

A REVISION OF TRIFOLIUM IN THE NEARER EAST

M. HOSSAIN

(Dept. of Biology, Eden College, Dacca, East Pakistan)

FOREWORD

The following account of *Trifolium* is taken from Dr. Hossain's thesis entitled "Taxonomic studies in the genus *Trifolium*: a taxonomic revision of the Oriental species of the genus", submitted for the Degree of Ph.D. at Edinburgh University in October 1958. Owing to the economic importance of the group and the thoroughness of Hossain's revision, the main body of the work is being published here almost in full. Exigencies of space, however, have forced us to omit the introductory sections on morphology and pollination. The thesis contains a long (and somewhat controversial) chapter on the typification of Linnaean species which has been omitted from the account published. His nomenclatural research resulted in the acceptance of some names that have been rejected by J. E. Dandy (List of British Vascular Plants: 1958). In view of the careful attention given to Linnaean typification by Hossain, we do not feel justified in altering, during his absence in Pakistan, the nomenclature adopted in the thesis. The names affected are *T. procumbens* L. (used by Hossain for *T. campestre* Schreb.), *T. filiforme* L. (for *T. micranthum* Viv.) and *T. agrarium* L. (for *T. aureum* Poll.). In the present account types are cited of all accepted taxa with the exception of Linnaean species.

Dr. Hossain's account is based mainly on two years intensive study of the collection in the herbarium of the Royal Botanic Garden, Edinburgh, combined with prolonged visits to the herbaria at Kew and the British Museum, and shorter ones to Paris and Geneva. Since his thesis was submitted, H. R. Oppenheimer has published a taxonomic revision of the species closely allied to *T. alexandrinum* L. (Bull. Res. Council. Israel, D. Botany, 7D (3-4), 202-219; 1959). His conclusions differ from Hossain's in treating *T. berytheum* Boiss. & Bl. as a variety of *T. alexandrinum* L., and in recognizing *T. vavilovii* Eig as specifically distinct from *T. carmeli* Boiss.

P. H. DAVIS, December 1960

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INTRODUCTION

In this revision the area under consideration comprises Turkey, East Aegaeon Is., Cyprus, Syria, Lebanon, Palestine (Jordan and Israel), Iraq and Iran. Since Boissier's "Flora Orientalis", there has been no detailed systematic study of the clovers of the whole area, although accounts of the group on a smaller scale have appeared in recent times in several local Floras.

The genus *Trifolium* is closely related to *Medicago* and *Trigonella*, with which, among others, it is placed in the Tribe *Trifolieae*. But the three can be easily distinguished by their peculiar pod characters: in *Medicago* they are usually circinate or spirally coiled, in *Trigonella* usually straight, falcate or arcuate, but in *Trifolium* they are more or less ovate or oblong, not reaching beyond the carina. *Trifolium* is further characterized by the claws of its wings and keel being adnate to the staminal fascicle. Of the other allied genera, *Ononis* differs by its monadelphous stamens and *Melilotus* by its small, hard, subglobose or obovate pods.

There are about 300 known species in *Trifolium*. Of these, about 54 occur exclusively in North America and about 33 exclusively in Africa south of the Sahara. The rest are distributed in Europe, Northern and South-Western Asia, North Africa and the neighbouring Atlantic Is., with the heaviest concentration in the districts surrounding the Mediterranean.

There are about 90 species (excluding those insufficiently known) occurring in the "Orient". Of these about 40 are almost confined to the area; 8 are endemic to Turkey, 10 to Syria, Lebanon and Palestine, 5 to N.E. Turkey and Caucasus (incl. Transcaucasia), 1 to Iraq and N.W. Iran, and 1 to Caucasus and N.W. Iran. The distribution of the species confined to the Orient is shown in the accompanying table.

The species are Chamaephytes, Hemicryptophytes or Therophytes. Most flower between March and July, a few still later.

In about 41 species of the genus, the chromosome number has been counted. In 12 of them the diploid number is 14, in 25 it is 16, in one it is both 14 and 16, in another (*T. pannonicum*) there are two aneuploid numbers. Only in *T. israeliticum* is 12 the diploid number (cf. Darlington and Wylie, 1955). These chromosome numbers, however, bear no relation to the morphological differences that separate the genus into 8 natural subgenera.

Table showing distribution of species confined to the Orient

Species	Cyprus	Turkey & E. Aegean Is.	Caucasus (incl. Transcauc.)	Syria, Leb- anon & Palestine	Iraq	Iran
<i>T. canescens</i>	—	+	+	—	—	+
<i>T. caudatum</i>	—	+	—	—	—	—
<i>T. cassium</i>	—	+	—	+	—	—
<i>T. trichocephalum</i>	—	+	+	—	—	+
<i>T. elongatum</i>	—	+	+	—	—	—
<i>T. longidentatum</i>	—	+	—	—	—	—
<i>T. pamphylicum</i>	+	+	—	+	—	—
<i>T. dichroanthum</i>	—	+	—	+	—	—
<i>T. haussknechtii</i>	—	+	—	+	+	—
<i>T. carmeli</i>	—	—	—	+	—	—
<i>T. scutatum</i>	+	+	—	+	—	—
<i>T. clypeatum</i>	+	+	—	+	—	—
<i>T. eriosphaerum</i>	—	—	—	+	—	—
<i>T. meduseum</i>	—	—	—	+	—	—
<i>T. pilulare</i>	+	+	—	+	+	—
<i>T. tumens</i>	—	—	+	—	—	+
<i>T. modestum</i>	—	—	—	+	—	—
<i>T. aintabense</i>	—	+	—	—	—	—
<i>T. argutum</i>	+	+	—	+	—	—
<i>T. glanduliferum</i>	—	+	—	+	—	—
<i>T. nervulosum</i>	—	+	—	+	—	—
<i>T. montanum</i> ssp. <i>humboldtianum</i>	—	+	+	—	—	—
<i>T. polyphyllum</i>	—	+	+	—	—	—
<i>T. stipitatum</i>	—	+	—	—	—	—
<i>T. billardieri</i>	—	—	—	+	—	—
<i>T. stenophyllum</i>	—	—	—	+	—	—
<i>T. erubescens</i>	—	—	—	+	—	—

"+" sign means present. "—" sign means absent

Species	Cyprus	Turkey & E. Aegean Is.	Caucasus (incl. Transcauc.)	Syria, Leb- anon & Palestine	Iraq	Iran
<i>T. mesogitanum</i>	—	+	—	—	—	—
<i>T. glaucescens</i>	+	+	—	+	+	—
<i>T. pumilum</i>	—	+	—	—	—	—
<i>T. prophetarum</i>	—	—	—	+	—	—
<i>T. davisii</i>	—	+	—	—	—	—
<i>T. roussaeum</i>	—	+	—	—	—	—
<i>T. israeliticum</i>	—	—	—	+	—	—
<i>T. chlorotrichum</i>	—	+	—	—	—	—
<i>T. pauciflorum</i>	—	+	—	+	—	—
<i>T. radicosum</i>	—	—	—	—	+	+
<i>T. boissieri</i> *	+	+	—	+	+	—
<i>T. affine</i> †	—	+	—	—	—	—
<i>T. palaestinum</i>	—	—	—	+	—	—
Total	7	28	6	23	5	4

* Also in S. Greece

† Also in S. Bulgaria

HISTORY OF THE GENUS

Species of *Trifolium* named by polynomials were known to botanists long before the time of Tournefort, who in 1700 first established the genus in his "Institutiones rei herbariae". For nomenclatural purposes, however, the authority of the name goes to Linnaeus, and the relevant original description is the one that appears in the 5th edition of his *Genera Plantarum* (1754). Linnaeus circumscribed the genus by including Tournefort's *Trifolium* and *Melilotus*, Micheli's *Trifoliastrum* and Buxbaum's *Lupinaster*. This circumscription, however, did not receive general acceptance by botanists. Thus, in 1763, Adanson (*Fam. Pl.* ii, 322–323) treated *Melilotus* and *Lupinaster* as two genera separate from *Trifolium*. Similarly, for the species of *Trifolium* with gamopetalous corollas, Moench (*Meth.* 509: 1794) took up Ponteder's name *Triphyllodes*. Other generic names proposed for the different groups of *Trifolium* species have been: *Pentaphyllon* Pers., *Dactyphyllon* Rafin., and *Microphyton* Fourr.

One of the most important modifications of the Linnaean circumscription was proposed by Presl. In his *Symbolae Botanicae* (i, 44–50: 1832), Presl divided the genus *Trifolium* L. (excl. *Melilotus*) into nine separate genera, retaining the name *Trifolium* for those species that correspond to the

Linnaean group *Lagopoda* (Subgen. *Trifolium* in the present work). In spite of the great merit of Presl's classification, none of his genera was accepted in its original status, though almost all were retained as different infra-generic categories of *Trifolium* L. The genus *Trifolium* is generally known in a slightly emended Linnaean sense, that is excluding the species under the group *Melilotus* (Sp. Pl. 764: 1753). It is in this sense that the genus is recorded in Jussieu's *Genera Plantarum* (1789) and in the *Genera Plantarum* of Bentham and Hooker (i, 487: 1867).

The subsequent history of the genus is mainly one of infra-generic classification. An excellent survey of it was made by Čelakovsky in 1874 (Oest. Bot. Zeitschr. xxiv, 37-44 and 75-82). Čelakovsky critically investigated the "structure" of the genus, reviewed all the important previous works and put forward a classification that was based essentially on those of Seringe (in DC. Prodr. ii, 189-207: 1825) and Presl. The three new sections proposed by Čelakovsky (viz. Sects. *Cryptosciadium*, *Hemiphysa* and *Stenosemium*) were based on the cohesion or otherwise of the vexillum with the other petals. Except in the case of *Cryptosciadium*, which possesses other characters to merit separate rank, this criterion seems rather weak. None of the species included in the other two sections show any marked divergence from their allies.

The next important classification of the genus was that by Lojacono (in Nuov. Giorn. Bot. Ital. xv, 225-278: 1883). Mainly on the basis of the presence or absence of floral bracts, Lojacono divided the genus into two subgenera (*Trifoliastrum* Gren. & Godr. and *Lagopus* Lojac.) and grouped the thirteen different sections under them. Lojacono's floral bract criterion, which incidentally was used long before by Savi (Obs. Trifol. 1810), leads to an artificial grouping rather than a natural one. For example, Subgen. *Trifoliastrum* is an assemblage of such diverse Sections as *Chronosemium*, *Galearia*, *Involucrarium*, etc. Similarly, the two sections of Subgen. *Lagopus* (*Eulagopus* and *Calycomorphus*) do not reveal any special affinity with one another, except in their gamopetalous corollas.

Gibelli and Belli's* monographic revision of the different sections of *Trifolium* is one of the most intensive that has ever been made of the genus. This excellent work, however, suffers from an excess of epithets and taxonomic ranks that have been given to the different groups of species under each section. For example, Sect. *Lagopus* has been divided into 14 "Stirpes", some of which consist of only one or two species (cf. *Eleuterosmium* for *T. striatum*, *Alpestris* for *T. alpestre* and *T. rubens*, *Clypeata* for *T. clypeatum* and *T. scutatum*, etc.). There is no doubt that in many cases these "Stirpes" reveal natural relationship between species; but where the species are so diverse and numerous that the groups (unless artificially made) have of necessity to be numerous, the use of epithets and taxonomic ranks for these groups is of doubtful value. The same criticism applies to Hermann (*Trifolium Conspectus sectionum et subsectionum europearum generis*, in Rep. Nov. Sp. xliii, 316: 1938). Moreover under Sect. *Lagopus*, Hermann's subsectional names are but different names for the "Stirpes" of Gibelli and Belli.

In a recent revision of the clovers of the U.S.S.R., Bobrov (in Acta Inst.

* Gibelli & Belli in Mem. Accad. Sc. Tor. Ser. II, xxxix (1889), xli (1891), xlii (1892), and xliii (1893).

Bot. Acad. Sc. URSS, Ser. I (6), 322: 1947) proposed two new sections and one new subsection. Of these, Sect. *Hiantia* Bobr. is professedly an artificial group. It contains such diverse species as *T. apertum*, *T. hirtum* and *T. arvense*. Sect. *Trichostoma* Bobr. consists of Subsect. *Intermedia* Gib. & Belli and Subsect. *Leimonophyllum* Herm. Subsect. *Rosea* Bobr. consists of *T. maritimum*, *T. leucanthum*, *T. squarrosum*, *T. echinatum* and *T. angustifolium*. The inclusion of *T. angustifolium* in this subsection seems hardly justified; the species is closely allied to *T. intermedium* and *T. purpureum* and is better grouped in "Stirps" *Angustifolia* of Gibelli and Belli.

It must be mentioned here that some of the earlier subgeneric and sectional names like *Lagopus* (containing the lectotype of the genus), *Eulagopus*, *Eugaleeris*, *Euamoria*, etc., are now illegitimate (cf. Art. 69).

DISCUSSION ON SUBGENERIC DIVISION

In the present work, the genus *Trifolium* has been divided into eight Subgenera: *Trifolium* (*Lagopus*), *Calycomorphum*, *Paramesus*, *Involucrarium*, *Galearia*, *Mistyllus*, *Amoria* and *Chronosemium*. Of these Subgen. *Trifolium*, *Calycomorphum*, *Paramesus*, *Galearia*, *Mistyllus* and *Amoria* (slightly emended) were first established by Presl as separate genera. Later authors, however, treated them variously as sections or subsections. The other two were first founded as sections and were treated as such in all the previous classifications. (Presl's genus *Amareus* is the same as Seringe's Sect. *Chronosemium* proposed earlier.) The present treatment involves only some changes in rank, which are proposed on the basis of the following conclusions drawn from this study:

(1) The genus *Trifolium* consists of several major and distinct natural groups (e.g. the subgenera mentioned above), which, however, are not very closely related. There is no obvious link between these different groups and no sign of hybridization.

(2) Combining these groups under two subgenera (mainly on the basis of the presence of absence of the floral bracts) leads to an artificial grouping rather than to a natural one.

(3) These groups are sufficiently distinct in their reproductive structures to merit the highest rank within the genus.

The only character shared by all the different groups is that of the adnation of the claws of the wings and keel to the staminal bundle of the nine connate stamens. In other respects, especially in the structure and method of development of the flowers, these groups differ widely.

Within the genus the arrangement of the subgenera has been made on the basis of the maximum morphological (especially floral) similarity. Some of the subgenera are closer to one another than others. These have been placed together. But the linear sequence of the different subgenera does not mean a linear phylogenetic arrangement. Of the eight subgenera, only *Involucrarium* is not represented in the Orient.

Within each subgenus, the perennials have been placed before the annuals. But those annuals which are clearly derivatives of certain existing perennials have been placed immediately after those perennials (cf. *T. pratense* (perennial) and *T. diffusum* (annual)).

BIOLOGY

1. Germination

Seeds of the following species were germinated at the Royal Botanic Garden, Edinburgh:

Subgen. *Trifolium* (Lagopus): *T. pratense*, *T. alpestre*, *T. canescens*, *T. trichocephalum*, *T. elongatum*.

Subgen. *Galearia*: *T. fragiferum*.

Subgen. *Amoria*: *T. repens*, *T. hybridum*, *T. ambiguum*, *T. montanum* subsp. *humboldtianum*.

Subgen. *Chronosemium*: *T. spadiceum*, *T. badium* subsp. *rytidosemium*.

These seeds were collected in Turkey in the summer of 1957 (by Dr. P. H. Davis and Mr. I. C. Hedge) and were allowed to germinate on the 20th December of the same year, at 60°F. The following observations were made:

(1) Seeds of species other than *T. arvense* germinated within 11–15 days; those of *T. arvense* germinated on the 6th day.

(2) Mode of germination in every case was epigeal. (Hypocotyl long, cotyledonary leaves thick, fleshy, oblongish).

(3) In the case of the seedlings of Subgen. *Trifolium*, the petiole, ventral surface of the midrib and margins of the first leaf (i.e. the first leaf after the cotyledonary leaves), as well as the rudimentary apical bud, were covered with soft spreading hairs. But in the case of the seedlings of other subgenera, the corresponding structures were entirely glabrous.

(4) Some of the adult characters were apparent at the seedling stage: e.g. in the case of *T. alpestre*, *T. stellatum*, *T. fragiferum*, etc., the leaflets of the second and of the subsequent leaves were denticulate; in *T. canescens*, *T. elongatum*, *T. pratense* and *T. spadiceum* they were emarginate.

2. Protection and dispersal of propagules

In the species of *Trifolium* the reproductive structures are highly specialized. The numerous flowers are clustered into more or less compact heads or head-like spikes. The calyx and corolla are adapted in various ways for greater efficiency in the protection and dissemination of the seeds. For example, in almost all the species the pods are thin-walled, but the safety of the seeds is ensured by adaptations in the calyx and/or corolla and/or by the development of some special outgrowths. These various adaptations and their biological significance require, however, experimental study. They differ widely in the different subgenera of *Trifolium* and are discussed here separately. Evolutionarily, the reproductive structures in the species of *Trifolium* mark a great advance over those in the species of the allied genera *Trigonella*, *Medicago* and *Melilotus* in which the pods are always naked and there is little modification in the calyx and the corolla.

Subgen. Trifolium: The pods are always included within the calyx-tube and are thin-walled. The function of protecting the seeds is transferred to the thick and extremely durable calyx-tube. The climax of this protective measure can be seen in the annular out-growth that almost totally closes the calyx-throat and prevents the seeds from coming out. Additional protection is afforded by the stiff calyx-teeth and their coarse hairs and also by the hairs on the calyx-tube.

The unit of dispersal is mostly a fruiting-calyx, which after ripening breaks off from the floral axis at the gentlest touch. Their dispersal is greatly facilitated by the stiff and more or less spreading calyx-teeth which are sometimes plumose (e.g. in *T. arvense*), sometimes densely hirsute (e.g. *T. alpestre*) and sometimes spinescent (e.g. in *T. canescens*, *T. elongatum*, *T. stellatum*, etc.). In some cases, however, the fruiting calyces are firmly attached to the floral axis and cannot be broken off without injuring some tissues. In such cases, the unit of dispersal is the entire fruiting head; that is, they are synaptospermous (e.g. in *T. cherleri*, *T. echinatum*, *T. leucanthum*, *T. clypeatum*, etc.). The peduncles of these heads are often brittle at their tips and easily break off after maturation. In *T. clypeatum* and *T. scutatum* the lowermost lobe of the calyx is broad and shield-shaped and no doubt helps to facilitate the dispersal of the fruiting-head.

The seeds do not come out of the calyx-tube even after dispersal or during germination. The thick tissues of the calyx-tube soften considerably after drawing moisture from the soil and permit an easy piercing by the radicle of the germinating seeds. Moreover, they also supply moisture to the germinating seeds.

Subgen. Calycomorpha: The pods are usually included within the calyx-tube and are thin-walled. The function of protecting the seeds is transferred partially to the durable calyx-tube. A further and more efficient protection is afforded by the sterile calyces. The fertile flowers are reflexed after maturation, and more or less completely covered over by a dense medusoid canopy formed by the reflexed sterile calyces and, in most cases, by their interwoven hairs.

The unit of dispersal is the entire fruiting head. The dense covering of hairs presumably performs the double function of protection and holding moisture for the germinating seeds.

The fruiting heads of *T. subterraneum* and *T. israeliticum* are remarkable for their geotropic habit. Late in the course of development these fruiting-heads bend downwards and lie adpressed to the soil or sometimes burrow into it (cf. *Arachis hypogaea* and *Faktorovskya aschersoniana*). The biological significance of this habit is rather obscure. However, the full development of the pods seems to be related to their contact with the soil, and may depend on the absorption of moisture and/or of certain minerals from it, as is the case with *Arachis* and *Faktorovskya*.

Subgen. Paramesus: The most remarkable feature is the hard and stony fruit-wall protecting the seeds—a feature entirely foreign to other subgenera of *Trifolium*. The pods exceed the calyx-tube of which the throat is open. The unit of dispersal is a pod.

Subgen. Galearia: The species of *Subgen. Galearia* show a peculiar modification in their calyx. At the fruiting stage the upper part of the calyx becomes inflated and gibbous. These inflated calyces are thin, but durable, reticulate and scarious. Their significance seems to lie primarily in dispersal, which undoubtedly they facilitate. But they also provide some protection to the seeds during and after their development.

