 1848-49; Boiss., Fl. 2: 128. 1872; Gib. & Belli, Mem. Accad. Sci. Torino ser. 2, 39: 384. 1889.
= *T. rigidum* Savi, Fl. Pis. 2: 154. 1798.
= *T. clypeatum* sensu Lapeyr., Hist. Abrég. Pyr.: 436. 1813, non L. 1753.
= *T. albidum* sensu Ten., Fl. Nap. App. 3: 619. 1830, non Retz. 1786-87.
= *T. glabellum* C. Presl, Fl. Sic. 1: XXI. 1826.
= *T. commutatum* Ledeb., Fl. Ross. 1: 543. 1843.
= *T. maritimum* Huds. var. *irregulare* (Pourr.) Aschers. & Graebn., Syn. Mitteleur. Fl. 6/2: 587. 1908.
= *T. irregulare* Pourr., Hist. Mem. Acad. Sci. Toulouse 3: 331. 1788.
= *T. nigrocinctum* Boiss. & Orph. in Boiss., Diagn. ser. 2, 6: 47. 1859.
= *T. maritimum* Huds. var. *nigro-cinctum* (Boiss. & Orph.) Boiss., Fl. 2: 129. 1872; Gib. & Belli, l.c.: 385 *("nigrocinctum").*
= *T. maritimum* Huds. var. *moriferum* Lojac., Tent. Monogr. Trif. Sic.: 136. 1878.
= *T. xatardii* DC., Fl. Fr. 5: 558. 1815; Willk. & Lange, Prodr. Fl. Hisp. 3: 369. 1877.

Icon.: Reichenb., Icon. 22: t. 2139, f. 2, 6-13. 1903; Gib. & Belli, l.c.: t. 8, f. 8.
Hab.: Coastal areas, meadows, roadsides and fields.
Gen. distr.: British Isles, Germany, Poland, Switzerland, Hungary, Romania, Portugal, Spain, France, Italy, Balkan Peninsula, Crimea, Turkey, Syria, Lebanon, Caucasus, Libya, Tunisia, Algeria, Morocco, Madeira.

Selected specimens. British Isles: East Kent, Isle of Sheppey, rough grassland around salt marsh 1953, *Cannon & al. 2304* (W); prope Southend 1884, *Fraser* (W). **Portugal:** In herbosis agris Olinponensis prope Lumiar 1891, *Welwitsch* (G). **Spain:** Champs humides à Lagos, Algarve 1853, *Bourgeau 1835* (G). **France:** Berges du Canal de la Vendée, Fontenay-le-Comte (Vendée) 1853, *Letourneux 1163* (G); Montpellier 1905, *Thellung 5116* (HUJ); prés humides au Havre 1836, *Grenier 52* (HUJ). **Sardinia:** *Thomas* (G). **Italy:** Calabria, Catanzaro in pascuis graminosis 1898, *Rigo 309* (W). **Jugoslavia:** Istria, Wiesengräben in Val Baudori bei Fasana 1809, *Korb* (W); Dalmatia, Spalato oberhalb Salona 1926, *Korb* (W). **Greece:** in pratis humidis Peloponnesi pr. Tyrinthon Nauphas 1857, *Orphanides 613* (W, lectotype of *T. nigro-cinctum*). **Crete:** Marais de Kissamos 1884, *Reverchon 239* (W). **Turkey:** Env. of Istanbul, Pendik 1892, *Aznavour* (G); San Stefano 1900, *Aznavour* (G). **Lebanon:** Beyrouth, *Girandy* (G). **Libya:** Cirenaica, Al Gubba-Ain-Mara 1934, *Pampanini & al. 4022* (W). **Algeria:** Alger, champs 1939,

Bové (G); lit de la rivière de Chiens près de Constantine 1857, *Cholette 332* (G). **Madeira:** Madeira 1838 (G); in pascuis Machico 1865-66, *Mandon 139* (W).