The unit of dispersal seems to be an entire fruiting head. The fruiting calyces are rather firmly attached to the floral axis and do not break off easily.

Subgen. Mistyllus: The pods are thin-walled and the function of protecting the seeds is taken over mainly by the thick and durable calyx. These calyces are slightly to considerably inflated at the fruiting stage and their teeth are sharply pointed and usually recurved. The petals are dry and papery and the vexillum is often pointed.

The unit of dispersal seems to be sometimes a single mature-flower (e.g. in *T. spumosum*) and sometimes an entire head (e.g. in *T. argutum*). In the latter case the fruiting-calyx is firmly attached to the floral axis.

Dispersal of the propagules is greatly facilitated by the lightness of the persistent calyx and corolla. The sharply pointed and recurved calyx-teeth may help in anchoring the propagules in the course of dispersal.

Subgen. Amorja: The seeds are protected mainly by the relatively thick fruit-wall and partially by the calyx and the corolla which always lie embracing the pod. There is no special modification involved in the different floral parts.

The unit of dispersal is a single mature flower which is pedicellate and which easily breaks off from the floral axis after maturation. The dispersal of the propagule is facilitated by the lightness of the thin and membranaceous calyx and corolla.

Subgen. Chronosemium: The function of protecting the seeds during and after their development is transferred to the petals. The pods are stipitate and thin-walled and usually lie enclosed within the carina on the one side and vexillum on the other.

The unit of dispersal is a single mature flower which easily breaks off the floral axis after maturation. Dispersal is greatly facilitated by the persistent, dry and papery corolla. The vexillum is usually oblong or rounded spoon-shaped and frequently acts like a wing.

TAXONOMY

Unless otherwise indicated, all the specimens cited have been examined. In the synonymy, ! after a citation indicates that its type was examined; in other cases it means "seen by the author". Under the heading "Distribution" the range of the species outside the area covered in detail is given; where all the material examined is cited, "Distribution" is omitted.

TRIFOLIUM Linn.

Sp. Pl. ii, 766 (1753), Gen. Pl. ed. 5, 337 (1754) (excl. *Meliloto*); Bentham & Hooker f., Gen. Pl. i, 487 (1867).

Lectotype: *T. pratense* L. (see Hitchcock & Green in *Proposals by British Botanists*, 177: 1929).

Annual or perennial herbs, rarely more than 40 cm. in height. Leaves palmately or, in some species of subgen. *Chronosemium*, pinnately trifoliolate (only in *T. lupinaster* and *T. polyphyllum* and some allied species 5-7-foliolate); stipules mostly entire (denticulate in the subgen. *Paramesius*

and in *T. stellatum* of subgen. *Trifolium*), lower parts of the stipules always adnate to the petioles. Inflorescence spicate, capitate or umbellate, usually $\pm$ compact. Petals most often marcescent and persistent, slightly to wholly united at the claws, or vexillum sometimes free. Stamens diadelphous (9 + 1), the united filaments of the 9 anterior stamens always adnate to the claws of the alae and carina, filaments often dilated at the tips. Ovary sessile or stipitate. Legume short, not reaching beyond the corolla, often included within the calyx-tube, 1-4 seeded (only in *T. uniflorum* c. 10-seeded).

Key to the Subgenera

- 1a. Inflorescence with a distinct, monophyllous (usually well-developed and $\pm$ reverse-umbrella-shaped) involucre: (N. America)

Subgen. 4 *Involucrarium*

- 1b. Inflorescence without any involucre, or with a minute inconspicuous one (in *T. fragiferum* the involucre are rather conspicuous in young capitula, but the fruiting calyces are bilabiate and gibbous):

- 2a. All flowers of the inflorescence with corollas:

- 3a. Calyx-tube 5-nerved (teeth very unequal, lower three about twice as long as the upper two); vexillum mostly spoon-shaped, sometimes obovate-cuneate or oblong-obovate (not more than than 12 mm. long); ovary stipitate

Subgen. 8 *Chronosemium* (p. 470)

- 3b. Calyx-tube 10- or more-nerved; vexillum $\pm$ linear-oblong (often slightly recurved); ovary sessile:

- 4a. Calyx-tube gibbous, when mature the gibbous part much inflated, reticulate & scarious Subgen. 5 *Galearia* (p. 446)

- 4b. Calyx-tube regular:

- 5a. Stipules denticulate or serrulate. Capitula naked (with minute rudimentary involucre); flowers minutely bracteate; calyx-throat open; corolla united below into a tube

Subgen. 3 *Paramesus* (p. 444)

- 5b. Stipules entire (except in *T. stellatum* where the flowers are ebracteate, calyx-throat closed by an annular outgrowth):

- 6a. Flowers ebracteate; calyx-throat thickened by an annular outgrowth or provided with a ring of hairs, mostly closed when mature; petals united at the claws into a long tube:

Subgen. 1 *Trifolium* (p. 397)

- 6b. Flowers bracteate; calyx-throat smooth, open; vexillum free or almost free from the rest of the corolla (except in Sect. *Cryptosciadium* where the corolla is tubular below):

- 7a. Calyx-tube more than 20-nerved (multistriate), slightly to conspicuously swollen (but equally on all sides) at the fruiting stage; vexillum entirely free from the rest of the corolla, longitudinally striate

Subgen. 6 *Mistyllus* (p. 455)

- 7b. Calyx-tube 10-nerved, unchanged in the fruiting stage; vexillum usually slightly united at the base with the rest of the corolla

Subgen. 7 *Amoria* (p. 459)

- 2b. Only outer flowers of each inflorescence with corollas, inner sterile medusoid ("Hydra"-like)

Subgen. 2 *Calycomorphum* (p. 438)

Subgen. 1. *Trifolium*

Syn.: *Lagopus* Bernh., Syst. Verz. Pfl. Erfurt, 228 (1800).

Trifolium L. (p.p.) sensu Presl, Symb. Bot. i, 48 (1832).

Trifolium Sect. *Lagopus* Koch, Synops. 184 (1837).

Trifolium Sect. *Eulagopus* Lojac. in Nuov. Giorn. xv (3), 228 (1883).

Lectotype: *T. pratense* L.

Annuals, biennials or perennials. Inflorescence spicate or capitate. Flowers sessile, ebracteate; calyx-tube regular, thick and durable, usually rather densely hairy, rarely glabrous or glabrescent, throat (except in *T. striatum*) $\pm$ closed by an annular outgrowth or by a ring of hairs, teeth $\pm$ stiff, often rigid. Petals (except in *T. striatum*) united and tubular at their long claws. Pod $\pm$ ovoid, minute, usually much smaller than and included within the calyx-tube, 1-2-seeded.

Key to the perennial species in the Orient

- 1a. Calyx-tube c. 20-nerved, hairy. Heads subsessile, dense, subglobose; leaflets oblong-lanceolate or narrowly elliptic, much longer than broad, serrulate; stem straight and erect 10. *T. alpestre*
- 1b. Calyx-tube 10-nerved, mostly hairy, rarely glabrous:
 - 2a. Calyx-tube glabrous. Stem flexuose; leaflets broadly ovate or elliptic, entire; heads pedunculate; calyx-lobes $\pm$ filiform 8. *T. medium*
 - 2b. Calyx-tube hairy:
 - 3a. Calyx-lobes blunt, linear-subulate:
 - 4a. Free parts of stipules abruptly narrowed, setaceous-aristate; flowers crimson or pink with purplish tip (except in ssp. *pallidum* with cream flowers) 11. *T. pratense*
 - 4b. Free parts of stipules gradually narrowed, lanceolate-subulate; flowers cream or pale sulphur 7. *T. trichocephalum*
 - 3b. Calyx-lobes sharply pointed:
 - 5a. Calyx-lobes glabrous or glabrescent. Stems rigid, terete, slightly flexuose, sparingly and adpressed pubescent;

leaflets (except on the undersurface of the midrib) glabrous, coriaceous and nervose; calyx tube adpressed puberulous

9. *T. heldreichianum*

5b. Calyx-lobes rather densely hairy:

6a. Capitula sessile; stems and petioles with spreading reflexed hairs; leaflets obcordate or obovate emarginate, not more than $1\frac{1}{2}$ times as long as broad 13. *T. caudatum*

6b. Capitula pedunculate, rarely subsessile; hairs on the stems and petioles adpressed, subadpressed or spreading; leaflets mostly more than $1\frac{1}{2}$ times as long as broad:

7a. Lowermost calyx-lobe $\pm$ twice as long as the rest:

8a. Calyx-lobes 3-nerved, corolla rose, leaflets of lower leaves obtuse 6. *T. cassium*

8b. Calyx-lobes 1-nerved, corolla ochroleucous, leaflets of lower leaves emarginate. Leaflets broadly ovate or obovate; capitula globose, 20–25 mm. in diam.; upper calyx-lobes $\pm$ equal to the calyx-tube 5. *T. ochroleucum*

7b. Lowermost calyx-lobe only a little longer than the rest:

9a. Leaflets of cauline leaves narrowly elliptic, much longer than broad, acute or slightly emarginate; lamina of vexillum much narrowed and acuminate above, reaching 6–8 mm. beyond the alae and carina 4. *T. elongatum*

9b. Leaflets of cauline leaves ovate, broadly oblong or lanceolate; lamina of vexillum broad and $\pm$ rounded above, reaching 3–4 mm. beyond the alae and the carina:

10a. Leaflets thick, with very prominent lateral nerves, broadly ovate to lanceolate, usually $30\text{--}40 \times 13\text{--}18$ mm.; stipules thick, free parts acuminate to lanceolate-acuminate; stem and petioles extremely adpressed hirsute. Calyx lobes 3-nerved; corolla rose, usually $1\frac{1}{2}$ times as long as the calyx: (Kurdistan) 1. *T. longidentatum*

10b. Leaflets thin; stipules (except in the uppermost leaves) thin and linear-subulate; petioles with spreading hairs:

11a. Corolla twice as long as the calyx; calyx-lobes usually 5–7 mm. long; leaflets (except in the uppermost leaves) broadly oblong and deeply emarginate: (Armenia & Cappadocia) 2. *T. canescens*

11b. Corolla almost equal to the calyx or slightly longer; calyx-lobes 9–12 mm. long; leaflets (except in the uppermost leaves) usually ovate and retuse: (N. Amanus)

3. *T. davisii*

Key to the annual species in the Orient

- 1a. Calyx-tube c. 20-nerved:
- 2a. Nerves of the calyx-tube hidden by a dense coating of hairs; capitula sessile, involucrate; leaflets obcordate or obovate-cuneate:
- 3a. Free parts of the stipules (except in the uppermost leaves) firm, subulate-aristate, $\pm$ erect; stem rarely decumbent; flowers pink or dilute purple 15. *T. hirtum*
- 3b. Free parts of stipules (except in the uppermost leaves) weak, $\pm$ triangular and acute, usually recurved; stem mostly prostrate or procumbent; flowers cream or creamy-white (rarely wings and keel flushed pink) 14. *T. cherleri*
- 2b. Calyx-tube glabrescent (glabrous in fruit), nerves conspicuous; capitula pedunculate not involucrate; leaflets oblong-obovate, corolla $\pm$ equal to the calyx 16. *T. lappaceum*
- 1b. Calyx-tube 10 nerved:
- 4a. Calyx lobes blunt:
- 5a. Calyx lobes extremely narrow, setaceous, plumose; corolla much shorter than or $\pm$ equal to the calyx. Spikes dense, soft, oblong or cylindrical, usually 12–15 mm. broad:
- 6a. Vexillum $\pm$ equal to the calyx, wings hairy outside 18. *T. affine*
- 6b. Vexillum much shorter than the calyx, wings glabrous outside 17. *T. arvense*
- 5b. Calyx lobes linear-subulate or narrowly lanceolate, hirsute or with silky hairs:
- 7a. Leaflets obovate-cuneate (in lower leaves obcordate), not more than $1\frac{1}{2}$ times as long as broad. Stipules ovate acute; calyx-lobes linear-subulate, nearly equal to the tube 19. *T. smyrnaeum*
- 7b. Leaflets (except in the basal leaves) narrowly elliptic or oblong-obovate, nearly twice as long as broad or more:
- 8a. Two uppermost leaves opposite:
- 9a. Corolla shorter than the calyx or $\pm$ equal; calyx-lobes 2–3 times as long as the tube:
- 10a. Calyx-lobes apparently without nerves, narrowly lanceolate; heads on long peduncles; leaflets narrowly elliptic, acute, almost parallel veined, 3–5 times as long as broad 38. *T. formosum*
- 10b. Calyx-lobes 3-nerved at the base, abruptly narrowed and filiform above; heads subsessile, $\pm$ involucrate; leaflets in lower leaves broadly lanceolate with a cuneate base and truncate apex, in upper leaves obovate cuneate with a retuse mucronate apex 12. *T. diffusum*

9b. Corolla longer than the calyx:

11a. Upper lobes of the calyx twice as long as the tube, c. 5 mm. long; calyx (tube + lobes) nearly as long as the alae and carina, lobes finely filiform, subequal; leaflets narrowly elliptic, acute 23. *T. prophetarum*

11b. Upper lobes of the calyx $\pm$ equal to the tube, c. 3 mm. long; calyx (tube + lobes) much shorter than the alae and carina, lobes linear-subulate; leaflets oblong-obovate or oblanceolate:

12a. Peduncles shorter than the petiole of the subtending leaves or $\pm$ equal. Stems 1-3, unbranched with soft white and shiny spreading hairs; capitula terminal, solitary or paired; leaflets oblong-obovate, in lower leaves sometimes emarginate 24. *T. roussaeum*

12b. Peduncles longer than the petioles of the subtending leaves:

13a. Stems repeatedly and dichotomously branched, adpressed pubescent; leaflets narrowly oblanceolate obovate or oblong-obovate; calyx covered with white silky hairs

25. *T. haussknechtii*

13b. Stem unbranched (except the terminal floral dichotomies), with deep brown, half-spreading, antrorse hairs; leaflets oblong-obovate; calyx densely covered with deep brown hairs. Corolla 2-3 times as long as the calyx

26. *T. dichroanthum*

8b. Leaves all alternate:

14a. Lowermost lobe of the calyx nearly twice as long as the rest; corolla twice as long as the calyx or more, 15-25 mm. long. Spikes oblong to cylindrical 21. *T. purpureum*

14b. Lowermost lobe of the calyx only slightly longer than the rest; corolla up to $1\frac{1}{2}$ times as long as the calyx, usually 12-15 mm. long

15a. Corolla white or cream; calyx densely covered with soft shiny hairs; heads ovate, mostly in terminal dichotomies; stems covered with soft shiny spreading hairs; leaflets oblanceolate, denticulate and mucronate at the apex 27. *T. palaestinum*

15b. Corolla usually bright pink; calyx hirsute (hairs not shiny); spikes usually oblong or cylindrical, terminal, solitary; stems adpressed hirsute; leaflets usually narrowly elliptic, acute or mucronate, but not denticulate 22. *T. pamphylicum*

4b. Calyx-lobes sharply pointed:

16a. Vexillum free from the rest of the corolla. Calyx-lobes aristate; corolla shorter than the calyx 41. *T. striatum*

16b. Vexillum united with the rest of the corolla and the staminal column into a tube below:

17a. Leaves all alternate:

18a. Inflorescence sessile. Calyx and corolla subequal:

19a. Heads ovate, involucre; lobes of the mature calyx often reflexed 36. *T. compactum*

19b. Heads cuneate at the base and almost naked; lobes of mature calyx stiff and straight 35. *T. scabrum*

18b. Inflorescence pedunculate:

20a. Leaflets narrowly elliptic, acute, many times longer than broad; free parts of stipules linear-subulate; spikes usually narrowly oblong-conical; calyx c. 10 mm. long, $\pm$ equal to the corolla, lobes stiff, needle-shaped spreading when mature

20. *T. angustifolium*

20b. Leaflets obcordate cuneate, denticulate; stipules $\pm$ foliaceous, obovate, denticulate; heads sub-globose; calyx c. 15 mm. long, $\pm$ equal to the corolla, stellately spreading when mature 37. *T. stellatum*

17b. Two uppermost leaves opposite:

21a. Corolla shorter than the calyx. Calyx-lobes spinescent, stellately spreading when mature, heads ovate, c. 18×13 mm.; leaflets oblong-obovate 34. *T. phleoides*

21b. Corolla longer than the calyx:

22a. Nerves of the calyx-tube hidden by a dense coating of hairs:

23a. Leaflets linear-oblong, acute, many times longer than broad, usually $20-25 \times c. 4$ mm.; calyx-tube 1-1.5 mm. long; corolla rose, about twice as long as the calyx

32. *T. latium*

23b. Leaflets oblong-obovate, sometimes (in the upper leaves) $\pm$ elliptic, usually $11-17 \times 4-6$ mm., corolla white or creamy, a little longer than the calyx

33. *T. leucanthum*

22b. Nerves of the calyx-tube conspicuous:

24a. Lowermost (longest) lobe of the calyx 3- or more nerved:

25a. Leaflets oblong-elliptic, $25-35 (-45) \times 9-11 (-13)$ mm., margin faintly denticulate; calyx-lobes gradually narrowed towards the apex; heads rather oblong, $20-25 \times c. 15$ mm.

29. *T. alexandrinum* var. *alexandrinum*

25b. Leaflets cuneiform, retuse, rounded or rounded-mucronate at the distal end; calyx-lobes usually lanceolate or oblong shield-shaped; heads $\pm$ obconical when young:

- 26a. Stipules of the two uppermost opposite leaves laterally connate and obconical; flowers 20–25 mm. long; calyx-lobes foliaceous, lowermost broadly lanceolate-shield-shaped, 7–8 $\times$ 2.5–3.5 mm. 39. *T. clypeatum*
- 26b. Stipules of the two uppermost opposite leaves slightly connate at the base, free and acuminate above; flowers. c. 12 mm. long; calyx-lobes usually foliaceous, lowermost usually oblong-shield-shaped, 3–4 $\times$ 1–2 mm. 40. *T. scutatum*
- 24b. Lowermost lobe of the calyx 1-nerved:
- 27a. Lowermost lobe of the calyx equal to the tube or slightly shorter, c. 2 mm. long; heads mostly subsessile. Calyx-lobes spinescent, densely covered with short tuberculate hairs, except at the apex 28. *T. berytheum*
- 27b. Lowermost lobe of the calyx longer than the tube, 2–5 mm. long; heads with long peduncles:
- 28a. Calyx-tube 1–1.5 mm. long, hidden in fruiting head by the stellately spreading calyx-lobes; fruiting head $\pm$ spherical, 'echinate'. Leaflets usually obovate, in upper leaves sometimes $\pm$ elliptic 31. *T. echinatum*
- 28b. Calyx-tube c. 3 mm. long, not hidden in fruiting head, lobes erect or slightly divergent, but not stellately spreading after maturity; fruiting head ovate:
- 29a. Heads terminal on branch apices as well as axillary; tube of the fruiting calyx slightly constricted below the throat, longitudinally striate; stem much branched 29. *T. alexandrinum* var. *phleoides*
- 29b. Heads always terminal on branch apices; tube of the fruiting calyx unconstricted, sulcate; stem sparingly branched 30. *T. carmeli*

1. *T. longidentatum* Nábělek in Publ. Fac. Sc. Univ. Masaryk, Brno, No. 35, 69, t. 3, f. 4 and p. 76, f. 76 (1923).

Holotype: "In Kurdistaniae Turcicae dist. Hakkari, mons Maidanoke supra pagum Hasitha dit. Gulmeric, in pascuis humidis alt. ca. 1800 m., 20 Jun. 1910," Nábělek 2848 (n.v.).

TURKEY. Prov. Van, dist., Şatak: Kavuşşahap Dağ, 2700 m., 24 July 1954, Davis & O. Polunin (D.23073). Prov. Bitlis/Van: mt. 10 km. S.E. of Pelli, 2700 m., 8 July 1954, Davis & O. Polunin (D.22533). Prov. Hakkari: Kara Dağ, 3240 m., 16 Aug. 1954, Davis & O. Polunin (D.24477); Cilo Dağ below Cilo Yayla, 2700 m., 10 Aug. 1954, Davis & O. Polunin (D.24231). Endemic to S.E. Turkey.

Habitat: Humid pastures, burnside, grassy or rocky slopes on mountains. Alt. 1800–3240 m. Flowering June–August.

2. *T. canescens* Willd., Sp. Pl. iii (2), 1369 (1802); Boissier, Fl. Or. ii, 117 (1872). *Icon.*: Bot. Mag. xxix, t. 1168 (1809); Jaub. & Sp., Ill. Pl. Or. ii, t. 140 (1844-46).

Syn.: *T. hohenackeri* Jaub. & Sp., Ill. Pl. Or. ii, sub t. 140 (1844-46)! Type—Turkey: "Habitat in Cappadocia", *Vieweg* (holo. Herb. Willd. Berlin, photo. E!).

TURKEY. Prov. Gümüşane: 1500 m. above Hamsekeui, 21 July 1933, *E. K. Balls* 487. Pontus, Sumila, 3 Aug. 1889, *Sintenis* 1642. Prov. Rize: Vallée sous-alpine de Djimil (Rize), vers 2000 m., Aug. 1866, *Balansa* 1403. Prov. Giresun: below Tamdere, 1600 m., 9 Aug. 1952, *Davis*, *Dodds & Çetik* (D.20627). Prov. Çoruh (Artvin): mountain above Artvin, 1900 m., 19 June 1957, *Davis & Hedge* (D.29718); Ardanuç—Kordevan Dağ (Artvin—Ardahan), 1450 m., 27 June 1957, *Davis & Hedge* (D.30126). Prov. Trabzon: N. side of Soğanlı Dağ above Çaykara, 2000-2200 m., 4 Aug. 1957, *Davis & Hedge* (D.32178).

IRAN. Prov. Mazanderan: in valle fluvii Calus, c. 2200-2600 m., Pol-e-Zanguleh, 6-7 Aug. 1948, *K. H. & F. Rechinger* 6335. In mont., *Szovitz* 522.

CAUCASUS. In montosis & proclivibus Georgiae Caucasicae, June 1834, *Hohenacker* (iso. *T. hohenackeri*, K! E!).

Habitat: Light non-lime soil on steep banks, rock ledges, turf, lush meadows, banks at edge of forests, Fagus scrub, undisturbed hill slopes, etc. Alt. 1500-2200 m. Flowering June-August.

Apart from the photograph of the type, no specimen was available from Cappadocia, the type locality. The only report of the species from here was, as far as the present author is aware, Tournefort's specimen on which Jaubert and Spach's figure was based. The plants represented in the photograph of the type and in Jaubert and Spach's figure are dwarfer than those usually growing in Armenia, Transcaucasia and Iran. In addition, their leaflets are shorter than those of their relatives growing further east. This may be due to the drier steppe condition of the Anatolian plateau. Hohenacker's specimens on which the name *T. hohenackeri* Jaub. and Sp. was based are but Caucasian representatives of Willdenov's species. The leaflets of the lower leaves of *T. canescens* are very characteristic. They are more or less as broad at the base as at the apex and rather deeply emarginate. The calyx-tube is hairy. As Sims (in Bot. Mag. t. 1168: 1809) already pointed out, Willdenov's description of it as glabrous was erroneous.

3. *T. davisii* Hossain, *sp. nov.* Affinis *T. canescenti* Willd. sed laciniis calycinis fere duplo longioribus, foliis floralibus longius petiolatis, foliolis foliorum radicalium minoribus ovatis differt.

Herba perennis caudicibus breviter rhizomatosis subcaespitosa. Caules florales simplices ascendentes ad 17 cm. alti, praeter folia bina floralia foliis destituti, subpatule pilosi. Folia radicalia caespitosa, stipulis membranaceis lineariter lanceolatis, 20-25 mm. longis et c. 3 mm. latis, petiolis 20-60 mm. longis. Folia floralia opposita sub flore remota; stipulae saepe purpurascens 20-25 mm. longae, inferne paulo imbricatae superne partibus liberis longe acuminatis, eae folii exterioris partibus adnatis c. 5 mm. latis, eae folii interioris partibus adnatis c. 2 mm. latis; petioli 18-30

mm. longi. Petioli et stipulae omnes patule pilosi. Foliola subsessilia ovata, ea foliorum radicalium retusa, ea foliorum floralium obtusa mucronulata, omnia integra adpresse pilosa plerumque rubro-maculata, (10-) 20-24 mm. longa, (7-) 12-13 mm. lata. Capitula c. 30 mm. in diam., globosa, terminalia, solitaria, pedunculis 20-45 (-70) mm. longis dense et adpresse pilosis suffulta. Flores sessiles ebracteati. Tubus calycis 10-nervius, minutissime glanduloso-punctatus, subadpresse pubescens, ad faucem annulo velutino obsitus, c. 6 mm. longus; laciniae virides, lineariter lanceolatae uninerviae, subanthesim erecto-patentes, praeter apices acutos nudos patule pilosae, infimae 11-12 mm. longae, ceterae 9-10 mm. longae. Corolla albida, in sicco ochroleuca. Vexillum 20-25 mm. longum, 5-6 mm. latum, oblongum, apice truncatum, infra medium ad unguis petalorum ceterum et filamenta connata adnata; alae et carina vexillo c. 4 mm. breviores. Ovarium bi-ovulatum, c. 1×0.75 mm., ovatum. Legumen ignotum. Fl. Apr.

TURKEY. Prov. Adana, dist. Bahçe (N. Amanus), Dumanli dağ above Haruniye, 700-900 m., shady banks in scrub, flowers white, 19 Apr. 1957, Davis & Hedge (D.26861, holo. E!).

T. davisii is allied to *T. canescens* Willd. The main differences between the two species are tabulated below:

<i>T. davisii</i>	<i>T. canescens</i>
1. Leaflets of the radical leaves ovate, retuse.	1. Leaflets of the radical leaves usually broadly oblong and deeply emarginate.
2. Floral leaves distinctly petiolate.	2. Petioles of the floral leaves extremely short, much shorter than the stipules and wholly adnate to their lower parts.
3. Calyx-lobes 9-12 mm. long.	3. Calyx-lobes 5-7 mm. long.
4. Corolla equal to the calyx or slightly longer.	4. Corolla nearly twice as long as the calyx.

As far as it is known *T. canescens* Willd. does not occur in southern Turkey where the new species has been collected.

4. *T. elongatum* Willd., Sp. Pl. iii (2), 1369 (1802). *Icon.*: Hooker in Bot. Mag. t. 2790 (1827); Jaubert and Spach, Ill. Pl. Or. ii, t. 139 (1844-46).

Syn.: *T. armenium* Willd., Enum. Hort. Berol. ii, 793 (1809)! Photo of holotype E!

T. olympicum Hornem. ex Hook. in Bot. Mag. t. 2790 (1827)!

T. sulphureum C. Koch in Linnaea, xix, 63 (1847).

Type—Turkey: "Habitat in Galatia", *Sestini* (holo. Herb. Willd. Berlin, photo. E! iso. G!).

TURKEY. Bithynia (Prov. Bursa), in reg. infer. montis Olympi, supra Brussa (Bursa), 300-500 m., 18 May 1899, *Bornmüller* 4320; in herbid. alp. Olympi Bith., Aug. 1850, *Clementi*. Prov. Kayseri: Bakir Dağ, between Kiske and Bakir Olugu Y., 1700 m., 28 June 1952, *Davis, Dodds & Çetlik*

(D. 19490). Prov. Amasya: in montis Ak-dagh, reg. subalp. 800–1200 m., June 1889, *Bornmüller* 223b. Prov. Gümüşane: pass between Köse and Gümüşane, 2000 m., 2 Aug. 1957, *Davis & Hedge* (D.31964); Moaldasdagh, 20 June 1894, *Sintenis* 5963. Prov. Erzurum: mountains between Ilica and Tercan, 1900 m., 10 July 1957, *Davis & Hedge* (D.30887). Prov. Tunceli: Pülümür, 1500 m., 8 June 1957, *Davis & Hedge* (D.29261). Prov. Kars: Sarikamiş, 2100 m., 7 July 1957, *Davis & Hedge* (D.30802).—Endemic.

Habitat: Rocky igneous as well as lush slopes, meadows, oak scrub, *Abietum*, etc., on the mountains. Alt. 300–2000 m. Flowering May–August.

The species has been generally known by the name *T. armenium* Willd. which, however, is rejected in favour of the earlier legitimate name adopted here.

T. elongatum Willd. is close to *T. pannonicum* Jacq. but differs in its narrower and shorter leaflets, smaller and narrower capitula, and especially, narrower vexillum (c. 4 mm. broad) with a long attenuated subacute tip. The vexillum in *T. pannonicum* is 5–6 mm. broad and has a broad and rounded tip. In addition, the calyx tube in *T. pannonicum* is more densely hairy and the lobes broader. *Davis* 30802 from Kars, however, shows characters intermediate between those of *T. elongatum* and *T. pannonicum*.

There is little doubt that these two species spring from the same stock, but they are distinct enough to be considered separate species rather than subspecies of a single species. Geographically, the two species occur largely in different areas. The area of *T. pannonicum* extends over N. Italy, Hungary, N. Balkan Peninsula, Rumania and S. Russia including Transcaucasia.

Bornmüller 4320 from near Bursa shows an extreme of variation in that all its leaflets are obovate or oblong-obovate (20–25 × c. 10 mm.) and deeply emarginate, while *Clementi*'s specimen from the same region has leaflets (except in the basal leaves) of the usual shape, narrowly elliptic, acute or slightly emarginate (20–25–(40) × 6–8–(10) mm.).

5. *T. ochroleucum* Huds., Fl. Angl. 283 (1762); Boissier, Fl. Or. ii, 116 (1872); Hayek, Prodr. Fl. Balc. i, 870 (1926). *Icon.*: Jacquin, Fl. Austr. i, t. 40 (1773); Ross-Craig, Drawings Brit. Pl. pt. vii, pl. 26 (1954).

Syn.: *T. dipsaceum* Thuill., Fl. Par. ed. 2, 382 (1798–9).

T. cinerascens Kit. in Linnaea, xxxii, 619 (1863), in syn.

Type—England: "Habitat in pratis et pascuis siccioribus, in comitatibus Essexiensi, Cantabrigiensi, frequens" (n.v.).

TURKEY. Bithynia, Mt. Olympus (Uludağ), *Aucher* 1210; *ibid.*, Diklekri-Elma Çukuru, 5 July 1944, *Heilbronn*. Prov. Çoruh (Artvin): Borçka-Hopa, 450 m., 21 June 1957, *Davis & Hedge* (D.29866). Prov. Gümüşane: pass between Köse and Gümüşane, 2000 m., 2 Aug. 1957, *Davis & Hedge* (D.31964B). Hurmuz nr. Bitlis, 1350 m., 31 June 1954, *Davis & O. Polunin* (D.23421).

IRAN. 12 m. west of Astara, 900 m., 16 June 1929, *Cowan & Darlington* 2503.

Habitat: Dry eroded banks, oak scrubs on igneous slopes, woods, mountain passes, etc. Alt. 450–2000 m. Whereas in Britain the species grows

mainly along roadsides, banks, meadows, commons, etc., on the Continent it is more common on grassy hill slopes and shady places of mountain woods. Flowering June–August.

Distribution: British Is., E. Spain, France, Italy, Switzerland, Germany, Austria, Hungary, Yugoslavia, Bulgaria and Greece. S. Russia (Boiss. l.c.). Mainly a European species, *T. ochroleucum* is comparatively rare in the Orient.

The species shows considerable variability, especially in central and southern Europe. The leaflets vary from ovate to obovate (sometimes $\pm$ elliptic) but the calyx-lobes are characteristically unequal and the corolla always ochroleucous (cf. note under *T. cassium* Boiss.).

6. *T. cassium* Boiss., Diagn. Ser. I (9), 23 (1849) et Fl. Or. ii, 117 (1872); Post, Fl. Syr. Pal. Sin. ed. 2, i, 333 (1932). *Icon.*: Gib. & Belli in Mem. Accad. Sc. Tor. Ser. II. xxxix, 426, t. 9, f. 2 (1889).

Type—Turkey/Syria: "In sylvaticis regionis inferioris montis Cassii", May–July 1846, *Boissier* (holo. G!).

TURKEY. Ex Amano pr. Beilan (Belen, Prov. Hatay), 1500 m., 19 June 1862, *Kotschy* 36; *ibid.*, 20 km. south of Ordu, 800–900 m., 8 June 1938, *Dinsmore* 20358. In tractu Cassii, June 1846, *Boissier* (K! ? iso.).

Habitat: Grassy places in the woods, along the road sides etc. in the subalpine regions of mountains. Flowering June.

T. cassium is allied to *T. ochroleucum* but differs from it in the elliptic acute denticulate leaflets of the upper leaves, much longer and 3-nerved calyx-lobes and rose corolla. In addition, the leaflets of the lower leaves of *T. cassium* are obtuse (emarginate in *T. ochroleucum*) and the calyx-lobes, unlike those in the latter species, are reflexed after maturity. From *T. longidentatum* it can be distinguished by its long narrowly subulate stipules, broadly oblong rounded leaflets of lower leaves, usually subsessile capitula and more unequal calyx-lobes with longer and denser hairs.

7. *T. trichocephalum* M. Bieb., Fl. Taur. Cauc. ii, 212 (1808); Ledebour, Fl. Ross. i, 545 (1843); Boissier, Fl. Or. ii, 118 (1872).

1a. Leaflets of stem-leaves ovate emarginate, usually $30\text{--}35 \times 13\text{--}15$ mm.
var. *trichocephalum*

1b. Leaflets of stem-leaves mostly lanceolate mucronulate, sometimes in lower leaves elliptic emarginate, $25\text{--}45 \times 8\text{--}13$ mm.

var. *lonchophyllum*

1c. Leaflets of stem leaves broadly elliptic mucronulate rarely emarginate, $50\text{--}60 \times 19\text{--}21$ mm.
var. *macrophyllum*

var. *trichocephalum*

Type: "In Caucasi iberici alpestribus, C. Mussin-Puschkin", a. 1800 (LE, n.v.).

TURKEY. Prov. Erzurum: 14 miles from Horasan towards Karaorgan, 2000 m., 13 June 1957, *Davis & Hedge* (D.29507); Erzurum, *Zohrab* 616. Prov. Kars: Yalnizçam, 1900 m., 16 June 1957, *Davis & Hedge* (D.29655). Armenia, c.a. 1867, *Calvert & Zohrab*.

CAUCASUS. Tiflis, *Wittman* 232. Gurjel, in montibus, June–July 1830,

Szovitz. Borzhom prope p. Bakuriani, in pratis, 7 July 1926, *Kozlovsky* 367.

Habitat: Meadows, grasslands, marshy grounds and woods on the mountains at an altitude of about 2000 m. Flowering June-July.

var. **lonchophyllum** Hossain, **var. nov.** A typo foliolis foliorum caulinarum lanceolatis mucronulatis vel anguste ellipticis paulo emarginatis, plerumque longioribus (25–45 × 8–10 mm.) differt.

Icon.: Bobrov in Fl. URSS. xi, 235, t. 15, f. 1. (1945)—as *T. trichocephalum* M.B.

TURKEY. Prov. Kars: S.W. side of Kisir Dağ, 2300 m., pastures, flowers cream, 30 June 1957, *Davis & Hedge* (D.30506, holo. E! iso. K!).

IRAN. Abkhare, 1900 m., *Parsa* 105 (as *T. ochroleucum*).

var. **macrophyllum** Hossain, **var. nov.** A typo foliolis foliorum caulinarum late ellipticis mucronulatis vel paulo emarginatis multo longioribus et latioribus (50–60 × 19–21 mm.) differt.

TURKEY. Prov. Van, dist. Hoşap: Kepir Dağ, 2700 m., by stream, stem ascending, flowers cream, 30 July 1954, *Davis & O. Polunin* (D. 23357; holo. E!, iso. K!).

The hollow stems (25–50 cm. high) with long reflexed hairs and 1 or 2 cauline leaves, the sessile involucrate capitula and the slender and blunt calyx-lobes distinguish *T. trichocephalum* from the allied *T. canescens*. The two species also differ in the size and shape of their leaflets, though in the case of the former species these foliar features also provide the varietal characters.

8. ***T. medium*** L., Amoen. Acad. iv, 105 (1759); Boissier, Fl. Or. ii, 114 (1872). *Icon.*: Sturm, Deutschl. Fl. IV. xv, t. 237 (1804); Ross-Craig, Drawings Brit. Pl. pt. vii, pl. 25 (1954).

Syn.: *T. flexuosum* Jacq., Fl. Austr. iv, 45, t. 386 (1776).

T. bithynicum Boiss., Diagn. Ser. I (9), 21 (1849).

TURKEY. Prov. Gümüşane: Tempede, 22 Aug. 1894, *Sintenis* 6270b. Prov. Rize: falaises des environs de Rhize (Lazistan), June 1866, *Balansa* 1401 (as *T. aucheri*); *ibid.*, vallée sous-alpine de Djimil (Rize), vers 2000 m., 8 Aug. 1866, *Balansa* 1402 (as *T. aucheri*).

N. IRAN. Koschadara, *Szovitz* 486. Djulfek, *Aucher* 4331. 12 miles west of Astara, 900 m., 16 June 1929, *Cowan & Darlington* 2502.

Habitat: Among bushes, woods, on mountain cliffs, hill slopes, etc., up to an altitude of about 2000 m. In Europe, the species also grows in meadows, pastures, agricultural fields, etc., in the plains as well as on the mountains. Flowering June-August. 2n = c. 126.

Distribution: Finland, Norway, Sweden, British Is., France, Italy, Switzerland, Germany, Austria, Hungary, Czechoslovakia, Carpathian Mountains, Romania, Balkan Penins., Russia (including Caucasus).

Essentially a European species, *T. medium* is comparatively rare in the Orient. It seems to be confined to the Mediterranean and Colchic regions of N.W. and N.E. Turkey and the Caspian sea coasts of N.W. Iran respectively.

In Europe, the species shows considerable variability in indumentum, and in the size, shape and texture of the leaflets. In the Orient, the variations involve the latter characters only and are of a continuous nature. *Balansa* 1402 from near Rize and *Szovitz* 486 from N. Iran have shorter and more broadly elliptic leaflets than those of the more or less typical *Balansa* 1401 from Rize and *Aucher* 4331 from N. Iran.

9. *T. heldreichianum* Hausskn. in Mitth. Thur. Bot. Ver. N.F. v, 72 (1893); Hayek, Prodr. Fl. Penins. Balc. i, 870 (1926).

Syn.: *T. flexuosum* Jacq. subsp. *heldreichianum* Gib. & Belli in Mem. Accad. Sc. Tor. Ser. II, xxxix, 333, t. 5, f. 3 and 3 bis (1889).

Type—Greece: "in nemorosis quercinis Pindus Dolopicus reg. infer. in ditione mon. Korona", a. 1885, *Heldreich*.

GREECE. Agrapha (Dolopia Veterum), in oropedio Neuropolis reg. infer. Pindi, 3500 ft., substr. schistoso, 25 June 1885, *Heldreich* (? iso. E! K!).

TURKEY. Prov. Bursa, Soğukpinar, Uludağ, 4 July 1944, *Heilbronn*.

Habitat: Grassy slopes, pastures, rocks, sandy slopes, and burnsides in the mountains and mountain valleys. Flowering June-July.

Distribution: Greece (Agrapha); Seres, E. Macedonia; Mt. Rhodope, W. Thrace; Kozludja & Xanthie—Shahin Rd., Thrace; Bulgaria (Alt. Rhodope pr. Bela Cerkva).

T. heldreichianum can be distinguished from *T. medium* by its rigid stem, obovate-cuneate, coriaceous and nervose leaflets (12–15 × 9 mm.), short-haired calyx-tube and pointed, glabrous or glabrescent calyx-lobes. In *T. patulum* Tausch, also an allied species, the stem is sharply flexuose, leaflets narrowly oblong, calyx-lobes rather densely pilose, and the capitula oblong.

10. *T. alpestre* L., Sp. Pl. ed. 2, ii, 1082 (1763); Boissier, Fl. Or. ii, 113 (1872). *Icon.*: Jacquin, Obs. Bot. iii, t. 64 (1768); Bonnier, Fl. compl. France, Suisse & Belg. iii, pl. 138 (1914).