60. Trifolium cinctum DC., Cat. Hort. Monsp.: 152, 1813; Ser. in DC., Prodr. 2: 193. 1825; Hayek, Prodr. Fl. Penins. Balc. 1: 862. 1926. **Typus:** France, au Port Juvénal, *Saltzman 1820* (holo.: G-DC.).
= *T. maritimum* Huds. subsp. *cinctum* (DC.) Gib. & Belli, Mem. Accad. Sci. Torino ser. 2, 39: 389. 1889; Thell., Mém. Soc. Sci. Nat. Math. Cherbourg 38: 320. 1912.
= *T. succinctum* Vis., Pl. Rar. Dalm., in Flora 12, Ergänzungsbl. 1: 21 no. 32. 1829.

Icon.: Reichenb., Icon. 22: t. 2148, f. 1, 1-5. 1903.
Hab.: Forests, meadows and probably elsewhere.
Gen. distr.: France, Italy, Balkan Peninsula.

Selected specimens. Jugoslavia: Dalmatia, *Velden 824* (W) in fruit; ibid.: in pratis ad Salonam, *Pichler 17* (P, W). **Albania:** in herbidis silvaticis pr. Pristani 1898, *Baldacci 333* (G).

T. cinctum should be kept apart from its nearest relative *T. squamosum,* not only for its involucre, but also because of the shape and indumentum of the calyx, and the length of the corolla. It is probably endemic in the Balkan Peninsula and has been adventively spread into Italy and France.

XV. Trifolium subsect. **Urceolata** Zoh. **subsect. nov.** Stirp. **Maritima** Gib. & Belli, Mem. Accad. Sci. Torino ser. 2, 39: 362. 1889, p.p.

Calyx 10-nervius; tubus urceolatus, viridis vel canescens, pubescens vel glaber; faux callositate bilabiata clausa; dentes calycini triangulari-lanceolati ad lanceolati, 3-5-nervii, aequilongi vel inferiores multo longiores. Corolla alba vel ochroleuca vel rosea, calyce aequilonga vel longior, caduca.

61. Trifolium juliani Batt., Bull. Soc. Bot. France 34: 387. 1887; Thell, Mém. Soc. Sci. Nat. Math. Cherbourg 38: 318. 1912; Murb., Contr. Fl. N-W Afr. 1, in Lunds Univ. Arrskr. 33/12: 64. 1897. **Typus:** Algeria, "in uliginosis montosis c. Constantine, Djebel Ouach Meridj, ubi delectus fuit anno 1886" leg. *Julien* (holo.: P).

Gen. distr.: Tunisia, Algeria.

Specimens seen. Tunisia: In herbosis montis Dir el Kef, 1896, *Murbeck* (BM).

The original description by Battandier was based on a specimen grown from seeds. Later Battandier probably changed his opinion on this binomial and here

is an interesting remark by him on the relations of this species to other related taxa (Bull. Soc. Dauphinoise ser. 11, 1890): "*Trifolium juliani* Batt. – Notre savant correspondant d'Algérie nous a envoyé cette plante sous le nom de *T. xatardii* Ser., abandonnant ainsi le nom de *T. juliani* qu'il lui avait d'abord donné dans le Bulletin de la Société botanique de France, vol. 34: 387, et tout récemment encore dans sa Flore d'Algérie: 235. C'est sur une lettre de M. Belli, l'un des auteurs de la Monographie des Trèfles italiens, que M. Battandier a cru devoir adopter cette nouvelle manière de voir. Mais la comparaison minutieuse que nous avons faite de la plante de Constantine avec la description que De Candolle, véritable auteur de l'espèce, donne de son *T. xatardii,* en 1815, Fl. Fr. 5: 558, nous laisse des doutes sur l'identification de la plante d'Algérie avec celle que Xatard avait récoltée à Prats de Mollo dans les Pyrénées-Orientales. Seringe (1825: 193), auteur du genre *Trifolium* du Prodrome, donna une description du *T. xatardii* qui, il faut le dire, convient un peu mieux à notre plante, mais qui, vu sa concision, ne lève pas tous les doutes. C'est pourquoi nous avons publié l'espèce sous le nom de *T. juliani* Batt., qui est un nom certain".

62. Trifolium daveauanum Thell., Repert. Sp. Nov. 3: 282. 1907. **Typus:** France, Montpellier (adventive), champ à l'Aiguelongue 1898, *Daveau* (holo.: MPU). "Planta peregrina patria haud recognita, sed affinitate Mediterranea in Galliam australem introducta".