TURKEY. Bithynia, in reg. inf. mont. Keschisch dagh (Uludağ) supra Brussa (Bursa), in Anatolia haud freq., 2–300 m. 24 May 1899, *Bornmüller* 4316; *ibid.*, a. 1837, *Aucher* 1912. Yachamichlar-Keui, au nord d'Ouchak (Uşak), prairies alpestres, 4 July 1857, *Balansa* 1192. Prov. Kars: Sarikamiş, 2100 m., 7 July 1957, *Davis & Hedge* (D.30799); *ibid.*, Zialet Dağ (Yal-nizçam Daglari), above Yal-nizçam, 2300 m., 29 June 1957, *Davis & Hedge* (D.30320); *ibid.*, 21–2300 m., 19 Aug. 1957, *Davis & Hedge* (D.32495).

IRAN. in montibus altioribus, 31 July 1829, *Szovitz* 556.

Habitat: Montane and submontane steppe, pastures, meadows, rocky limestone slopes, grassy clearing of forests, burnsides etc. Alt. 200–2300 m. Flowering May-July. 2n = 16.

Distribution: Denmark, Poland, Germany, France, Switzerland, Italy, Austria, Hungary, Yugoslavia, Albania, Greece, Bulgaria, S. Russia, Caucasus.

The spread of *T. alpestre* in the Orient seems to have taken place by two routes: one through the Balkan Peninsula to W. and N.W. Turkey, the

other through southern Russia and Caucasus to N.E. Turkey and N.W. Iran.

The species is very variable in its indumentum, stem-height, size and shape of the leaflets, number of heads on each stem, flower-colour, etc. The large number of varieties, subvarieties and formae associated with the species (see Aschers. & Graeb., Synops. vi, 576–578: 1908, and Hayek, Prodr. Fl. Balc. i, 872–873: 1926) gives a measure of its variability, though many of these taxa are based on an exaggeration of the importance of individual variations.

In Thessalia and Macedonia some very dwarf forms with short leaflets occur which seem to belong to var. *brevifolium* Boiss. (cf. Zmilyau, Mt. Smolika, Macedonia, 7000 ft., 4 July 1937, *Balls & Gourlay* 3505. Pindus Tymphaeus, in summi montis Zygos supra Metzovo, reg. silv. 4500–5000 ft. substr. siliceo-serpentino, 19–20 July 1885, *Heldreich*). But *Balansa* 1192 (a syntype of var. *brevifolium* Boiss.) from near Uşak in Turkey has taller stems and longer leaflets and is but a habitat form of the typical variety rather than of var. *brevifolium*.

11. **T. pratense** L., Sp. Pl. ii, 768 (1753); Boissier, Fl. Or. ii, 115 (1872); Hayek, Prodr. Fl. Balc. i, 868 (1926); Post, Fl. Syr. Pal. Sin. ed. 2, i, 333 (1932). *Icon.*: Ross-Craig, Drawings Brit. Pl. pt. vii, t. 24 (1954); Javorka & Czapody, Ic. Fl. Hungar. 278 (1931); Reichenbach, Ic. Fl. Germ. Helv. xxii, t. 83 (1903).

Syn.: *T. expansum* Waldst. & Kit., Pl. Rar. Hung. iii, 263, t. 237 (1812).

TURKEY. Prov. Giresun: Tamdere, 1600 m., 9 Aug. 1952, *Davis, Dodds & Çetik* (D.20643). Prov. Tunceli: above Pülümür, 1900 m., 23 July 1957, *Davis & Hedge* (D.31597). Prov. Trabzon, N. slope of Soğanlı Dağ, above Çaykara, 1300 m. 5 Aug. 1957, *Davis & Hedge* (D.32068). Prov. Erzurum: Horasan–Karaorgan, 14 miles from Horasan, 2000 m., 13 June 1957, *Davis & Hedge* (D.29517). Prov. Kars. Haçuvan (Kars–Ardahan), 1900 m., 30 June 1957, *Davis & Hedge* (D.30473). Prov. Çoruh (Artvin), above Artvin, 1200 m., 19 June 1957, *Davis & Hedge* (D.29704). *Ibid.*, Ardanuç–Kordevan Dağ (Artvin–Ardahan), 1400 m., 27 June 1957, *Davis & Hedge* (D.30152). Prov. Van, dist. Şatak, Kavuşşahap Dağ, 2100 m., 22 July 1954, *Davis & O. Polunin* (D.22987). Prov. Bitlis: Reşadiye–Kotum, 1900 m., 5 July 1954, *Davis & O. Polunin* (D.22425). Constantinople (Istanbul), *Aucher* 1220. In Olympo Bithyno (Uludağ), *Noë*. Ankara–Beyn am, c. 1250 m., 22 June 1945, *Kasapligil* 263. Tokat–Keşiş Dağ. July 1835, *Wiedemann*. Anatolia, 1835, *Wiedemann*. Prov. Bolu: Adapazari (Sakarya)—Bolu, c. 25 km. from Bolu, c. 500 m., 21 July 1956, *McNeill* 250 (p.p.).

CYPRUS. Kyros Potamos, 1545 m., 20 June 1937, *Kennedy* 558. Mont Troodos, 1500–1920 m., June 1912, *Haradjian* 474.

IRAQ. Valley east of Arl Gird Dagh, 1950 m., 4 Aug. 1947, *Gillett* 9490. Mergadreija nr. Haji Omran, 1500–1600 m., 21 June 1947, *Rawi* 9150. Chia Bandali, 1350 m., 20 July 1932, *Guest* 2754. Khalana, 1500 m., 30 June 1954, *Rawi* 13700; *ibid.*, *Rawi* 13779 and 13716.

IRAN. W. Tabriz, 6 July 1926, *Gilliat-Smith* 1663. Hill near Sir, 2100 m., 16 May 1929, *Cowan & Darlington* 2219. 10 m. E. Zorab, 1650 m., 14 May 1929, *Cowan & Darlington* 1605. Hamadan, 2100 m., Aug. 1929, *Rogers*

0510. Lahijan, Guilan, a. 1937, *Lindsay* 989. Prov. Mazanderan, dist. Nur, inter Kamarband et ?, c. 2800 m., 8 Aug. 1948, *K. H. & F. Rechinger* 6406. Habitat: Cultivated fields, meadows, pastures, road sides, burnside, grassy hill slopes. Alt. 0–2100 m. Flowering May–August. $2n = 14(28)$. Distribution: Whole of Europe, Central and Southwestern Asia, Kashmir, W. Pakistan, Afghanistan, N. Africa, Canaries, N. America (introd.).

T. pratense L. (Red Clover) is cultivated almost throughout the North Temperate region as an important forage crop. Much of its present wide range of distribution has been attained through escape from cultivation. The species is extremely variable, much of this variability being associated with cultivation. On the basis of habit, leaf size, flower colour, etc., a large number of varieties and forms have been described, of which it is not intended to give an account here.

Normally, the plants grow some 30–50 cm. high. But in closed grassy and damp habitats some dwarf forms often occur. These, as well as all other forms of the species, however, are easily recognized as belonging to *T. pratense* by the abruptly narrowed setaceous-aristate free parts of the stipules and by the hairy calyx with slender blunt lobes.

12. *T. diffusum* Ehrh., Beitr. Nat. vii, 165 (1792); Boissier, Fl. Or. ii, 125 (1872); Hayek, Prodr. Fl. Balc. i, 861 (1926). *Icon.*: Winterl, Ind. Hort. Bot. Univ. Hungar. f. 7 (1788); Reichenbach, Ic. Fl. Germ. Helv. xxii, t. 96 (1903); Javorka & Csapody, Ic. Fl. Hungar. 279 (1934).

Syn.: *T. purpurascens* Roth, Catalect. Bot. fasc. i, 91 (1797).

T. ciliolum Thuill., Fl. Par. ed. 2, 380 (1799).

T. pratense L. subsp. *diffusum* (Ehrh.) Gib. & Belli in Mem. Accad. Sc. Tor. Ser. II. xxxix, 313 (1889).

Type: (? Berlin. n.v.). The species was described from plants raised in Ehrhart's garden (see the title of the chapter in Ehrhart, l.c.).

KURDISTAN (Turkey), sine loco, a. 1840, *W. H. F. Strangways* (K!).

No other specimen of the species from the Orient was available in the Kew and Edinburgh Herbaria. It has been reported from Byzantium (Boissier, l.c.) and Lydia (Boissier, l.c.; Bornmüller in Mitteil. Thur. Bot. Ver. xxiv, 37: 1908).

Habitat: Herbage among bushes, forests, etc., in the subalpine regions.

Distribution: S. Spain, Hungary, Serbia, S. Greece. The species has also been reported from Central France, Sardinia, Corsica, Dalmatia, Transylvania and southern Russia (including Cis- & Trans-Caucasia).

13. *T. caudatum* Boiss., Diagn. Ser. I (9), 22 (1849) et Fl. Or. ii, 116 (1872).

1a. Free parts of stipules of lower leaves 25–10 mm. long

var. *caudatum*

1b. Free parts of stipules of lower leaves 8–(6) mm. long

var. *grosseanum* Boiss.

var. *caudatum*.

Type—Turkey: "In herbidis pratis superioris montis Mesogis supra Tralles in Lydia", June 1842, *Boissier* (holo. G!).

TURKEY. Bithynia, Brussa (Bursa), in reg. subalp. mont. Olympi (Ulu dağ), 9–1200 m., 27 May 1899, *Bornmüller* 4318; *ibid.*, Soğukpinar, 17

May 1944, *Heilbronn* 42. Prov. Izmir: in monte Mesogis, supra oppidum Tire, 800–900 m., 14 June 1906, *Bornmüller* 9284^b. Prov. Konya: Ak-scheher, in reg. alp. mont. Sultan dagh, 1600–1800 m., 21 June 1899, *Bornmüller* 4319. Prov. Antalya, dist. Kemer: Taktali Dağ at Penirlik Yayla, 1600 m., 10 July 1949, *Davis* 15108. Cilicia (Prov. Seyhan), a. 1895, *Siehe* 114.

Habitat: Grassy places in mountain meadows, forests, etc. Alt. 800–1800 m. Flowering June–July.

var. *grosseanum* Boiss., Fl. Or. Suppl. 166 (1888).

Type—Turkey: "Mt. Ida (Kazdağı, Prov. Çanakkale—Balıkesir), in sylvis prope Kareikos", 3 July 1883, *Sinten* 631 (E!K!).

14. *T. cherleri* L., Demonstr. pl. 21 (1753) et Amoen. Acad. iii, 418 (1756); Boissier, Fl. Or. ii, 119 (1872); Hayek, Prodr. Fl. Balc. i, 871 (1926); Post, Fl. Syr. Pal. Sin. ed. 2, i, 333 (1932). *Icon.*: Moris, Fl. Sard. i, t. 61 (1837); Bonnier, Fl. Compl. France, Suisse & Belg. iii, pl. 137 (1914).

Syn.: *T. sphaerocephalon* Desf., Fl. Atlant. ii, 201 (1799).

TURKEY. Dardanelles, 1883, *Sinten* 174. Coteaux pierreux bordant la partie nord du golfe de Smyrne, 22 Apr. 1854, *Balansa* 171. Lycia, Adalia, 20 Apr. 1860, *Bourgeau* 99. Prov. Antalya: Belkis, 45 m., 29 Mar. 1936, *Tengwall* 210. Above Kepes (Prov. Antalya?), 60 m., 18 Apr. 1936, *Tengwall* 339. Ad Alaya (= Alanya), Apr. 1845, *Heldreich*. Prov. Muğla: Yatagan—Çine, 100 m., 1 Apr. 1956, *Davis* & *O. Polunin* (D.25555 B). Prov. Antalya: Kumköy, between Antalya and Serik, 20 m., 6 Apr. 1956, *Davis* & *O. Polunin* (D.25730); *ibid.*, 5 m., 6 Apr. 1956 *Davis* & *O. Polunin* (D.25705); *ibid.*, Manavgat—Kara point, 3 m., 10 Apr. 1956, *Davis* & *O. Polunin* (D.25840). Prov. Maraş, dist. Pazarcik: between Narli and Karabiyikli, 600–700 m., 11 May 1957, *Davis* & *Hedge* (D.27842). Prov. Urfa: Sürüç—Urfa, c. 20 km. from the turning to Sürüç, 600 m., 14 May 1957, *Davis* & *Hedge* (D.27985). Prov. Mardin: Mardin—Nusaybin, 12 km. from Mardin, 750 m., 22 May 1957, *Davis* & *Hedge* (D.28473). Prov. Hatay, dist. Antakya: Iskenderum—Antakya, West of Amik Göl, 150 m., 25 Apr. 1957, *Davis* & *Hedge* (D.27143).

CYPRUS. In montes pr. Kythraea, Apr. 1880, *Sinten* & *Rigo* 413. 3 m. from Tefra on the road to Kyrro, 90 m., 20 Apr. 1927, *Huddle* 37. Peristeruna (Alhaki), 45 m., 30 Mar. 1935, *Syngrassides* 775. Larnaca-tis-Lapithou, 3 Apr. 1941, *Davis* 2981. Papusta (Agios), 1200 m., 9 Apr. 1941, *Davis* 3105. Platres, flowers creamy, 1200 m., 10 Apr. 1941, *Davis* 3178. Lacovonnera forest, 195 m., 6 Apr. 1950, *Chapman* 194. Pergamos, 105 m., 4 Mar. 1955, *Merton* 1985. Near Ayios Epiktitos, 30 m., 8 Apr. 1956, *Casey* 1709.

RHODES. Champs incultes près Bastida, 19 May 1870, *Bourgeau*.

SYRIA. Aleppo, a. 1769, *Freer*.

PALESTINE. Jaffa (Israel), April 1897, *Bornmüller* 400 a. Even Yehuda, 13 Mar. 1942, *Davis* 4090. Gamala (Jordan), 200 m., 3 Apr. 1911, *Meyers* & *Dinsmore* 1609. Jebel Montar, 100 m., 3 Apr. 1911, *Dinsmore* 3609.

IRAQ. Qaranjir, between Kirkuk and Chemchemal, 700 m., 14 Apr. 1947, *Gillett* & *Rawi* 7515. Qaradagh to Ja-aforan, 900 m., 22 Apr. 1947, *Gillett* 7880. Jarmo, Camp Wadi, 1 Apr. 1955, *Helbaek* 563.

IRAN. Luristan, c. 1884, *Bell*.

Habitat: Sandy sea coasts, fields, pastures, grassy roadsides rocky limestone slopes, stony as well as grassy places on hill-slopes, among bushes of the garigue, etc., from sea level to 1200 m.

Distribution: Madeira, Portugal, S. Spain, Pyrenees Or., Balearic Is., S. France, Corsica, Sardinia, Sicily, Italy, Istria, Dalmatia, Hercegovina, Albania and Greece.

In the Orient, the area of *T. cherleri* consists of Cyprus, the Mediterranean districts of Turkey, Syria, Lebanon and Palestine and the inland districts of S.E. Turkey, Iraq and the adjacent parts of W. Iran. In Cyprus, Turkey, Syria, and Iraq the area of this species is, in general, the same as that of *T. hirtum*, and the two often grow together. Usually, however, there is a difference in the altitudinal preferences of the two species. *T. cherleri* is more common from sea level to about 200 m. along the coasts than at higher altitudes. In *T. hirtum*, on the other hand, the preference is for higher altitudes (up to 1300 m.). For morphological differences between these two species see the remarks under *T. hirtum*.

15. *T. hirtum* All., Auct. Fl. Pedem. 20 (1789); Boissier, Fl. Or. ii, 119 (1872); Hayek, Prodr. Fl. Balc. i, 871 (1926); Post, Fl. Syr. Pal. Sin. ed. 2, i, 333 (1932). *Icon.*: Reichenbach, Ic. Fl. Germ. Helv. xxii, t. 96 (1903).

Syn.: *T. hispidum* Desf., Fl. Atlant. ii, 200, t. 209, f. 1 (1799).

T. pictum Roth, Catalect. ii, 101 (1800).

Type—Italy: "In Monteserrato secus agros", *Allioni* (TO, n.v.)

TURKEY. Constantinople (Istanbul), a. 1846, *Noë* (as *T. pauciflorum* Ser.). Prov. Çanakkale: Renkoei, in valle Dumbrek, 8 May 1883, *Sintenis* 178; Dardanelles, May 1883, *Sintenis* 174. Izmir: inter arboreta Smyrne (Izmir), April 1827, *Fleischer* (as *T. hispidum* Desf.); *ibid.*, *Balansa* 173; *ibid.*, *Bornmüller* 9304 & 9309. Prov. Aydın: Mesogis supra Tralles (Aydın), June 1842, *Boissier*. Anatolia, Handeik, *Wiedemann* 35. Amasya, 400–600 m., a. 1889, *Bornmüller* 222. Prov. Ankara: Hacikadum valley nr. Keçiören, 11 June 1952, *Davis & Dodds* (D.18729). Prov. Niğde/Kayseri: between Nevşehir and Ürgüp, 1200–1300 m., 22 June 1952, *Davis & Dodds* (D. 19107). Prov. Antalya: Atbuku between Antalya and Finike, 10 m., 7 May 1936, *Tengwall* 533. Prov. İçel: Burujik—Asir Gedigi, Cilician Taurus, 1200 m., 7 June 1934, *Balls* 1293. Prov. Maraş, dist. Pazarcik: between Narli and Karabiyikli, 600–700 m., 11 May 1957, *Davis & Hedge* (D.27782). Prov. Urfa: Sürüç—Urfa, c. 20 km. from the turning to Sürüç, 600 m., 14 May 1957, *Davis & Hedge* (D.27985 A).

CYPRUS. Platres, 1125 m., 26 Apr. 1938, *Kennedy* 1272 & 1286; *ibid.*, 1050 m., 22 Apr. 1941, *Davis* 3187. Yialia, 150 m., 10 Apr. 1955, *Merton* 2149.

SYRIA. Monts Nusairy, Ain Halakin, 750–950 m., June 1910, *Haradjian* 3504.

IRAQ. Kurdistanie, in montis Kuh-Sefin reg. infer. ad pagum Schaklava (dit. Erbil), 900 m., 9 May 1893, *Bornmüller* 1125. Halabja, 700 m., 18 Apr. 1947, *Rawi* 8872.

Habitat: Among garigue on dry mountain slopes, by paths in the pine forests, on dry open places, along hillsides and rocky limestone slopes, in disturbed calcareous steppes and cultivated fields, at 10–1300 m., but

mostly at the higher altitudes. Flowering April-June. The Cyprus plants seem to flower earlier (April) than their mainland relatives (usually May-June).

Distribution: S. Spain, E. Pyrenees, S. France, Corsica, Italy, Yugoslavia, Albania, Greece, Bulgaria, Crimea, (Aegean Is. & N. Africa). In these countries as well as in the Orient the species occurs mainly in the Mediterranean regions. In the Orient, however, it has penetrated further inland into Anatolia and N. Iraq.

Among the many specimens examined from Europe and the Orient only two from Cyprus (Platres, *Kennedy* 1286 and *Davis* 3187) and three from Turkey (Renkoei, *Sintenis* 178; Amasia, *Bornmüller* 222; Mesogis, *Boissier*) were found to bear spots of different sizes on the leaflets. Of these, *Kennedy* 1286 bore whitish spots on a green background. *Kennedy* 1272 from the same place as *Kennedy* 1286 (collected on different dates) bore no spots at all.

Leaflets with λ -shaped spots of different sizes and colour occur rather indiscriminately in many other species of *Trifolium* (cf. *T. pratense* L., *T. physodes* Stev., *T. repens* L.). Their origin and mechanism of transmission are still obscure. Their scattered distribution, however, renders them unsuitable as taxonomic characters.