Hab.: Fields.
Gen. distr.: Not certain.

Specimens seen. France: only the above-cited type specimen.

63. Trifolium miegeanum Maire, Contr. Fl. Afr. N., in Bull. Soc. Hist. Nat. Afrique N. fasc. 19, 23: 177. 1932. **Typus:** Morocco, env. Rabat 1926, *Miège* (holo.: P).

Hab.: Pastures.
Gen. distr.: Morocco (endemic).

T. miegeanum is very near to *T. obscurum,* but differs from it by a few characteristics, among them: the lanceolate teeth of calyx which are not narrowed at base. The latter is a highly diagnostic character.

64. Trifolium squarrosum L., Sp. Pl.: 768. 1753; DC., Fl. Fr. 5: 531. 1815. **Typus:** Hb. Linn. 930/31. Described from Spain.
= *T. oblongifolium* Ser. in DC., Prodr. 2: 197. 1825.
= *T. panormitanum* C. Presl, Fl. Sic. 1: XXI. 1826; Godr. in Gren. & Godr., Fl. Fr. 1: 409. 1848-49; Boiss., Fl. 2: 128. 1872.

= *T. longistipulatum* Loisel., Fl. Gall. ed. 2, 2: 122. 1828.
= *T. dipsaceum* Thuill., Fl. Env. Par. ed. 2: 382. 1799; Gib. & Belli, Mem. Accad. Sci. Torino ser. 2, 39: 362. 1889.
= *T. squarrosum* L. var. *majus* et var. *minus* Rouy, Fl. Fr. 5: 115. 1899.

Icon.: Reichenb., Icon. 22: t. 2139, f. 1, 1-5. 1903; Gib. & Belli, l.c.: t. 6, f. 5.
Hab.: Meadows, pastures and fallow fields.
Gen. distr.: Germany, Portugal, Spain, France, Corsica, Sardinia, Italy and islands, Balkan Peninsula, Crimea, Algeria, Morocco, Mauritania, Canary Islands.

Selected specimens. Portugal: Prov. Estremadura, Sintra no Algueirão, nos terrenos em pousio, 180 m, 1950, *Bento Rainha 1933A* (HUJ). **Corsica:** près de l'étang de Biguglia 1867, *Mabille 221* (W). **Sardinia:** Santa Teresa, Galhira par Tempio, prairies calcaires de Bancamino 1881, *Reverchon 193* (P). **Italy:** pâturages et moissons de champs dans les terrains argileux près de Pise (Toscana) 1857, *Savi 455* (W). **Sicily:** in cultis Palermo, *Todaro* (W). **Algeria:** Fossés près de Maison Blanche (dép. d'Alger) 1957, *Dubius & al. 2969* (W); **Morocco:** Ripas fl. Lukas, 1930, *Font-Quer 343* (BM). **Mauritania:** *Bové 45* (W). **Canary Islands:** Teneriffa, Laguna, in collibus 500-600 m, 1900, *Bornmüller 486* (W).

T. squarrosum is a well delineated species. It has the largest flowering and fruiting head in the group "Urceolata"; the head which may reach 2 cm in width, never elongates to a spike, but remains globular or ovoid in fruit and is most striking by the divergent long calyx teeth; the lower calyx tooth is much longer than the other teeth, the two upper ones are connate to about half their length. The basi-bulbous hairs which often cover the calyx are also very characteristic. Unlike *T. obscurum,* the corolla exceeds here the calyx in length. The attempt to follow Gibelli & Belli or Ascherson & Graebner to subdivide the species into varieties has failed.

65. Trifolium obscurum Savi, Obs. Trif. 31, f. 1. 1808-10; Caruel, Prodr. Fl. Tosc.: 161. 1860 ≡ *T. obscurum* Savi emend. Gib. & Belli, Mem. Accad. Sci. Torino ser. 2, 39: 372. 1889. **Typus:** Italy, di Pisa dalla compaignon, *Michelli 24* (holo.: FI?).
= *T. panormitanum* C. Presl var. *aequidentatum* Perez-Lara, Fl. Gadit. 4: 459. 1891.
= *T. dipsaceum* Thuill. var. *aequidentatum* (Perez-Lara) Willk., Suppl. Prodr.: 246. 1893.
= *T. isodon* Murb., Contr. Fl. N-W Afr. 1, in Lunds Univ. Arrskr. 33/12: 64, t. 3, f. 7, 8. 1897.
= *T. obscurum* Savi subsp. *aequidentatum* (Perez-Lara) C. Vicioso, Rev. Gen. Trif., in Anal. Inst. Bot. Cavanilles 11: 344. 1953.