T. hirtum is very close to *T. cherleri* L. The two often grow together (*Sintenis* 174 from Dardanelles and *Davis* 27985 from near Suruç, Urfa, are mixed gatherings of *T. hirtum* and *T. cherleri*) and can be easily confused. Some Cyprus plants of *T. hirtum* are very dwarf and procumbent. These seem to be but habitat forms and can be recognized by their firm aristate stipules, larger heads and purple corolla. The main differences are tabulated below:

<i>T. hirtum</i>	<i>T. cherleri</i>
1. Stem mostly firm and erect, sometimes ascending, rarely procumbent.	1. Stem mostly weak and procumbent, sometimes ascending.
2. Leaflets mostly obovate cuneate, very rarely retuse: 7-10-13 mm. $\times$ (4.5)-6.5-7.5-(9) mm.	2. Leaflets mostly obcordate-cuneate; 5-7-(9) mm. $\times$ 4-4.5-(5) mm.
3. Free parts of stipules aristate, firm.	3. Free parts of stipules shortly acuminate or obtuse, herbaceous and recurved.
4. Capitulum globose, 15-20 mm. in diam.	4. Capitulum globose, 9-12 mm. in diam.
5. Flowers dilute purple.	5. Flowers cream or creamy-white, (rarely wings and keel flushed pink).
6. Calyx usually up to 10 mm. long (tube 3 mm. + lobes 7 mm.)	6. Calyx usually 7 mm. long (tube 3 mm. + lobes 4 mm.)

16. *T. lappaceum* L., Sp. Pl. ii, 768 (1753); Boissier, Fl. Or. ii, 119 (1872); Hayek, Prodr. Fl. Balc. i, 872 (1926); Post, Fl. Syr. Pal. Sin. ed. 2, i, 334 (1932).

- 1a. Calyx-throat closed by a ring of long hairs var. *lappaceum*
 1b. Calyx-throat glabrous var. *zoharyi*

var. *lappaceum*. *Icon.*: Moris, Fl. Sard. i, t. 62. f. 1 (1837); Reichenbach, Ic. Fl. Germ. Helv. xxii, t. 91 (1903).

Syn.: *T. lappaceum* L. var. *brachyodon* Hausskn. in Mitteil. Thur. Bot. Ver. N.F. v, 73 (1893).

T. rhodense Pamp. in Bull. Soc. Bot. Ital. (1925) 142. *T. lappaceum* L. var. *rhodense* (Pamp.) Rech. fil., Fl. Aegaea, 368 (1943).

TURKEY. Bithynia, ad Mudania, 10 May 1899, *Bornmüller* 4331. Dardanelles, 28 May 1883, *Sintenis* 1085. Lydia, Smyrna (Izmir), in collibus prope "Kokarialu" and Giostepe, 3 May 1906, *Bornmüller* 9322; *ibid.*, 12 May 1854, *Balansa* 163. Cilicia, Pompeiopolis (near Silifke), Apr. 1896, *Siehe* 106. Trabzon, Hang südl. der Stadt, 200 m., 27 June 1931, *Gorz* 668. Asia Minor, sine loco, a. 1842, *Boissier*.

RHODES. Champs incultes près Bastida, 21 May 1870, *Bourgeau*. In monte Prophet Elias pr. Salakos in silvis lapidosis, c. 600 m., 11 May 1935, *K. H. & F. Rechingher* 7217.

CYPRUS. Pr. Cerignia, 28 May 1880, *Sintensis & Rigo* 647. Platres, 1200 m., 7 June 1938, *Kennedy* 1282. Paphos, Kannavion, 19 July 1939, *Lindberg*. Kyrenia, 60 m., 6 Apr. 1955, *Merton* 2083. Larnaca-tis-Lapithou, 3 Apr. 1941, *Davis* 2981. Below Strumbi, 7 May 1941, *Davis* 3373.

SYRIA. Banias, a. 1863-64, *Lowne*. Coele-Syriacae, Koh-Elias, June 1877, *Post* 358.

LEBANON. Garden west of Tripoli, 10 May 1865, *leg.* ? Beirut, 12 May 1871, *Herb. Post.* Ras Beirut, 13 May 1871, *Herb. Post.* Ad Berytum, ad Ras Beirut, 4 and 8 May 1910, *J. & F. Bornmüller* 11648. Montium Libani australis in declivitatibus occidentalibus ad pagum Bhamdun, 5 June 1910, 12-1300 m., *J. & F. Bornmüller* 11646.

PALESTINE. Jaffa, 7 Apr. 1897, *Bornmüller* 403; *ibid.*, 27 Apr. 1912, *Meyers & Dinsmore* 9244. Galilaea borealis, ditionis oppidi Safed, 800 m., 25 Apr. 1897, *Bornmüller* 404. Galilaea, ad Nazareth (solo calc.), 26 Apr. 1897, *Bornmüller* 402. Castle of Subebbeh, 760 m., 10 May 1911, *Meyers & Dinsmore* G.1244. Fields near Cana, 200 m., 16 May 1911, *Meyers & Dinsmore* 3244. Jerusalem, Dilbe, damp places, 15 May 1908, *Dinsmore* 1244.

IRAQ. In gram. Derbent-i-basian, 6 May 1867, *Haussknecht*. Mesopotamia, a. 1888, *Sintenis* 497. Babylonia, ad Bagdad, 21 Apr. 1893, *Bornmüller* 1129. In montis Kuh-Sefin reg. infer. supra pagum Schaklava (ditionis Erbil), 100 m., 13 May 1893, *Bornmüller* 1128. Shaheban, 11 Apr. 1947, *Gillet & Rawi* 7307. Shaqlawa, 900 m., 8 May 1947, *Gillet* 8027. Jarmo, from Camp Wadi, 25 Apr. 1955, *Helbaek* 1187; *ibid.*, 6 May 1955, *Helbaek* 1586. Field near Amara, 13 Apr. 1918, *Evans* M/254.

IRAN. Mohammera, May 1830, *Noë* 380.

var. *zoharyi* Eig in Inst. Agri. Nat. Hist. Bull. 6. (1927); Post, Fl. Syr. Pal. Sin. ed. 2, i, 334 (1932).

No specimen of this variety was available.

Habitat: (of the species): Shady places in woods, forests, gardens, etc.,

mountain declivities; open, stony places along hill-slopes; dry sandy places along the coasts; among grasses in cultivated as well as uncultivated fields; in both dry and damp places. Alt. 0–1300 m. Flowering April–June. Distribution: Portugal, S. Spain, S. France, Corsica, Sardinia, Sicily, Italy, Istria, Dalmatia, Greece, Aegean Is.

T. rhodense (from Rhodes) is the same as *T. lappaceum* var. *brachyodon* (from Greece). Both of these have been differentiated from the "typical" *T. lappaceum* mainly by the calyx-tube being villose and the calyx-lobes being shorter (3.5–4 mm. long). These criteria, however, do not always hold good. Specimens with short lobes (3.5–4 mm.) and glabrescent tubes (cf. *Davis* 2981 from Cyprus, *Meyers & Dinsmore* 9244 from Jaffa and *Dinsmore* 1244 from Jerusalem), or long lobes (5–6 mm.) and villose tubes (cf. *Bornmüller* 11648 from Ras Beirut) are not uncommon. The calyx-tube is usually thinly villose (especially outside the throat) when young, but becomes glabrescent after maturity.

The stem is usually 12–20 cm. tall, much-branched, diffuse, ascending or procumbent. In *Siehe* 106 from the ruins of Pompeiopolis (Turkey), however, it is extremely dwarf (3–6 cm. tall) and in *Bornmüller* 1128, and *Evans* M/254 from Iraq it is 25–35 cm. tall with longer internodes and fewer branches.

17. *T. arvense* L., Sp. Pl. ii, 769 (1753); Boissier, Fl. Or. ii, 120 (1872); Hayek, Prodr. Fl. Balc. i, 864 (1926); Post, Fl. Syr. Pal. Sin. ed. 2, viii, 334 (1932).

1a. Calyx 5.5–7 (–9 mm.) long; stems usually erect or ascending

var. *arvense*

1b. Calyx 3.5–4 (–4.5) mm. long; stems usually slender and procumbent

var. *gracile*

var. *arvense*. *Icon.*: Reichenbach, Ic. Fl. Germ. Helv. xxii, t. 95 (1903); Ross-Craig, Drawings Br. Pl. pt. vii, pl. 29 (1954).

Syn.: *T. longisetum* Boiss. & Bal. in Boiss. Diagn. Ser. II (6), 47 (1859)!

T. arvense L. var. *longisetum* (Boiss. & Bal.) Boiss. Fl. Or. ii, 120 (1872).

TURKEY. Dardanelles, in montosis, 28 May 1893, *Sintenis* 788. Constantinople (Istanbul), June 1845, *Noë* 177. Prov. Izmir, dist. Odemiş: Bozdağ, 1200 m., 15 Aug. 1950, *Davis* 18169. Dist. Ankara: Haji Kadin valley, nr. Keciören, 9 July 1947, *Davis* 13169; Hussein Gazi bei Ankara, Bergsteppe, 4 June 1932, *Kotte*; *ibid.*, Gerede—Ankara, nr. Kizilcahamam, c. 1200 m., 22 July 1956, *McNeill* 275. Prov. Niğde: Hasan Dağ, above Taşpinar, 1100–1200 m., 15 June 1952, *Davis*, *Dodds & Çetik* (D.18886). Prov. Niğde/Kayseri: between Nevşehir and Ürgüp, 1200–1300 m., 22 June 1952, *Davis*, *Dodds & Çetik* (D.19108). Prov. Antalya: between Belek and Serik, 150 m., 10 May 1936, *Tengwall* 559; *ibid.*, *Forbes* 235. Prov. Mersin: gorge du Guzel-Dere, à 3 lieues au No. de Mersina, 20 May 1855, *Balansa*. Prov. Adana, dist. Feke: Sencan dere near Gürtümze, 1300 m., 30 June 1952, *Davis*, *Dodds & Çetik* (D.19670). Prov. Maraş: Akher Dagħ (Ahir dağı), 1200 m., 17 May 1934, *Balls & Gowlay* 1115. Prov. Hatay: Hatay—Yayla dağı, Kesep hudut, 22 June 1944, *Kasapligil* 26; *ibid.*, S. of Kastel Moayf, 7000 m., 14 May 1938, *Dinsmore* 13771. Tokat, *Wiedemann* 35. Prov. Trabzon: of, sea level, 5 Aug. 1957, *Davis & Hedge* (D.32019).

Prov. Çoruh (Artvin): above Borçka, 300 m., 21 June 1957, *Davis & Hedge* (D.29864). Erzeroum, *Zohrab* 614. Prov. Bitlis: Pelli Dağ, above Pelli, 2250 m., 9 July 1954, *Davis & O. Polunin* (D.22616). Kurdistan, sine loco, a. 1841, *Kotschy* 44.

CHIOS. Karthamylla-Marmaio, 50 m., alt., 11 Apr. 1939, *Platt* 77.

CYPRUS. Platres, 1020 m., 9 May 1938, *Kennedy* 1276. Kata Platres, 900 m., 2 June 1948, *Mavromoustakis*. Yialia, 150 m., 10 Apr. 1955, *Merton* 2129. Kakopetria, Platania forest station, 1050 m., 30 June 1936, *Syngrassides* 1275; *ibid.*, Galata, 26 Apr. 1941, *Davis* 3204. Stavros (Paphos forest), 750 m., 30 July 1940, *Davis* 1762.

SYRIA. Above Bludan, 1800 m., *Davis* 6209. A. Djebel Druz, 1110 m., 28 Apr. 1933, *Meinertzhagen*.

LEBANON. Broumana, 27 May 1952, *Mooney* 4418. Mt. Lebanon, 1500 m., a. 1863-64, *Lowne*.

PALESTINE. Jokhadar, 700 m., 8 May 1911, *Meyers & Dinsmore* G.1771. Al-katr, 1350 m., 9 May 1935, *Dinsmore* I1771. Jaffa, in siccis arenosis, 13 May 1897, *Bornmüller* 405.

IRAN. Bhaistan—Astara pass, 1050 m., 15 June 1929, *Cowan & Darlington* 1651.

Habitat (var. *arvense*): Dry sandy places along sea coasts, river banks, road-sides, etc.; cultivated fields, grassy hill-sides, mountain slopes, open places as well as under pine trees and among busy garigues of the Mediterranean regions; at an altitudinal range of sea level to 2250 m. Flowering April-July.

Distribution outside the Orient (var. *arvense*): Almost the whole of Europe (excluding its northern-most parts), N. & W. Asia, N. Africa (reaching southwards to Abyssinia) and Canary Is.

var. *gracile* (Thuill.) DC., Fl. France, ed. 3, iv. 530 (1805). *Icon.*: Reichenbach, Ic. Fl. Germ. Helv. xxii, t. 95 (1903).

Basionym: *T. gracile* Thuill. Fl. Env. Par. ed. 2, 383 (1799).

Type: *Thuillier* (P,n.v.).

TURKEY. Prov. Antalya, dist. Kemer: Gönük, 0-50 m., 7 July 1949, *Davis* 15034. Trebizond (Trabzon) 120 m., 5 July 1934, *Balls* 1570.

N. IRAN. Guilan, June 1937, *Lindsay* 1046; *ibid.*, Lahijan, June 1937, *Lindsay* 837. Shores of Caspian Sea near Sakht-i-Sar, level of Caspian, May 1934, *Trott* 137.

Habitat: (var. *gracile*) Dry sandy places along sea-coasts, gritty soil among non-lime rocks, granite hill-slopes, and dry grassy places in pine woods, etc., sea-level to 120 m. Flowering June-July.

Distribution (var. *gracile*): the variety occurs sporadically throughout the species' area. However, judging from the proportion of its representation in herbaria, it seems more frequent in Britain, France and the Iberian peninsula than in other parts of its range.

T. arvense L. is very variable in habit, indumentum, size and shape of the leaflets and length of the calyx-lobes. However, it can be easily recognized by the following characteristic features: (1) spikes dense soft, plumose, narrow, oblong to cylindrical, (2) calyx-lobes bristle-like, plumose-patent, light to deep purple, much longer than the corolla.

T. arvense L. occurs in N. America, S. Africa, Australia and New Zealand as an introduced species.

18. *T. affine* Presl, Symb. Bot. i, 54, t. xxxiv (1832).

Syn.: *T. preslianum* Boiss. Diagn. Ser. I (2), 25 (1843), et Fl. Or. ii, 121 (1872).

Type: *Herb. C. B. Presl* (? PRC, n.v.). The native locality of the species was unknown to its discoverer who raised the plants from seeds received under the name *T. lagopus*.

TURKEY. Constantinople (Istanbul), in collibus apricis pr. "Bostandjik", June 1906, *Aznavour*. Montes Lydiae & Cariae, June 1842, *Boissier*. Ex Lydiae Monte Sipyllo, supra Magnesiam (Manisa), 21 Oct. 1867, *Ball*; *ibid.*, sinus Smyrneus, in monte Dio-Adelphia (Iki-Kardasch, Corax), 600-900 m., 15 May 1906, *Bornmüller* 9319; *ibid.*, Ildija, in vinetis, 29 May 1906, *Bornmüller* 9317; *ibid.*, fr. Vignes au-dessus de Birghui (Birgi), 23 July 1854, *Balansa* 174. Kaia-gueul Dere, à 2 lieues au SO d'Ouchak (Uşak), vers 800 m., coteaux calcaires, 7 July 1857, *Balansa* 1193. Caria, a. 1843, *Pinard*.

RHODES. In declivibus siccis lapidosis ad Embona, 15 May 1935, *K. H. & F. Rechinger* 7295; *ibid.*, Monastero di Calopetra, 20-24 May 1924, *Ferrini*.

Kos (Coo). In declivibus siccis tuff inter Pili & Antimachia, 6 June 1935, *K. H. & F. Rechinger* 7960.

Habitat: Mostly in dry stony mountain declivities, sometimes among grape-vines, at 600-900 m. Flowering May-July.

Distribution: S. Bulgaria.

T. preslianum Boiss. was published as an avowed substitute for *T. affine* Presl, non Lejeune. The name *T. affine* Lejeune (ex Ser. in DC. Prodr. ii, 195: 1825), however, has no claim to recognition for nomenclatural purposes because it appeared merely as a synonym of *T. medium* L.; *T. affine* Presl accordingly stands.

T. affine is very close to *T. arvense*. The main distinguishing features between the two are tabulated below.

<i>T. affine</i>	<i>T. arvense</i>
1. Calyx-lobes soft setaceous.	1. Calyx-lobes comparatively stiff bristle-like.
2. Vexillum $\pm$ equal to the calyx (tube + lobes) and slightly emar- ginate.	2. Vexillum much shorter than the calyx and not emarginate.
3. Wings hairy outside.	3. Wings glabrous outside.

In addition, the spikes in *T. affine* are more compact and dense, and the calyx-tube more densely hairy than in *T. arvense*.

From its description, *T. eriocephalum* Ledeb. (Fl. Ross. i, 541: 1843) seems to be a synonym of *T. affine* Presl. Ledebour's name was based on Wittmann's specimen from "Provinciis Caucasicae" where, however, *T. affine* Presl is not known to occur.

19. *T. smyrnaeum* Boiss., Diagn. Ser. I (2), 25 (1843) et Fl. Or. ii, 121 (1872). *Icon.*: Coste, Fl. France, i, 350 (1901) (as *T. lagopus* Pourr.); Vicioso in Anal. Inst. Bot. Cav. XI, ii, 375 (1952) (as *T. sylvaticum* Gerard).

Syn.: *T. lagopus* Pourr. ex Willd., Sp. Pl. iii, 1365 (1802)—non Gouan, Fl. Monsp. 105 (1765).

T. hervieri Freyn in Bull. Herb. Boiss. i, 543 (1893).

T. lagopus Pourr. var. *smyrnaeum* (Boiss.) Bornm. in Engl. Bot. Jahrb. lix, 475 (1925)!

Type—Turkey: In montibus circa Smyrnaeum, mons Corax, jugum Sipyleum supra Bournabat, Mai—Jun. 1842, Boissier (G!).

TURKEY. Prov. Çanakkale: Renkoei, in valle Dumbrek, 30 April 1883, *Sintenis* 177. Prov. Izmir: Smyrne (Izmir), 24 April 1854, *Balansa* 159; *ibid.*, in reg. pinetorum mont. Yamanlar dagh, dit. urb. Smyrna, 800–900 m., 13 May 1906, *Bornmüller* 9287; in collibus ad Deirmendere (inter Menemen & Manissa), 200–300 m., 8 May 1906, *Bornmüller* 9288. Bunarbaschi, in monte Takhtali-dagh, 900–1000 m., 26 May 1926, *Bornmüller* 9291. Prov. Kutahya: Kaiaguenl Dere, à 2 lieues au SSO d' Ouchak (Uşak), 1 June 1857, *Balansa*. Prov. Konya: Sultandagh, supra Akşehir, 1500–1600 m., 21 June 1899, *Bornmüller* 4333. Caria (Prov. Muğla): a. 1843, *Pinard*. Prov. Antalya: Elmalu, 19 June 1860, *Bourgeau* (as *T. bourgaei*, G!).

Habitat: Bare as well as grassy places on hill-slopes, mountains and in mountain-valleys. Alt. 200–1600 m. Flowering April–June.

Distribution: Spain, E. Pyrenees, S. France, Italy, Jugoslavia, Bulgaria, Greece, Aegean Is.

In Turkey, the species shows some variability in the relative lengths of its calyx and corolla. Generally, the corolla is about $1\frac{1}{2}$ times as long as the calyx, but some of the specimens from Lydia (e.g. *Bornmüller* 9291) have the corolla twice as long as the calyx, though others are of the usual type.

The name *T. lagopus* Pourr. ex Willd. is illegitimate, being a later homonym of *T. lagopus* Gouan, and must therefore be rejected. Vicioso adopted *T. sylvaticum* Gerard as the earliest legitimate name for Pourret's species. But the original description accompanying Gerard's name refers to a species "foliolis ovatis obtusis . . . dentibus calycinis setaceis ciliatis . . . Planta . . . sericea lanugine vestita . . . spica uncialis sericea, constans floribus ultra 40; corollae purpureae". *T. lagopus* Pourr., on the other hand, has leaflets obovate-cuneate (retuse), calyx-teeth linear, plants spreading pilose, spikes hirsute, flowers less than 40 and corolla rose. On this score, *T. sylvaticum* Gerard and *T. lagopus* Pourr. are not conspecific. As far as is known *T. smyrnaeum* Boiss. is the earliest legitimate name for the species.