Icon.: Savi, l.c.: f. 1; Gib. & Belli, l.c.: t. 7, f. 4.
Hab.: Damp pastures.
Gen. distr.: Italy, Turkey, Algeria, Morocco (and probably elsewhere).

Selected specimens. Italy: San Casciano di Bagni, ad occid. urbis Chiasi, juxta confinum romanum, etc., 1881, *Levier* (P). **Turkey:** Env. of Constantinopol (Istanbul), Halki ou près de Kichathanakmy 1883, *Aznavour* (G). **Algeria.** Terny sur Tlemcen 1890, *Battandier & Trabut 526* (G). **Morocco:** in pascuis humidis Atlantis medii inter Azron et Ito, solo basaltico, 1200-1300 m, 1936, *Maire* (G, as *T. isodon* Murb.).

T. obscurum is a well delimited species, differing from all other allied species by the short corolla and especially by the particular shape of the equal calyx teeth narrowed at base. *T. isodon* is, no doubt, identical with *T. obscurum.* The few differences recorded by Murbeck seem not to be constant.

66. Trifolium constantinopolitanum Ser. in DC., Prodr. 2: 193. 1825; Boiss. Diagn. ser. 2, 2: 14. 1856, non Fl. 2: 127. 1872. **Typus:** Turkey ad Byzantium, *Castagne* (holo.: G-DC.).

= *T. alexandrinum* L. var. *phleoides* (Boiss.) Boiss., Fl. 2: 127. 1872; Hossain, Not. Roy. Bot. Gard. Edinb. 23: 426. 1961.

Hab.: Damp fields, roadsides, river banks, etc.

Gen. distr.: Switzerland, France, Italy (introduced), Turkey, Syria, Lebanon, Palestine, Algeria (probably adventive).

Selected specimens. Switzerland: Solothurn, Bahnhof der Zollikofen 1919, *Streun* (HUJ). **France:** Cherbourg, littoral 1859, *Le Jolis 35* (W). **Italy:** Trieste, Campo Mayio (advena) 1882, *Marchesetti* (W, E). **Turkey:** Antigone, 1893, *Aznavour 663a* (G); collines, bords des champs, Kathane-Chichli 1893, *Aznavour 663* (G); champs de l'île de Kisali (golfe de Smyrna) 1854, *Balansa 165* (G, W, E, P); Bafra, Orman Isletime, open field in grass 20 m, 1963, *Tobey 387* (E); Hatay, around marshes of Amouk 1932, *Delbès* (HUJ). **Lebanon:** Marj Ayyoun 1947, *Mouterde* (HUJ); env. de Saïda 1854, *Blanche* (P); **Palestine:** Dan Valley, banks of Hatsbani River, near Ma'ayan Barukh 1963, *Zohary & Plitmann 21/3* (HUJ). **Algeria:** Oran, dans les forêts de l'est Algérie 1914, *d'Alleizette* (P).

In various herbaria one finds this species under different names, e.g. *T. scutatum, T. echinatum, T. alexandrinum,* etc.

67. Trifolium leucanthum M. B., Fl. Taur.-Cauc. 2: 214. 1808; Boiss., Fl. 2: 128. 1872; Hayek, Prodr. Fl. Penins. Balc. 1: 862. 1926; Post, Fl. Syr. Pal. Sin.: 408. 1883-93 et ed. 2, 1: 339. 1932. **Typus:** Crimea, in Tauriae meridionalis collibus siccis, *Bieberstein* (LE).

= *T. obscurum* Guss., Cat. Pl. Boccadif.: 65. 1821, non Savi 1808-10.

= *T. reclinatum* sensu Griseb., Spicil. Fl. Rumel. 1: 21. 1843, non Waldst. & Kit. 1810-11.