20. *T. angustifolium* L., Sp. pl. ii, 769 (1753); Boissier, Fl. Or. ii, 122 (1872); Hayek, Prodr. Fl. Balc. i, 866 (1926); Post, Fl. Syr. Pal. Sin. ed. 2, i, 335 (1932). *Icon.*: Sibth. & Sm., Fl. Graeca, viii, t. 749 (1833); Javorka & Csapody, Ic. Fl. Hungar. 279, fl. 2029 (1934).

TURKEY. Constantinople (Istanbul), *Aucher* 1199. Dardanelles (Çanakkale), in montibus prope Sarad-Schik, 28 May 1883, *Sintenis* 985. Lydia (Izmir),

in montis Sipyli (nr. Izmir), in reg. infer. 2–300 m., 19–20 May 1906, *Bornmüller* 9298. Village de Sedichig, à 2 lieues au NO. de Mersina (Mersin), 20 May 1855, *Balansa*. Hatay—Yayladağı, Kesephudut mevhu, 27 June 1944, *Kasapligil* 27.

CYPRUS. Kyrenia, sea level, 22 April 1956, *Atherton* 1344; *ibid.*, rocky slopes of valley on top of Kilarieri Range, 600 m., 26 May 1955, *Mapple* 65. Platres, 1020 m., 19 May 1938, *Kennedy* 1273. Drousha, 600 m., 1 May 1941, *Davis* 3254.

PALESTINE. In declivitatibus montis Carmel (solo calc.), 1–30 m., 6 May 1897, *Bornmüller* 410 (labelled as *T. augustifolium* L. f. *brachystachys*).

IRAN. Ghilan, *Aucher* 4329. Lahijan, Guilan, June 1937, *Lindsay* 954. Prov. Gorgan (Asterabad): Gorgan, May 1948, *Sharif* 108.

Habitat: Roadsides, edge of vineyard, dry banks, rocky slopes in valleys, mountain declivities, etc., from sea level to about 1000 m. Flowering April–May.

Distribution: Canary Is., Portugal, Spain, S. France, Sardinia, Sicily, Italy, Istria, Dalmatia, Hercegovina, Greece (Macedonia & Thrace), E. Bulgaria, Crimea and Caucasus.

21. *T. purpureum* Loisel., Fl. Gall. ii, 484, t. 14 (1807); Boissier, Fl. Or. ii, 123 (1872); Hayek, Prodr. Fl. Balc. i, 867 (1926); Post, Fl. Syr. Pal. Sin. ed. 2, i, 336 (1932).

1a. Corolla usually 17–25 mm. long; calyx (excluding the lowermost lobe) usually 6–8 mm. long. Stems $\pm$ erect or ascending, usually 25–40 (–50–60) cm. high: var. *purpureum*

1b. Corolla usually 13–15 mm. long; calyx (excluding the lowermost lobe) usually c. 5 mm. long. Stems procumbent or ascending, usually 12–20 (–25–30) cm. high: var. *laxiusculum*

var. *purpureum*. *Icon.*: Reichenbach, Ic. Fl. Germ. Helv. xxii, t. 93 (1903) (lowermost lobe of the calyx in this figure is less than twice as long as the rest).

Syn.: *T. purpureum* Loisel. var. *linearifolium* Nábelek in Publ. Fac. Sc. Univ. Masaryk, Brno, No. 35, 70 (1923).

Type—France: “Ad margines agrarum circa Monspelim.” ? *Degland* (? P) (cf. Preface to Loiseleur’s Fl. Gall. ii, p.v.).

TURKEY. Prov. Adana, dist. Feke: Göksun, gorge below Himmetli 700–800 m., 9 July 1952, *Davis, Dodds & Çetik* (D.19836): Sencan Deresi, between Gürümze and Süphandere, 1000 m., 1 July 1952, *Davis, Dodds & Çetik* (D.19624). Prov. Mersin, dist. Anamur: Anamur—Gilindere, 20 m., 14 Apr. 1956, *Davis & O. Polunin* (D.25993—immature plants). Maraş—Gaziantep, 600 m., 24 May 1934, *Balls* 1145. Lydia (Prov. Izmir): ad Ephesum (nr. Akincilar), 1 June 1906, *Bornmüller* 9286. Mont Sipyle, audessus de Magnesie (Manisa), 11 June 1854, *Balansa* 167. Troad (Prov. Çanakale), Narly, in littorali, 10 June 1883, *Sintenis* 988.

SYRIA. South of Kastel—Moauf, 800 m., 14 May 1938, *Dinsmore* 3879.

PALESTINE. Wady Shomrya (Carmel), 9 April 1942, *Davis* 4382. Between Haifa and Nazareth, 150 m., 5 May 1909, *Meyers & Dinsmore* 6688. Above Jabbok river, 500 m., 2 May 1911, *Meyers & Dinsmore* G.613.

N.E. of Salt, 830 m., 1 May 1911, *Meyers & Dinsmore* M613. Moab: Wadi Heiaan, 26 Apr. 1945, *Davis* 9609. Jordan: Wadi Malih, 160 m., 26 Mar. 1936, *Dinsmore* 12688.

IRAQ. Jarmo, excavation mound, 26 Apr. 1955, *Helbaek* 1914. Qara Tu, 5 May 1946, *Rawi* 5642. Shaqlawa, 900 m., 8 May 1947, *Gillett* 8044; *ibid.*, 1000 m., 10 May 1893, *Bornmüller* 1134.

IRAN. Prov. Kermanshah, Gilan-e-Gharb, Vajinan, 8 May 1948, *Behbudi* 73.

Habitat: Littoral places, waste lands, fields, edges of cultivated fields, roadsides, hillsides, mountain gorges, rocky limestone slopes, etc. Alt. 0–1000 m. Flowering April–May.

Distribution: S. France, Italy, Balkan Penins., Caucasus.

var. *laxiusculum* (Boiss. & Bl.) M. Hossain, **comb. nov.**

Basionym: *T. laxiusculum* Boiss. & Bl. in Boiss., *Diagn. Ser. II* (2), 13 (1856)!

Syn.: *T. blancheanum* Boiss., l.c. p. 13!

T. desvauxii Boiss. & Bl., l.c. p. 12!

T. desvauxii Boiss. & Bl. var. *laxiusculum* (Boiss. & Bl.) Boiss., Fl. Or. ii, 123 (1872)!

T. desvauxii Boiss. & Bl. var. *blancheanum* (Boiss.) Boiss., Fl. Or. ii, 124 (1872)!

T. purpureum var. *desvauxii* (Boiss. & Bl.) Post, Fl. Syr. Pal. Sin. 236 (1896)!

Type—Lebanon: "In cultis prope Beyrout", May 1853, *Blanche* (G!).

SAMOS. Between Carlovasi and Dhrakaion, dry slopes, 150 m., 7 May 1940, *Davis* 1703.

LEBANON. Tripoli, May 1866, *Blanche*. Entre Saida and Beyrouth, *Blanche*. Nahr el Kelb, 15 May 1943, *Davis* 6082. Montium Libani australis in declivitatibus occidentalibus ad pagum Bhamdun, 12–1300 m., 11 June 1910, *Bornmüller* 11638.

PALESTINE. Dilbe, 200–800 m., 26 Apr. 1905, *Dinsmore* 613.

Habitat: Dry slopes, rocky places, riversides, mountain declivities, etc. Alt. 100–1300 m. Flowering April–June.

Distribution: Areas mentioned above (Bulgaria, Thrace—Hayek l.c.)

In addition to their relatively dwarf size, the stems in var. *laxiusculum* are also weaker than those in var. *purpureum*. Var. *laxiusculum* varies in stem-height and in the size and shape of the spikes and of the leaflets. The leaflets are usually elliptic to narrowly elliptic and acute, but in some cases they are oblong-obovate and obtuse (except in the uppermost leaves). In *Blanche*'s specimen from Tripoli, for example, there are two plants: the leaflets in one are oblong-obovate and obtuse, in the other elliptic and acute. The same is the case with *Davis* 1703 from Samos.

T. purpureum is allied to *T. angustifolium*, *T. intermedium* and *T. pamphylicum*. All of these form a natural group and resemble each other to varying extents in indumentum, stems, leaves, texture of the calyx-tube and shape of the vexillum (lamina slightly deflexed laterally at the base). However, they differ in their stem-height and in the size and shape of their leaflets, spikes, calyx-tube and corolla.

22. **T. pamphylicum** Boiss. & Heldr. in Boiss., *Diagn. Ser. I* (9), 20 (1849); Boissier, *Fl. Or. ii*, 123 (1872).

Syn.: *T. purpureum* Loisel. subsp. *pamphylicum* (Boiss. & Heldr.) Holmboe, *Studies Veg. Cyprus*, 105 (1914).

- 1a. Calyx-lobes usually 3–4 mm. long (lowermost 4 mm., other four 3 mm.). Stems 7–13 cm. high var. *pamphylicum*
 1b. Calyx-lobes 5–7 mm. long (lowermost 6–7 mm., other four c. 5 mm.). Stems usually 10–25 cm. high var. *dolichodontum*

var. **pamphylicum**

Type—Turkey: "In arenosis Pamphylicae ad fluvium Melas infra Monargat", Apr. 1845, *Heldreich* (holo. G! iso. K!).

TURKEY. Prov. Mersin, dist. Anamur: Gilindere, 50 m., 14 Apr. 1956, *Davis & O. Polunin* (D.25969). Prov. Antalya: Karanlık Sokak, 150 m., 5 Apr. 1936, *Tengwall* 263.

CYPRUS. Larnaca: Skarinou, 17 Mar. 1941, *Davis* 2673; 9 m., 22 Mar. 1955, *Merton* 2000; 20 Apr. 1912, *Haradjian* 8; *Druce*. Famagusta, Apr. 1901, *Lascelles*. Nicosia-Myrtou Rd., Mile 3, 150 m., 12 Apr. 1950, *Chapman* 401 and 576. Agios Irini (Morphou), 12 Mar. 1941, *Davis* 2589. Galata (Kakopetria), 24 Apr. 1941, *Davis* 3202. Kambia, 12 May 1908, *Reid*. Ayios Epiktitos, 15 m., 8 Apr. 1956, *Casey* 1705. Drousha, 600 m., 1 May 1941, *Davis* 3217.

SYRIA. Jebel Druze, 1080 m., 29 Apr. 1933, *Meinertzhagen*.

Habitat: Open places in the garigues, dry mountainsides, fields, sandy river-beds, etc. Alt. 0–1100 m. Flowering March–May.

The stems are usually 1–3 per plant, mostly ascending, rarely procumbent. The spikes are ovate- or oblong-conical when young, but become oblong or cylindrical after maturation. They vary from 20–40(–45) mm. in length and are about 15 mm. in breadth.

var. **dolichodontum** Hossain, var. nov. A typo laciniis calycinis longioribus differt.

Type—Cyprus: Platres, 1125 m., dry mountainside, among bushes of *Cistus*, flowers bright pink, 28 May 1938, *Kennedy* 1277 (holo. K!).

CYPRUS. Platres, 1050–1200 m., 2 May 1937, *Kennedy* 560 A; *ibid.*, July 1914, *Feelden*. Sand-dunes near Agios Memnon, 1 May 1948, *Mavromoustakis*.

The stems and the spikes in var. *dolichodontum* are usually similar to those in var. *pamphylicum*, except that the former are often taller and the latter broader (c. 20 mm. broad) on account of their longer calyx-lobes.

Mavromoustakis's specimen is somewhat atypical. It differs from others of the variety in its conspicuously longer (c. 60 mm.) spikes with relatively stiff (spreading) calyx-lobes. It resembles *T. angustifolium*, but can be easily distinguished from it by its blunt and much less thick calyx-lobes and by its corolla being a little longer than the calyx. (The corolla in *T. angustifolium* is usually a little shorter than the calyx.)

23. **T. prophetarum** Hossain, sp. nov. Affinis *T. pamphylico* Boiss. & Heldr., sed indumento nitido, foliis supremis oppositis, spicis longe pedunculatis,

dentibus calycis tenuissimis subaequalibus, lamina vexilli lanceolata (basi late cuneato nec auriculato), ovario breviter stipitato distinguitur.

Herba annua. Caules plures ascendentes superne saepe dichotome ramosi, 7–13 cm. alti, nitide subadpresse hirsuti. Folia palmatim trifoliata, alterna, suprema semper fere opposita; stipulae parte adnata 6–3 mm. longa, 2–1 mm. lata, longitudinaliter nervosa et parte libera 3–2 mm. longa subulata, nitide villosulae; petioli foliorum inferiorum stipulas longe superantes, (20–)15–10 mm. longi, ei foliorum superiorum stipulas subaequant. Foliola anguste oblongo-elliptica mucronulata, ea foliorum basilarium obtusa, superiorum acuta, 8–15(–20) mm. longa, 2–3(–4) mm. lata. Pedunculi 15–30 mm. longi adpressissime piloso-hirsuti plerumque folia suprema superantes. Spicae terminales oblongae compactae, 25–30 × c. 20 mm., internum in capitula obovata abbreviatae. Flores sessiles, bracteati. Tubus calycis 10-nervius, 2–2.5 mm. longus, dense subadpresse nitide piloso-villosus, fauce callo pubescenti clausus; laciniae pilis nitidis patulis praeditae, filiformes, truncatae, subaequales, 4–5 mm. longae, tubo duplo longiores, sub anthesi patentes. Corolla in vivo lilacino-rosea; vexillum c. 12 mm. longum, calyce sesquilinguis, lamina lanceolata basi late cuneata, c. 8 mm. longa, c. 3 mm. lata, ungue c. 4 mm. longo; alae c. 9 mm. longae; carina c. 8 mm. longa; unguis petalorum connati et filamentis connatis toto adnati. Ovarium c. 2 mm. longum, breviter stipitatum, biovulatum. Legumen monospermum; semen 1 mm. in diam. Flowering March–April.

PALESTINE. Mt. Gilboa, near Beit Alfa, flowers lilac-pink, 18 Mar. 1942, Davis 4142 (holo. E! iso. K!). Jerusalem, road sides, 800 m., 15 Apr. 1908, Dinsmore 3162 (as *T. formosum* Urv. var. ?, E!). "Southern Syria", a. 1863–64, Lowne (K!).

T. prophetarum differs from all other species of the genus by its extremely narrow filiform calyx-lobes which are almost equal to one another but twice as long as the tube. Though it resembles *T. pamphylicum* Boiss. & Heldr. more than any other species, its precise relationship is rather obscure. In its oblong spikes, truncate filiform calyx lobes and narrowly oblong-elliptic leaflets it shows an affinity with the group of species (of which *T. pamphylicum* is one) around *T. purpureum* Loisel. But the uppermost opposite leaves, as had already been mentioned in the diagnosis (occurring mostly on a single peduncle and rarely at a terminal dichotomy), the stipitate ovary and the shiny hairs all over the plant mark a departure from the characters of this group.

24. *T. roussaeum* Boiss., Diagn. Ser. I (2), 26 (1843).

Syn.: *T. desvauxii* Boiss. & Bl. var. *roussaeum* (Boiss.) Boiss., Fl. Or. ii, 123 (1872)!

T. angustifolium L. subvar. *roussaeum* (Boiss.) Gib. & Belli in Mem. Accad. Sc. Tor. Ser. II. xxxix, 346 (1889)!

T. purpureum Loisel. subsp. *roussaeum* (Boiss.) Holmboe, Studies, Veg. Cyprus, 105 (1914)!

Lectotype: "Hab. in Oriente, Rousseau (G!)."

TURKEY. In rupestribus Ciliciae, Aucher 1236 (syntype; G!). Prov. Mersin, dist. Tarsus: Gorge of Tarsus river between Ulaş and Şamlar, 150 m., flowers pink, 5 Apr. 1957, Davis & Hedge (D.26439).—Endemic.

Habitat: Rocky limestone slope on terra rossa.

T. roussaeum is quite distinct from the different varieties (var. *purpureum* and var. *laxiusculum*) and forms of *T. purpureum* and can be recognized by the following characteristics:

1. Stems and petioles covered with soft spreading hairs.
2. Uppermost pair of leaves opposite.
3. Capitula geminate.
4. The calyx-tube densely covered with long glossy hairs.

It is allied to *T. haussknechtii* from which it can be distinguished as follows:

<i>T. roussaeum</i>	<i>T. haussknechtii</i>
1. Stems and petioles covered with long spreading hairs.	1. Stems and petioles adpressed pubescent.
2. Stems simple.	2. Stems dichotomously branched.
3. Capitula only on the short terminal dichotomies of the main branches, (1)2-6 in number.	3. Capitula on the terminal dichotomies of the main as well as axillary branches, numerous.
4. Peduncles shorter or equal to the petioles of the subtending leaves.	4. Peduncles distinctly longer than the petioles of the subtending leaves.

25. *T. haussknechtii* Boiss., Fl. Or. ii, 125 (1872); Post, Fl. Syr. Pal. Sin. ed. 2, i, 338 (1932).

- 1a. Stems usually 13-15 cm. high; leaflets usually narrowly oblanceolate, 15-20 × 3-4 mm. var. *haussknechtii*
- 1b. Stems usually 8-11 cm. high; leaflets usually obovate or oblong-obovate, 8-10 × 3-4 mm. var. *candollei*

var. *haussknechtii*

Lectotype: Syria borealis, in graminosis Djebel Muhassan prope Aleppo, 20 Mar. 1865, *Haussknecht* (G! K!).

TURKEY. Prov. Diyarbakir: 5 km. south of Diyarbakir town, 650 m., quarry banks, 31 May 1957, *Davis & Hedge* (D.28750).

The duplicate of the lectotype at Kew (which was received in June 1870) is labelled as *T. lasiocalycinum* Boiss. and Hausskn. This name, however, was never validly published.

var. *candollei* (Post) Hossain, **comb. et stat. nov.** *Icon.*: Post, Fl. Syr. Pal. Sin. ed. 2, i, 338 (1932).

Basionym: *T. candollei* Post in Journ. Linn. Soc. xxiv, 425 (1888).

Type—Turkey: "Prope Aintab (Gaziantep), floret Maio" (*Herb. Post*, Beirut, n.v.).

TURKEY. Prov. Urfa: c. 20 km. from the turning to Sürüç towards Urfa, 600 m., disturbed calcareous steppe, 14 May 1957, *Davis & Hedge* (D. 27986).

Distribution: Endemic to S.E. Turkey and adjacent parts of Syria and Iraq.

The stems in var. *haussknechtii* are, in addition to their greater length, much thicker than those in var. *candollei*. The calyx-lobes, however, are variable in length. In the duplicate of the lectotype (var. *haussknechtii*) at Kew the calyx-lobes are as long as those in *Davis* 27986 of var. *candollei* (lowermost lobe 3–4 mm., other c. 2 mm. long). In *Davis* 28750 of var. *haussknechtii*, however, they are longer (lowermost lobe 5–6 mm., others 3–4 mm., long). In both varieties the calyx-lobes appear to shorten to some extent at the fruiting stage.

26. *T. dichroanthum* Boiss., Diagn. Ser. I (9), 20 (1849) et Fl. Or. ii, 124 (1872); Post, Fl. Syr. Pal. Sin. ed. 2, i, 337 (1932).

Type—Palestine: "In collibus Judaeae circa Gazam, fl. ineunte Aprili" 1846, *Boissier* (holo. G? iso. K!).

TURKEY. Environs de Giaour-Kioi, près de Mersina (Cilicie)—région chaude, 17 Apr. 1855, *Balansa* 450. In monte Tauro, aestate 1838, *Kotschy* 142.

LEBANON. Talus des cultures, dans les sables ferrugineux, près de Beyrouth, 5 May 1853, *Blanche* 60.

PALESTINE. Near Haifa, woods, 6 May 1909, *Dinsmore* 1414. Jaffa, in arenosis ad Wadachnin, 9 Apr. 1897, *Bornmüller*. Plain of Sharon, *Post*. Between Gaza and Jebel Montar, 70 m., 3 Apr. 1911, *Dinsmore* 3414. Wadi Hanein, 5 Apr. 1922, *Meyers & Dinsmore* 9857.

Habitat: Sandy soil in the fields, usually at sea level, sometimes on low hills. Flowering April-May.

T. dichroanthum is close to *T. palaestinum*, in which the indumentum is denser and shinier. The two can also be distinguished as follows:

<i>T. dichroanthum</i>	<i>T. palaestinum</i>
1. Corolla purple, 2–3 times as long as the calyx.	1. Corolla white or creamy, not more than 1½ times as long as the calyx.
2. Calyx c. 7 mm. long, lobes rather slender, not spreading when mature.	2. Calyx 10–11 mm. long, lobes semi-stiff, ± spreading when mature.
3. Leaflets mostly oblong obovate, only in the upper leaves with a broadly acuminate mucronate apex.	3. Leaflets usually oblanceolate with a broadly acuminate denticulate apex.

27. *T. palaestinum* Boiss., Diagn. Ser. I (9), 21 (1849) et Fl. Or. ii, 124 (1872); Post, Fl. Syr. Pal. Sin. ed. 2, i, 337 (1932).

Type—"In arenosis circa Gaza Palaestinae", Apr. 1846, *Boissier* (G!).

PALESTINE. Binyamina—Caesarea, 8 Apr. 1942, *Davis* 4410. Jaffa, 9 Apr. 1897, *Bornmüller* 418; *ibid.*, coast, 1–20 m., 29 Apr. 1909, *Dinsmore* 1365. South of Ramleh, 50 m., 5 Apr. 1911, *Dinsmore* 5365. Acre, 15 Apr. 1926, *Jolles* 110.—Endemic.

Habitat: Coastal sand dunes and low sandstone hills in the maritime regions. Flowering April.

Stems per plant are one to several, all arising from a common point at the root, all unbranched but usually bifurcating at the end to bear two capitula on each terminal dichotomy. Leaves, as a rule, are all alternate.

Occasionally, however, the two uppermost leaves on some branches appear more or less opposite. This is due to the rudimentary condition of the lower capitulum (of a terminal pair) and its peduncle, so that the subtending leaves of each capitulum are closely approximated.

28. *T. berytheum* Boiss. & Bl. in Boiss., Diagn. Ser. II (2) 15 (1856).

Syn.: *T. supinum* Savi var. *tuberculatum* Boiss., Fl. Or. ii, 126 (1872).

T. alexandrinum L. var. *tuberculatum* (Boiss.) Gib. and Belli in Mem. Accad. Sc. Tor. xxxix, 390 (1889).

T. echinatum M.B. var. *berytheum* (Boiss. & Bl.) Dinsmore in Post, Fl. Syr. Pal. Sin. ed. 2, i, 338 (1932)!

Type—Lebanon: Ad ostium rivi Sainib prope Saidonem inter segetes, *Blanche* (holo. G! iso. K! E!).

TURKEY. Mont Amanus, vallées, 750 m., June 1906, *Haradjian* 762.

LEBANON. Saida, *Gaillardot*.

PALESTINE. Mejdal (Sea of Tiberias), 200 m., 5 May 1913, *Meyers & Dinsmore* 1611^b. Near Cana, 200 m., 16 May 1911, *Meyers & Dinsmore* 3383.

Habitat: Mountain valleys, fields, river banks, coastal sand, etc.

T. berytheum is allied to *T. alexandrinum* but can be distinguished from it by the following characters:

1. Stems weak.
2. Capitula sessile (rarely pedunculate).
3. Calyx-teeth short (c.2 mm. long, rather shorter than the tube), with dense tuberculate hairs towards the base, one-nerved, spinescent.

The above characters also distinguish the species from *T. echinatum* which, however, differs further in its calyx-teeth being longer than the tube and spreading stellately at the fruiting stage.

Meyers & Dinsmore 1611^b is atypical in having rather broadly elliptic leaflets and distinctly pedunculate capitula, but its habit and calyx-teeth are characteristic of *T. berytheum*.

29. *T. alexandrinum* L., Cent. Pl. i, 25 (1755) et Amoen. Acad. iv, 286 (1759); Boissier, Fl. Or., ii, 127 (1872); Post, Fl. Syr. Pal. Sin. ed. 2, i, 339 (1932).

For key to the varieties see key to the annual species on p. 399.

var. *alexandrinum*

Syn.: ? *T. constantinopolitanum* Ser. in DC., Prodr. ii, 193 (1825) (see below).

TURKEY. Prov. Antalya: between Belek and Serik, 150 m., 10 May 1936, *Tengwall* 562.

PALESTINE. Ad Haifa, 4 May 1897, *Bornmüller* 428. Saron, cultivated, 1–20 m., 16 May 1908, *Dinsmore* 1280. Jordan, Ain et Tabigha, 200 m., 4 Apr. 1911, *Meyers & Dinsmore* 1611.

IRAQ. Edge of ditch by the Tigris above Amara, 16 May 1918, *Evans* M/125.

Habitat: Mostly cultivated. Alt. 1–200 m., Flowering April–May.

Distribution: Confined to the Middle East (Turkey, Iraq, Syria, Lebanon, Palestine and Egypt).

var. *phleoides* (Boiss.) Boiss., Fl. Or. ii, 127 (1872).

Basionym: *T. constantinopolitanum* Ser. var. *phleoides* Boiss., Diagn. Ser. II (2), 15 (1856).

Syntypes—Turkey: "Cum priore (*T. constantinopolitanum* Ser. s.s.) circa Byzantium, Castagne, Noë" (G, n.v.).

TURKEY. Prov. Istanbul: in agri Byzantini declivibus argillosis prope "Abraham Pascha Tschiflik" inter pagos Buyukdere et Kila situm, 4 June 1890, *Degen*. Prov. Izmir: Champs de l'île de Kisali (golfe de Smyrne), 3 May 1854, *Balansa* 165 (as *T. constantinopolitanum* Ser.).

In addition, the following specimens from Europe belong to this variety: Trieste, camp Mayis (advenae) a. 1882, *Guigno* (ex Herb. Dorfl.). Two specimens from Port Juvenal labelled as *T. cinctum* DC. and *T. scutalum* Boiss. respectively (ex Herb. Giles Munby). England, near Bath, a. 1902, *S. Dunn*: riverside between Kew and Richmond, July 1855, *A. & B.*

The above treatment of the variety is after Boissier (*Flora Orientalis*, ii, 127: 1872) and on the basis of *Balansa* 165 cited therein.

There is some controversy about the true identity of *T. constantinopolitanum* Ser. Boissier examined the type of the species (Castagne's gathering from around Constantinople: in Herb. DC.) and (Diagn. Ser. II (2) p. 15: 1856) assigned one part of it to *T. constantinopolitanum* Ser. and the other, along with a part of Noë's gathering from the same area, to var. *phleoides*. Later in *Flora Orientalis* (ii, 127: 1872) he revised this decision and considered *T. constantinopolitanum* var. *constantinopolitanum* as the same as *T. alexandrinum* L. var. *alexandrinum* and transferred var. *phleoides* to this latter species, without, however, citing Castagne's specimen. During the present investigation, unfortunately, no authentic specimens of Seringe's species and Boissier's variety were available for comparison. But the shape of the leaflets ("foliolis lanceolato-linearibus") in the original description of Seringe's species suggests a similarity of the latter to *T. alexandrinum* L. var. *alexandrinum*, though doubt arises in this respect from the point of geographical distribution. Var. *alexandrinum* is not known from near Constantinople, whereas var. *phleoides* (with relatively short, elliptic, oblong obovate or obovate leaflets) is. The main differences between these two distinctive varieties are as follows:

var. <i>phleoides</i>	var. <i>alexandrinum</i>
1. Stems much-branched (branches both primary and secondary).	1. Stems sparingly branched (branches primary only).
2. Leaflets usually 12–17 (–20) × 6–7 (–8) mm., elliptic or oblong-obovate.	2. Leaflets usually 25–35 (–40) × 9–11 (–13) mm., oblong-elliptic.
3. Calyx a little constricted at throat, teeth one-nerved and divergent in fruit.	3. Calyx broadest at the throat, teeth ± erect in fruit, lowermost tooth 3-nerved.

Some authors (Hayek, Prodr. Fl. Balc. i, 863: 1926; Rechinger, Fl. Aegaea, 365: 1943) have considered var. *phleoides* as the true *T. constantinopolitanum*. Unfortunately, their accounts do not contain any reference to the relevant types.

30. *T. carmeli* Boiss., Diagn. Ser. II (2), 16 (1856) et Fl. Or. ii, 127 (1872); Post, Fl. Syr. Pal. Sin. ed. 2, i, 339 (1932).

1a. Leaflets of uppermost leaves serrulate; stems not or seldom branched; lowermost tooth of the calyx 5–6 mm. long var. *serrulatum*

1b. Leaflets of uppermost leaves obscurely and remotely denticulate; stems usually dichotomously branched, lowermost tooth of the calyx 4–5 mm. long var. *carmeli*

var. *carmeli*. *Icon.*: Mouterde, Fl. Djebel Drouze, pl. 8, f. 1 (1953)—as *T. vavilovi* Eig.

Syn.: *T. echinatum* M.B. var. *carmeli* (Boiss.) Gib. & Belli in Mem. Accad. Sc. Tor. Ser. II. xxxix, 377 (1889).

T. constantinopolitanum Ser. var. *carmeli* (Boiss.) Thell. in Viertelschr. Nat. Ges. Zurich, lii, 454 (1907).

T. vavilovi Eig in Bull. Appl. Bot., Leningrad, Ser. vii (1), 108 (1934).

Lectotype—Palestine: Fauces Carmeli, April-May 1846, Boissier (G!).

PALESTINE. Wadi Shomrya (Carmel), 9 Apr. 1942, Davis 4390. Jerusalem, 800 m., 12 Apr. 1912, Meyers & Dinsmore 4927.—Endemic.

Habitat: Grassy and shady places on hills. Alt. c. 800 m. Flowering April-May.

var. *serrulatum* Hossain, var. nov. A typo caulibus simplicibus (vix ramosis), foliolis foliorum superiorum serrulatis, laciniis calycinis (praesertim infimis) longioribus minus crassis sed magis patule hirsutis differt.

Holotype—N. Palestine: Jebel Jermuk, 110 m., grassy places, 4 May 1913, Meyers & Dinsmore 6927 (E!).

In this species, the naked tips of the calyx-teeth turn black at the fruiting stage, a peculiarity not known in any other species of *Trifolium*. The calyx-teeth are usually stiffer, narrower and more unequal than those in the allied *T. alexandrinum*. They are more or less erect or often slightly recurved after maturation, but never widely divergent as in *T. echinatum*.

31. *T. echinatum* M.Bieb., Fl. Taur. Cauc. ii, 216 (1808); Boissier, Fl. Or. ii, 126 (1872); Hayek, Prodr. Fl. Balc. i, 863 (1926); Post, Fl. Syr. Pal. Sin. ed. 2, i, 338 (1932).

1a. Stems usually 20–25 (–30) cm. tall and c. 1.5 mm. thick; calyx-tube c. 1.5 mm. long var. *echinatum*

1b. Stems usually c. 60 cm. tall and c. 3 mm. thick; calyx-tube c. 2 mm. long var. *reclinatum*

var. *echinatum*. *Icon.*: Reichenbach, Ic. Fl. Germ. Helv. xxii, t. 90 (1903)—as *T. supinum* Savi; Hegi, Ill. Fl. Mittel-Eur. iv (3), 1282 (1931).

Syn.: *T. supinum* Savi, Obs. Trif. 46, f. 2. (1810).

T. echinatum M.B. subsp. *supinum* (Savi) Aschers. & Graeb., Syn. vi, 590 (1908).

T. sefinense Freyn & Bornm. in Mém. Herb. Boiss. xiii, 3 (1900) (cf. Bornmüller in Beih. Bot. Centralbl. lvii (6), 256: 1937).

Type: "Ad Caucasum", M. Bieberstein (LE, n.v.)

TURKEY. Prov. Istanbul: c. 12 km. from Istanbul towards Edirne, c. 50 m., 16 July 1956, *McNeill* 210. Renkiu, Dardanelles, May 1856, leg.? Prov. Antalya: between Kuzdere and Çukur Yayla on Tahtali Dağ (Kemer), 1440 m., 17 Aug. 1947, *Davis* 14088. Fauces Trimboulkchan Pamphyliæ, *Heldreich*. Bouloukli près de Mersina (Mersin), 3 June 1854, *Balansa* 448. Prov. Diyarbakir: 5 km. S. of Diyarbakir, 650 m., 31 May 1957, *Davis & Hedge* (D.28759); 8 km. from Diyarbakir towards Çınar, 650 m., 31 May 1957, *Davis & Hedge* (D.28775 A); 10 km. from Diyarbakir towards Ergani, 750 m., 1 June 1957, *Davis & Hedge* (D.28803). Prov. Mardin: 5–10 km. from Nusaybin towards Mardin, 600 m., 22 May 1957, *Davis & Hedge* (D.28405).

RHODES. Prope Lardos, 20 May 1935, *K. H. & F. Rechinger* 7522.

CYPRUS. Prodromos, 1350 m., 12 July 1951, *Casey* 1207. Hill above Panagra (nr. Myrtou), 210 m., *Casey* 1345. Circa Cerignia, 28 May 1880, *Sintenis & Rigo* 414.

LEBANON. Mt. Lebanon, nr. Gezzin, c. 1000 m., May 1877, *Ball* 1619 Tom Niha, 1500–1800 m., 13 May 1877, *Ball* 1701 and 1702.

IRAQ. Jebel Hamrin inter Bagdad & Kirkuk, 22 Apr. 1893, *Bornmüller* 1138. Bagdad, Waziriyah, 23 Apr. 1955, *Haines* W.198. Daltawah, 26 Mar. 1932, *Guest* 2449. Jarmo, camp Wadi, 25 Apr. 1955, *Helbaek* 1186. Erbil liwa: Bekhme gorge, 500 m., 4 May 1947, *Gillett* 8238.

Habitat: Grassy, humid places in fallow as well as cultivated fields, along roadsides, hill-slopes, etc. Alt. 50–1800 m. Flowering March–June. Distribution: Italy, Yugoslavia, Greece, Caucasus.

var. *reclinatum* (W. & K.) *Aschers. & Graeb.*, *Synops.* vi, 591 (1908).

Basionym: *T. reclinatum* Waldst. & Kit., *Pl. Rar. Hung.* iii, 299, t. 269 (1812).

Type: "Crescit in graminosis prope Temesium fluv. infra vineas Pancsoviensis [Pancevo, Yugoslavia]. Fl. Jun." (PR, n.v.).

TURKEY. Dardanelles (Prov. Çanakkale), prope Sariyer, 31 May 1883, *Sintenis* 889.

SYRIA. Pont de Marad Pasha et berges du lac Baluk Gol, 45 m., 8–15 May 1911, *Haradjian* 4139.

PALESTINE. Carmel etc., Apr. 1846, *Boissier*. Ex collibus Palaestinae pr. Nazareth, May 1877, *Ball* 1245.

IRAN. Near Bushire, 17 Apr. 1928, *Homer* 192. Mohammera, a. 1850, *Noë* 380.

Habitat: By the sides of streams, lakes, etc., along hillslopes.

Distribution: The variety occurs scattered more or less all over the specific range.

T. echinatum is very variable. The most characteristic feature of the species is its echinate mature capitulum. The calyx-tubes are very small and are always obscured by the spreading, stiff and pointed calyx-teeth after maturation. The fruiting calyces are strongly attached to the floral axis and cannot be detached without injuring the lower calycine tissues.

32. *T. latinum* Sebast., *Rom. Pl. fasc.* i, 7, t. 1, fig. 2 (1813); *Boissier*, *Fl.*

Or. ii, 126 (1872); Hayek, Prodr. Fl. Balc. i, 862 (1926); Post, Fl. Syr. Pal. Sin. ed. 2, i, 338 (1932).

Type—Italy: "Sylvula prope Romam versus Mare vulgo dicta Macchi de Mattei" 1813, *Sebastiani* (n.v.).

TURKEY: Bosforus, *leg.*? Lydia (Prov. Izmir), sinus Smyrnaeus in cacumine montis Yamamlar dagh, 900 m., 22 May 1906, *Bornmüller* 9323; in sylvis Mesogis supra Tralles (Aydin), June 1842, *Boissier*.

Habitat: Granite soil; usually in woods on the plains as well as hills. Flowering May-June.

Distribution: Italy, S. Greece.

33. *T. leucanthum* M. Bieb., Fl. Taur. Cauc. ii, 214 (1808); Boissier, Fl. Or. ii, 128 (1872); Hayek, Prodr. Fl. Balc. i, 862 (1926); Post, Fl. Syr. Pal. Sin. ed. 2, i, 339 (1932); *Icon.*: Moris, Fl. Sard. i, t. 62, f. 2 (1837).

Syn.: ? *T. obscurum* Savi, Obs. Trif. 31, f. 1 (1810).

T. leucotrichum Petrovic, Fl. Agr. Myss. 228 (1882).

Type—Crimea: In Tauriae meridionalis collibus siccis. Floret Majo-Junio, *Bieberstein* (LE, n.v.).

TURKEY. Prov. Çanakkale: Renkoei, ad Thymbram, 3 May 1883, *Sintenis* 176. In agris Smyrnae (Izmir), May 1827, *Fleischer* (sub *T. phleoides* L.). Lydia (Prov. Izmir), in collibus ad Emir Aleem et Deirmendere, 8 May 1906, *Bornmüller* 9328. Village d' Alla-Dagh, à 7 lieues au NO. de Mersina (Cilicie), reg. mont., 16 May 1885, *Balansa* 449. Prov. Maraş: 10 km. S. of Maraş, 550 m., 1 May 1957, *Davis & Hedge* (D.27337). Prov. Diyarbakir: Diyarbakir—Çınar, 8 km. from Diyarbakir, 650 m., 31 May 1957, *Davis & Hedge* (D.28775).

CYPRUS. Pergamos, 105 m., 4 & 22 Mar. 1955, *Merton* 1980. Platres, 1200 m., 13 May 1938, *Kennedy* 1283; 1200 m., 10 Apr. 1941, *Davis* 3150. Trypilos, 1140 m., 17 May 1941, *Davis* 3483. Yaila (Kyrenia range), 28 Mar. 1941, *Davis* 2881. Ay. Varvara, 90 m., 6 Apr. 1937, *Syngrossides* 1496. Lacovounera forest, 180 m., 11 Apr. 1950, *Chapman* 364.

IRAQ. Kurdistania, in montis Kuh-Sefin reg. infer. supra pagum Schaklava (dit. Erbil), 900 m., 21 May 1893, *Bornmüller* 1155. Kirkuk liwa, between Qaranjur & Chemchemal, fl. purple, 800 m., 14 April 1947, *Gillett & Rawi* 7570. Sulciman liwa, between Qaradagh & Jaeferan, 900 m., 22 Apr. 1947, *Gillett* 7884. Five miles west of Divana across the valley, 14 Apr. 1955, *Helbaek* 780.

Habitat: On grassy as well as rocky hill-slopes, but mostly as an undergrowth in pine, cedar and oak forests, usually at 500–900 m. Flowering April-May.

Distribution: S. Spain, Corsica, Sardinia, Sicily, Italy, Serbia, Greece. Bulgaria and Crimea.

The species is variable in stem and leaflet characters. Usually plants growing in moist and shady habitats have weak stems and oblong-obovate leaflets whereas those growing in dry and rocky habitats have semi-rigid stems and elliptic mucronate leaflets on the upper leaves. Stems are usually ascending but occasionally they may be decedinate. Such variations, however, are often found in the same gathering. *Davis* 3283 from Cyprus, for example, consists of two plants, with the stems decedinate in one and ascending in another.

The original description of the species characterises the stems as declinate and the flowers as white. Boissier's var. *declinatum*, established on the basis of declinate stems and flesh coloured corolla, therefore differs from the type only in the latter character.

The original description of *T. obscurum* Savi is accompanied by a figure which is not particularly suggestive of *T. leucanthum*. However, Moris in his *Flora Sardo* gives indication of having seen Savi's specimen and considers it the same as *T. leucanthum*.

34. *T. phleoides* Pourr. ex Willd., Sp. Pl. iii, 1377 (1802); Boissier, Fl. Or. ii, 120 (1872); Hayek, Prodr. Fl. Balc. i, 865 (1926). *Icon.*: Moris, Fl. Sard. i, t. 60 (1837); Fiori & Paol., Ic. Fl. Ital. 234 (1899).

Syn.: *T. erinaceum* M.Bieb. Fl. Taur. Cauc. iii, 510 (1819).

Type—"Habitat in Hispania", *Pourret* 230 (holo. Herb. Willd. Berlin, n.v., photo. E!).