= *T. leucanthum* M. B. var. *declinatum* Boiss., Fl. 2: 128. 1872.

= *T. leucotrichum* Petrovic, Fl. Agr. Nyss.: 228. 1882.

= *T. dipsaceum* Thuill. subsp. *leucenthum* (M. B.) Gib. & Belli, Mem. Accad. Sci. Torino ser. 2, 39: 369, 422, t. 7. 1889.

Icon.: Reichenb., Icon. 22: t. 2148, f. 2, 6-17. 1903.
Hab.: Mountain slopes, damp and grassy places, forest clearings.
Gen. distr.: Germany, Spain, France, Corsica, Sardinia, Italy, Sicily, Balkan Peninsula, Crete, Crimea, Turkey, Cyprus, Syria, Palestine, Iraq, Iran, Algeria.

Specimens seen. Spain: inter Duruelo et Penaranda de Bracamonte (Ovila-Salamanca), in graminosis humidis 1956, *Lainz* (W). **France:** Paris 1843, *Spach* (P). **Sardinia:** in herbidis prope Tortoli, *Moris* (P). **Sicily:** Palermo, *Todaro* (P); in pascuis submontosis Ficuzza, Portella del vento 1856, *E. & A. Huet du Pavillon 38* (P). **Greece:** ad declivitates umbrosas montis Taktuli (G). **Bulgaria:** in graminosis ad Nova Mahala 1894, *Stribrny* (K). **Crimea:** Jalta-Alupka, in declivitatibus siccis subapertis 1901 (K). **Turkey:** Turquie d'Europe 1842, *Grisebach* (G); Malatya distr., 20-30 km W of Malatya, *Quercus cerris* forest remnants, 1600 m, 1963, *Zohary, Orshan & Plitmann 27522* (HUJ); Sinus Smyrnaeus, in monte "Dyo-Adelphia" (Iki-Karadasch), 600-800 m, 1906, *Bornmüller 9327* (G); village d'Alla-Dagh, à 7 lieues au NO de Mersine (Cilicie), région montagneuse 1855, *Balansa 449* (G). **Cyprus:** Platres, in pine forest by edge of overflow from a water tank, 1219 m, 1941, *Davis D. 3150* (HUJ). **Palestine:** Upper Galilee, Wadi Hish, *Naftolsky 17003* (HUJ). **Iraq:** Distr. Sulaimaniya, inter Sulaimaniya et Dokan, in jugo prope Surdash, in apertis quercetorum c. 1000 m, 1959, *Rechinger 12470* (W).

XVI. Trifolium subsect. **Echinata** Zoh. **subsect. nov.**

Annuae. Calyx 10-nervius; calycis fructiferi nervi nonnumquam evanescentes, faux callositate bilabiata clausa; dentes calycini subinaequales, fructiferi erecti vel paulum divergentes, non patentes; calycum bases inter se et cum capituli rhachide concrescentes; capitulum fructiferum non disarticulans. Corolla calyce longior.

68. Trifolium latinum Seb., Rom. Pl. Fasc. 1, 7, t. 1. f. 2. 1813; Boiss., Fl. 2: 126. 1872; Hayek, Prodr. Fl. Penins. Balc. 1: 862. 1926. **Typus:** Italy, sylvula prope Romam versus mare vulgo dicta Macchi de Mattei, 1813, *Sebastiani.*

Hab.: Forests and maquis.
Gen. distr.: France, Italy, Greece, Bulgaria, Turkey.

Selected specimens. Greece: Nutades in Pinde tymphaeo 1896, *Sintenis 452* (P). **Bulgaria:** in collinis ad Suraw 1910, *Stribrny* (G). **Turkey:** Sinus Smyrnaeus, in monte "Dyo-Adelphia" (Iki-Karadasch) 600-800 m, 1906, *Bornmüller 9321* (E).

69. Trifolium echinatum M. B., Fl. Taur.-Cauc. 2: 216. 1808. **Typus:** Ad Caucasum, *Bieberstein* (photo.: LE).

Hab.: Forest clearings, dwarf shrub formations, waste places, river banks and roadsides.

Gen. distr.: Germany, Switzerland, Hungary, Romania, Italy, Balkan Peninsula, Turkey, Cyprus, Syria, Lebanon, Palestine, Iraq, Transcaucasia.

1a. Keel of corolla not purple at tip. Teeth of calyx entire with sparse cilia. Fruiting head small, 1.2-1.6 x 1-1.4 cm . . . . *69a.* var. *echinatum*

1b. Keel of corolla with purple tip. Teeth of calyx, especially the lower one, serrulate, with long, patulous hairs. Fruiting head large, 1.5-2.3 x 1.5-2 cm . . . . . *69b.* var. *carmeli*

69a. T. echinatum M. B. var. **echinatum.**

= *T. echinatum* M. B., l.c.; Boiss., Fl. 2: 126. 1872, pro syn.; Hayek, Prodr. Fl. Penins. Balc. 1: 863. 1926.
= *T. echinatum* M. B. subsp. *supinum* (Savi) Aschers. & Graebn., Syn. Mitteleur. Fl. 6/2: 590. 1908.
= *T. echinatum* M. B. subsp. *supinum* (Savi) Aschers. & Graebn. var. *trichostomum* (Godr.) Thell. in Aschers. & Graebn., l.c.
= *T. echinatum* M. B. subsp. *supinum* (Savi) Aschers. & Graebn. var. *reclinatum* (Waldst. & Kit.) Aschers. & Graebn. et II *procerum* (Rochel) Aschers. & Graebn., l.c.: 591.
= *T. echinatum* M. B. var. *brevidens* Thell. in Zimmerm., Advent. Ruder. Fl. Mannheim: 131. 1907.
= *T. supinum* Savi, Obs. Trif. f. 2: 46. 1808-10; Griseb., Spicil Fl. Rumel. 1: 22. 1843.
= *T. trichostomum* Godr., Mem. Acad. Sci. Montp. sect. Med. 1, 4: 427. 1853.
= *T. reclinatum* Waldst. & Kit., Pl. Rar. Hung. 3: 299, t. 269. 1810-11; Ser. in DC., Prodr. 2: 197. 1825; err. *"reflexum".*
= *T. procerum* Rochel, Pl. Banat. Rar.: 50. 1828.
= *T. sefinense* Freyn & Bornm. in Freyn, Mém. Herb. Boiss. 13: 5. 1900.

Icon.: Reichenb., Icon. 22: t. 2141, f. 2, 8-14. 1903.

Selected specimens. Hungary: in pratis fertilibus ad Danubium infra Alt-Moldova et ad Szakolovatz frequentissime; in loco posteriore cum *Trifolio resupinato* L. (locus classicus), *Borbàs 1220* (P). **Romania:** Reg. Constanta, raion Negru Voda, 1955, *Todar & Dinulescu 58a* (HUJ). **Italy:** Toscane, lieux incultes et cultivés, bords des champs et des chemins, moissons dans les terrains argileux, près de Pise 1857, *Savi 456* (HUJ). **Jugoslavia:** Pratis siccis prope Belgrad, *Pančić* (W). **Greece:** Thessalia: Larissa, in incultis et ad versuras planitiae 4 km oppido meridiem versus 1961, *Rechinger 22768* (W). **Bulgaria:** Gebüsche bei Obrasov – Irchifthik nächst Russe 1930, *Zorny* (W). **Turkey:** Thracia, 16 km N of Tekirdag, shrub formation 1963, *Orshan* (HUJ); prov. Adapazari, Sapanca Gölü 50 m, eroded banks, 1962, *Davis & Coode* (E); SE Anatolia, East of Diyarbakir, neglected field, heavy soil 1964, *Zohary & Plitmann 1962-9* (HUJ). **Cyprus:** Inter Heptakomi et Lionarissa 1880, *Sintenis & Rigo 414* (P). **Syria:** In humidis, Aintab,

1865, *Haussknecht* (W). **Lebanon:** A'Eden 1869, *Blanche 816* (G). **Palestine:** Upper Galilee, Wadi Abu Ali 1926, *Eig & Zohary* (HUJ). **Iraq:** In collibus Dschebel Hamrin inter Baghdad et Kirkuk 1892, *Bornmüller 1138* (W). **Transcaucasia:** Azerbajdzhan, distr. Kjurdamir inter pag. Kjulalu et Kalagajly, ad vias 1936, *Grossheim 37* (HUJ); in graminosis Georgiae Caucasicae 1834, *Hohenacker* (G). **Libya:** El Beda: Bir Tacar, 1934, *Pampaniri & Pichi-Sermolli 4023* (FI).

69b. T. echinatum M. B. var. **carmeli** (Boiss.) Gib. & Belli, Mem. Accad. Sci. Torino ser. 2, 39: 377. 1889. **Typus:** Palestine, Fauces Carmeli, April-May 1846, *Boissier* (holo.: G).

= *T. carmeli* Boiss., Diagn. ser. 2, 2: 16. 1856, et Fl. 2: 127. 1872; Post. Fl. Syr. Pal. Sin.: 237. 1883-96, et ed. 2, 1: 339. 1932; Opphr., Bull. Res. Counc. Israel D, 7: 207. 1959.

= *T. carmeli* Boiss. var. *carmeli* Hossain, Not. Roy. Bot. Gard. Edinb. 23: 427. 1961, p.p.

= *T. constantinopolitanum* Ser. in DC. var. *carmeli* (Boiss.) Thell., Vierteljahrschr. Nat. Ges. Zürich 52: 454. 1907.

Selected specimens. Palestine: Mt Carmel, Shefeyia to Bat Shelomo, *Quercus* maquis 1954, *Grizi 16614* (HUJ). Occurs probably also in Lebanon and Syria.

Trifolium echinatum is exceedingly polymorphic in its vegetative parts, its habit and indumentum. There are also some variations in the parts of the flower. But these are continuous and quantitative variations, a great deal of which should be considered habitative deviations. Among others, stems range from dwarf to tall and from densely hairy to almost glabrous; leaves range from almost obovate to narrowly elliptical; flower colour varies from yellow to whitish and pink to violet. There is also marked variation in the proportion of the nervature and margin configuration of the teeth. All these are inadequate to divide the species even into varieties. Even var. *carmeli* is not sharply delineated from var. *echinatum,* and intermediates occur between the two in overlapping areas. It is, therefore, strange that Boissier (l.c.), Hossain (l.c.) and others considered *T. carmeli* as an independant species.

It is still more astonishing that Ascherson & Graebner have not synonymized the many binomials around *T. echinatum,* which gave rise to such a confusion. It is especially amazing that Hossain (l.c.) has divided *T. carmeli* into 2 varieties according to denticulation of the upper leaflet and length of the lower calyx tooth.

XVII. Trifolium subsect. **Clypeata** Gib. & Belli, Mem. Accad. Sci. Torino ser. 2, 39: 393. 1889, pro stirpe.

Annuals. Calyx 10-nerved; teeth unequal, reflexed in fruit, somewhat leaf-like, 3-5-nerved, the 2 posterior ones shorter than tube, long-connate; throat closed by a 2-lipped callosity. Corolla cream, white or pink, much exceeding calyx. Heads not disarticulating (synaptospermic).

70. Trifolium clypeatum L., Sp. Pl.: 769. 1753; Boiss., Fl. 2: 129. 1872; Gib. & Belli, Mem. Accad. Sci. Torino ser. 2, 39: 394. 1889. **Typus:** Hb. Cliff. 373. Described from the Orient.

Icon.: Reichenb., Icon. 22: t. 2152, f. 1, 1-8. 1903; Gib. & Belli, l.c.: t. 8, f. 4.
Hab.: Fields, roadsides and batha.
Gen. distr.: Greece and Aegean Islands, Turkey, Cyprus, Syria, Lebanon, Palestine.

Selected specimens. Greece: N Syros in maquis on road up outside crater 1963, *Gathorne-Hardy 376* (E). **Turkey:** Prov. Hatay, Antakya n. St. Peter's Church, 300 m, rocky limestone slope 1957, *Davis & Hedge 27241* (E). **Cyprus:** Platanisso, Karpas 300 ft, edge of road 1950, *Chapman 207* (HUJ). **Syria:** Mts Nussairy, Buhamra 1909, *Haradjian 2828* (G). **Palestine:** Upper Galilee, Kerem ben Zimra, quercetum, among basalt rocks 1956, *Grizi 16648* (HUJ). Also seen from Chios, Rhodes, Lebanon, Cyprus...

This is one of the most common species. Although generally prefering rather favourable habitats with regard to moisture, it also occurs on stony hillsides and open sunny areas. It ascends the mountains up to 1200 m. In its dimensions, size of leaves, indumentum and flower heads, it varies considerably according to habitat. There is no room, however, for an infraspecific subdivision of this species.

71. Trifolium scutatum Boiss., Diagn. ser. 1, 2: 27. 1843, et Fl. 2: 129. 1872; Post, Fl. Syr. Pal. Sin.: 238. 1883-96, et ed. 2, 1: 340. 1932. **Typus:** Turkey, in montosis Smyrnae supra Bournabat, V. 1842, *Boissier* (holo.: G).

Hab.: Fields and among shrubs; calcareous and marly-calcareous soils.
Gen. distr.: Turkey, Cyprus, Syria, Lebanon, Palestine, Iraq, Libya.

Selected specimens. Turkey: prov. Adana, distr. Osmaniye, Toprakkale, basalt gulley, below the castle, 1957, *Davis & Hedge D. 26906* (E); Lydia, Smyrna, Ilidja, in collibus 1906, *Bornmüller 9338* (E). **Syria:** Tripoli 1866, *Blanche 137* (G). **Lebanon:** Ras Beyrouth, *Peyron* (G). **Palestine:** Upper Galilee, env. of Metula, roadsides and abandoned yards, 1963, *Zohary & Plitmann 113/27* (HUJ). **Iraq:** Mohammera 1850, *Noë 142* (G). **Libya:** Cirenaica, Ain Mara 1931, *Pampanini & Sermolli 4022* (K).

Rather variable in size of leaves and heads and number of flowers per head. Experiments have shown that these characters are adaptive. Transition between *T. scutatum* and *T. plebeium* occur in overlapping areas of the two species.

72. Trifolium plebeium Boiss., Diagn. ser. 1, 9: 23. 1849, et Fl. 2: 129. 1872. **Typus:** Syria, Antilebanon inter Rasheya et Damascus, *Boissier* (holo.: G).

= *T. alsadami* Post, Journ. Linn. Soc. Lond. Bot. 29: 425. 1888; Mout., Fl. Djebel Druze: 129. 1953.

Hab.: Hills, mountain slopes, batha, maquis, river banks.
Gen. distr.: Turkey, Syria, Lebanon, Palestine.

Selected specimens. Syria: 74 km SW of Damascus, basalt rocks, 950 m, 1933, *Eig & Zohary* (HUJ). **Palestine:** Jerusalem, Beit Hakerem 1952, *Orshan 17297* (HUJ).

Boissier (l.c.) has well delineated this species, but Post (l.c.) was probably unaware of it and described it again as *T. alsadami* from Djebel Druze; his description, however, is short and the illustration of the calyx misleading. This became quite clear after Père Mouterde had kindly sent us a photography and a drawing of *T. alsadami.* Hossain is wrong in synonymizing *T. plebeium* with *T. scutatum* by stating that the former is only a depauperate form of the latter. The differences between the two species under discussion are tabulated here after examining scores of specimens (in HUJ).

Characters	*T. scutatum*	*T. plebeium*
Tips of calyx teeth	Purple	White
Lower tooth of flowering calyx	Broadly lanceolate to broadly oblong, slightly longer than calyx tube, twice as long as other teeth and 2-3 times as broad	Lanceolate-subulate, 1.5 times as long as calyx tube, 1.5 times as long as other teeth and as broad as the others
Upper teeth of flowering calyx	Triangular-lanceolate	Triangular-subulate to oblong-lanceolate
Lower tooth of fruiting calyx	Ovate-lanceolate, foliaceous	Oblong-lanceolate, often prickle-like
Fruiting calyx tube	Almost glabrous	Pubescent

Doubtfull species

T. pulchellum Schischkin, Ber. Tomsk. Staats Univ. 80: 475. 1929; Zohary in Davis Fl. Turkey 3: 447. 1970. **Typus:** Turkey, distr. Muş, in jugo Scharf-dagh inter pagos Megahosor et Czarborch 1916, Schischkin (LE). Turkey endemic; only known from type specimen.

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