TURKEY. Phrygia, Sultandagh, in jugis subalpinis montium supra Akseher (Akşehir, Prov. Konya), 1600 m., 21 June 1899, *Bornmüller* 4332. Prov. Adana, dist. Feke: Sencan dere nr. Gürümze, 1300 m., 30 June 1952, *Davis, Dodds & Çetik* (D.19669). Armenia Turcica, Szandschak Gumuschkhane (Gümüşane), Moaldas dagh, 20 June 1894, *Sintenis* 5964.

Habitat: Mountain meadows, etc., at 1300–1600 m.

Distribution: S. Spain, Sardinia, S. Italy, Sicily, Algeria, Bulgaria, Caucasus.

The species is comparatively common in the western part of its range and rather sparse in the eastern part. There is also some discontinuity in its distribution. It has not so far been recorded from Dalmatia, S. Greece or the Aegean islands, but occurs in Bulgaria, western, southern and north-eastern Turkey and in Caucasia.

35. *T. scabrum* L., Sp. Pl. ii, 770 (1753); Boissier, Fl. Or. ii, 130 (1872); Hayek, Prodr. Fl. Balc. i, 860 (1926); Post, Fl. Syr. Pal. Sin. ed. 2, i, 391 (1932). *Icon.*: Javorka & Csapody, Ic. Fl. Hungar. 279, f. 2024 (1931); Hegi, Ill. Fl. Mittel-Eur. iv (3), 1326, f. 1410 (1923); Ross-Craig Draw. Br. Pl. pt. vii, pl. 32 (1954).

TURKEY: Ex agro Byzantino secus Bosphorum, June 1877, *Ball* 2535. Ad vias Smyrnae (Izmir), Mar. 1827, *Fleischer* (as *T. scabrum* Dec.). West of Antalya, 30 m., 2 May 1936, *Tengwall* 484. Prov. Antalya, Alanya promontory, 100 m., rocky limestone slopes, procumbent, flowers pinkish white, 11 Apr. 1956, *Davis & O. Polunin* (D.25852). Prov. Adana, dist. Osmaniye, Toprakkale, 80 m., basalt gully below the castle, flowers pinkish white, local, 20 Apr. 1957, *Davis & Hedge* (D.26909). Prov. Hatay, dist. Belen, below Belen, 400 m., roadside, 23 Apr. 1957, *Davis & Hedge* (D.27014).

SAMOS. Tigani, sea shore, growing through *Thymus capitatus*, flowers pink, 29 Apr. 1940, *Davis* 1622.

CYPRUS. Skarinou (dist. Larnaca), shingle in river bed, flowers white or pinkish white, 17 Mar. 1941, *Davis* 1691. Between Kythrea and Halefka, 450–600 m., dry stony slopes, flowers cream fading pinkish, 29 Mar. 1941,

Davis 2914. Mile 7, Nicosia-Famagusta road, in grass steppe on poor soil, 150 m., 12 Apr. 1950, *Chapman* 371. Platres, fallow land, 1125 m., flowers white, 27 Apr. 1938, *Kennedy* 1278. Near Ay. Epiktitos, hard land, 30 m., 8 Apr. 1956, *Casey* 1708. Syrianochori, sea level, sandy soil, 30 Mar. 1935, *Syngrassides* 764. Komitou Yialou, Karpas, occasional in glade in forest, 45 m., 7 Apr. 1950, *Chapman* 233. Hatcha, stony field near beach, 9 Apr. 1950, *Chapman* 278.

SYRIA. Région inf. du Jebel Seman, 360 m., 15–20 Mai 1908, *Haradjian* 2044 p.p.

LEBANON. Tripoli, hill at Meena gate, 25 Apr. 1965, *Post*. Ex clivo occidentali Montis Libani, prope Gezzin, c. 1000 m., May 1877, *Ball* 1618; *ibid.*, prope Muktarrah, 14 May 1877, *Ball* 1772. Prope Beyrout, May 1877, *Ball* 2275.

PALESTINE. Merj Abu Aishe, 800 m., 28 Apr. 1911, *Meyers & Dinsmore* M.704. Jerusalem, fields, 800 m., 19 Apr. 1905, *Dinsmore* 4704. Ex reg. collina Palaest. in Monte Tabor, 4 May 1877, *Ball* 1379^b.

IRAQ. Acra, fodder plant eaten by sheep, 450–900 m., *Qaimagam* 3081^A.

IRAN. Near Siaret, 8 May 1858, *Bunge*. Lahijan, Guilan, found only on dry wall, cultivated, May 1937, *Lindsay* 817.

Habitat: Shingle in river bed, sandy soil on sea shores, road sides, fallow lands, rocky limestone slopes, mountain declivities, from sea level to 100 m. Flowering April–May.

Distribution: British Isles, Spain, France, Western Mediterranean Islands, Italy and Balkan Peninsula.

36. *T. compactum* Post, Fl. Syr. Pal. Sin. 239 (1896) et ed. 2, i, 341 (1932).

Syn.: ? *T. turcicum* Velen. in Sitzb. Boehm. Ges. Wiss. 23 (1892–93).

? *T. scabrum* L. subsp. *turcicum* Velen., Fl. Bulg. suppl. i, 82 (1898).

Type—Turkey: Aintab (Gaziantep), ? *Post* (Herb. Post, Beirut, n.v.).

TURKEY. Dardanelles (Çanakkale), in graminosis, 30 May 1883, *Sinten* 1086. Bithynia (Prov. Bursa), in olivetis Mudania, 12 May 1899, *Bornmüller* 4338 (sub *T. scabrum* ssp. *turcicum* Velen.). Prov. Ankara, Hacikadun valley near Keciören, 11 June 1952, *Davis & Dodds* (D.18825). Prov. Adana, dist. Feke, Sencan dere near Gürümze, 1300 m., 30 June 1952, *Davis, Dodds & Çetik* (D.19685). Prov. Mardin, Mardin—Nusaybin, 12 km. from Mardin, 750 m., 22 May 1957, *Davis & Hedge* (D.28472). Prov. Hatay, dist. Antakya, Iskenderun—Antakya, west of Amik Göl., 150 m., 25 Apr. 1957, *Davis & Hedge* (D.27145). Prov. Maraş, dist. Pazarcik: between Narli and Karabiyikli, 600–700 m., 11 May 1957, *Davis & Hedge* (D.27779).

Habitat: Grassy places in fallow fields, steppes, olive groves, etc., and rocky limestone slopes, at 150–1300 m. Flowering April–June.

Distribution: Istria, Corfu, Greece.

The present author did not find any specimen of *T. dalmaticum* Vis. (in Flora, xii (1), *Erganzbl.* 21:1829) from the Orient. The type of this name was not available for study, but the original description of the species leaves no doubt as to its true identity. A comparison of this description with the specimens cited by Boissier under *T. dalmaticum* (Fl. Or. ii, 131)

from W. & S.W. Turkey shows they were misidentified. These specimens, in fact, belong to *T. compactum* Post.

T. scabrum, *T. compactum* and *T. dalmaticum* are closely related to each other. The main distinguishing features between them are tabulated below:

<i>T. scabrum</i>	<i>T. compactum</i>	<i>T. dalmaticum</i>
1. Capitula $\pm$ ovate, conspicuously cuneate at the base, not or very slightly involucrate.	1. Capitula ovate, broadest at the base, conspicuously involucrate.	1. Capitula mostly oblong, sometimes obovate cuneate, involucrate.
2. Corolla $\pm$ equal to the calyx.	2. Corolla $\pm$ equal to the calyx.	2. Corolla twice as long as the calyx.

In addition, the calyx-teeth in *T. compactum* are broadly lanceolate and densely hirsute. They are usually reflexed when mature, and not as stiff as in *T. scabrum* or as pungent as in *T. dalmaticum*.

T. filicaule Boiss. & Heldr. (Boiss., Diagn. Ser. I (9), 24: 1849) does not occur in the Orient. It is related to *T. dalmaticum* and *T. scabrum*. The original description of the species shows that its corolla is "subduplo longior" than its calyx. It may be that *T. filicaule* represents but a variation of *T. dalmaticum* Vis.

No authentic specimen of *T. scabrum* subsp. *turcicum* was available during the present study. From its description (Velenovsky, Fl. Bulg. Suppl. p. 82) subsp. *turcicum* appears to be the same as *T. compactum*, though the account of the calyx therein ("calyx teeth much narrower and tube more striate than those of *T. scabrum*") leaves some doubt in this respect.

The capitula in Bornmüller 4338, cited above, are more or less globose (cf. *T. scabrum* subsp. *turcicum*, where they are ovate oblong). However, the specimen seems to be but a variant of *T. compactum*.

37. *T. stellatum* L., Sp. Pl. ii, 769 (1753); Boissier, Fl. Or. ii, 121 (1872); Hayek, Prodr. Fl. Balc. i, 865 (1926); Post, Fl. Syr. Pal. Sin. ed. 2, i, 335 (1932).

1a. Peduncle with long spreading hairs:

2a. Corolla $\pm$ equal to the calyx var. *stellatum*

2b. Corolla conspicuously longer than the calyx var. *longiflorum*

1b. Peduncle with adpressed hairs var. *adpressum*

var. *stellatum*. Icon.: Reichenbach, Ic. Fl. Germ. Helv. xxii, t. 92 (1867-86); Vicioso in Anal. Inst. Bot. Cav. XI, ii, 367 (1952).

TURKEY. In agro Byzantio, Wiedmann. Prov. Muğla, dist. Fethiye: Xanthus, 50 m., 29 Mar. 1956, Davis & O. Polunin (D.25466). Prov. Antalya: Alanya promontory, 100 m., 11 Apr. 1956, Davis & O. Polunin (D.25856). Prov. Antalya: Karanlık Sokak, 150 m., 5 Apr. 1936, Tengwall 262. Adalia (Antalya), 17 Apr. 1960, Bourgeau. Prov. Hatay, Antakya, near St. Peter's Church, 300 m., 27 Apr. 1957, Davis & Hedge (D.27228);

ibid., Alexandretta (Iskenderun), Mar. 1931, *Rogers* 5059. Gaziantep, 900 m., 26 Apr. 1935, *Balls* 2180. Prov. Mardin: Savur, 900 m. 24 May 1957, *Davis & Hedge* (D.28560); Mardin—Nusaybin, 12 km. from Mardin, 750 m., 22 May 1957, *Davis & Hedge* (D.28475).

CHIOS. Kampochere, 100 m., 10 Apr. 1939, *Platt* 73.

CYCLADES. Insula Nikouria pr. Amorgos, 11 Apr. 1940, *Davis* 1411.

CYPRUS. Kyrenia, 30 Mar. 1956, *Atherton* 1259. Tehiclos, 300 m., 11 Mar. 1956, *Atherton* 1134. Akrotiri Bay, Mar. 1947, *Mavromoustakis*. Mile 5, Nicosia-Famagusta Rd., 150 m., 30 Mar. 1950, *Chapman* 32. Kokkinatri-mithia-Kafkalla, above sea level, 7 Apr. 1933, *Syngrassides* 333 (6 plants on the sheet: all dwarf, not exceeding 5.6 cm. in height). Yaila (Kyrenia range), Halefka forest station, 750 m., 27 Mar. 1941, *Davis* 2853. Gastria, dist. Famagusta, 27 Feb. 1941, *Davis* 2428.

SYRIA. Aleppo, a. 1841, *Kotschy* 56.

LEBANON. Beirut, 29 Mar. 1933, *Meinertzhagen*; *ibid.*, *Post*; *ibid.*, *Somerville*.

PALESTINE. Magdala, 1863–64, *Lowne*. Jerusalem, Mt. Scopus, 23 Mar. 1931, *Amdursky* 137. Ain Karim, 3 Apr. 1928, *Edwards* 182. Jordan, Ajlun, 2 May 1945, *Davis* 9455; *ibid.*, Jebel Attarus (Moab), 600–690 m., 25 Apr. 1945, *Davis* 8714; *ibid.*, Wadi Sir, 800 m., 28 Apr. 1911, *Meyers & Dinsmore* M.651. Jerash, 500 m., 3 May 1911, *Meyers & Dinsmore*. East of Jordan, a. 1873, *Paine*.

IRAQ. Halabja, 700 m., 18 Apr. 1947, *Rawi* 8877. Qarachitan at feet of Pir Omar Gudrum, 18 Apr. 1947, *Gillett* 7705. Mosul Liwa, 1 May 1951, *Mooney* 4324. Nafal Rash, Acra, 450–900 m., Apr. 1932, *Qaimagam* 3081. Western edge of Bekme gorge, 440 m., 13 Apr. 1955, *Helbaek* 774. IRAN. Kazarum, plain near Bushire, 22 Mar. 1928, *Homer* 191. 1 mile north of Khurramabad, 1500 m., 10 Apr. 1929, *Cowan & Darlington* 1022. Luristan, *Bell*.

Habitat: Mainly rocky limestone slopes, often waste lands, cultivated places, grassy fields and slopes along mountains and hills, up to about 900 m.; sometimes at sea level, along roadsides, on bare ground, etc. Flowering March–May.

Distribution: Canary Islands, Portugal, Spain, Balearic Islands, S. France, Corsica, Italy, Sicily, Istria, Dalmatia, Greece, Aegaeon Islands, Morocco, Algeria, Libya and Tunisia.

var. *adpressum* Turrill in Kew Bull. 1924, 327.

Lectotype—Turkey: Troad, Thymbra, in collibus, 3 May 1883, *Sintenis* 175 (E! K!).

TURKEY. Gallipoli, Suvla, pale pink flowers, 24 Apr. 1924, *Durham* 60 (syntype). Suvla and Anzae, 16 May 1924, *Kent* 116 (syntype).

CYPRUS. Eurychon, in fields on rocky soils, 450 m., 12 Mar. 1935, *Syngrassides* 831. Without locality, pocket on rocky hillsides, 300 m., 27 Mar. 1952, *Probyn* 70.

IRAQ. Palegawra, West of Sagirma Dag, 15 miles S.W. of Pir-i-Mukhrun of the Zagros mountains, 1000 m., 6 Apr. 1955, *Helbaek* 663. Rowanduz gorge, 17 Apr. 1932, *Guest* 2026.

IRAN. Railway gorge near Khorramabad, 1200 m., flowers pink, 19 Apr. 1936, *Trott* 394.

Habitat: (var. *adpressum* Turrill). Mainly on grassy hill slopes, sometimes on rocky soils and calcareous sandstones. Flowering April-May.

Distribution: Sicily, Istria, S. Macedonia, Thasos Island.

var. *longiflorum* Griseb., *Spicil. Fl. Rum. Bith. i*, 19 (1843). *Icon.*: Sibth. & Sm., *Fl. Graec. viii*, t. 750 (1833).

Syntypes—Turkey: "In regione semperviridi Bithyniae et Thraciae alt. 0-1200: Copiose in campis siccis pr. Modania, in pascuis pr. Cartal, in pratis maritimis pr. Hersek; frequens in pratis campisque lapidosis collum pr. Ruskoy et in campo summi m. Tschatal-tepe pr. Enos (substr. vario)!, in declivitate boreali Orbeli pr. Carloba (Friv.); pr. Byzantium sec. Sibth." N.v.

None of the syntypes of the variety exists at Edinburgh, Kew or the British Museum. Sibthorp's figure of which Grisebach wrote: "quae a nostra paulullum recedit floribus ochroleucis tubo roseo et vexillo acuto, calyceque rubente" is otherwise typical. But no specimen to fit the description or the illustration was found from Turkey or elsewhere in the Orient. From Greece, however, there is a specimen at Kew labelled: "*T. xanthinum* Freyn b. *rubicundum* Hal. Beitr. z. Fl. Greich in Verhandl. zool. bot. Ges. (1898) p. 710 forma (nova) corolla purpurascens. Laconia borealis: in districtu Alagonia cum typo, 6 June 1899, *Heldreich* 1527^b." This specimen seems to be the nearest approach to Grisebach's variety and can be distinguished by its corolla being longer than the calyx and purple.

The flower colour in *T. stellatum* usually varies from white through white with a pink tip to purple-pink. This variation is found in all the three varieties mentioned above.

38. *T. formosum* Urv. in *Mém. Soc. Linn. Paris*, i, 350 (1822); Boissier, *Fl. Or. ii*, 124 (1872); Hayek, *Prodr. Fl. Balc. i*, 864 (1926); Post, *Fl. Syr. Pal. Sin. ed. 2*, i, 337 (1932).

Syn.: *T. dasyurum* Presl, *Sym. Bot. i*, 53, t. 33 (1832).

T. velivolum Paine, *Third Statement, Pal. Expl. Soc.* 103 (1875)!

T. formosum Urv. var. *minus* Post, *Fl. Syr. Pal. Sin.* 236 (1896).

Type: "In cultes insulae Meli frequens, aprili floret", 1819-20, *D'Urville* (CN, n.v.).

TURKEY. In gramin. pr. Aintab (Gaziantep), 900 m., 22 Apr. 1865, *Hausknecht*. Prov. Urfa: Sürüç—Urfa, c. 20 km. from the turning to Sürüç, 600 m., 14 May 1957, *Davis & Hedge* (D.27983); *ibid.*, Biredjik (Birecik), Kefr, 28 Apr. 1888, *Sintenis* 494. Prov. Elazığ: Maden, 1300 m., 2 June 1957, *Davis & Hedge* (D.29082). Prov. Mardin: Savur, 900 m., 24 May 1957, *Davis & Hedge* (D.28558); *ibid.*, Mardin—Nusaybin, 5-10 km. from Nusaybin, 600 m., 22 May 1957, *Davis & Hedge* (D.28413).

CYCLADES. Syros, 18 Apr.-10 May 1889, *Heldreich* 1023. Amorgos, at Langadha, 10 Apr. 1940, *Davis* 1495. Syra, a. 1920, *Gandoger*. In insula Cythno (nunc Thermia), 6 Apr. 1900, *Tuntas* 1528. Ins. Idra, in monte, Apr. 1876, *Elias*.

CYPRUS. Ay. Varvara, 240 m., 6 Apr. 1937, *Syngrassides* 1494. Near Ayios Epiktitos (E. of Kyrenia), 60 m., 8 Apr. 1956, *Casey* 1706. Peristerona

(Akaki), 45 m., 30 Mar. 1935, *Syngrassides* 779. Akrotiri, 7.5 m., 1 Apr. 1927, *Huddle* 38. Ayios Demetrianos, Kythrea, 180 m., 3 Apr. 1950, *Chapman* 92. In monte pr. Kythrea, Apr. 1880, *Sintenis & Rigo* 503. Kantara, 1 Mar. 1941, *Davis* 2454. Chalk hills above Lefkara, 660 m., 19 Mar. 1941, *Davis* 2756; *ibid.*, *Davis* 2725; *ibid.*, 600 m., *Davis* 2711. Limasol, Perapedhi, 720 m., 7 May 1938, *Kennedy* 1274. Tehiklos, 300 m., 11 Mar. 1956, *Atherton* 1133. Pergamos 105 m., 4 Mar. 1955, *Merton* 1977. Kyrenia, sea level, 18 Mar. 1956, *Atherton* 1185. In campis prope Larnaka veterem, 4 Mar. 1880, *Sintenis & Rigo* 817. Mile 2, Nicosia—Famagusta Road, 150 m., 13 Apr. 1950, *Chapman* 443.

SYRIA. 65 km. east of Aleppo, 300 m., 15 Apr. 1939, *Dinsmore* 7036. Env. de Hammah, 1500 m., 20 Apr.—4 May 1908, *Haradjian* 1841.

LEBANON. Ex vertice montis Libani, Tom Niha, 13 May 1877, *Ball* 1703.

PALESTINE. Walls of Jerusalem, *Dawson Borrer* (K!), a paratype of *T. velivolum* Paine). East of Jordan, a. 1873, *Paine* (K!), ? isotype of *T. velivolum* Paine). Jerusalem, Mt. Scopus, 16 Mar. 1931, *Amdursky* 138. Tiberias—Magdal, 3 Apr. 1942, *Davis* 4255.

IRAQ. Between Qaranjir & Chemchemal, 800 m., 14 Apr. 1947, *Gillett & Rawi* 7569. Kurdistania, in montis Kuh-Sefin reg. infer. supra pagum Schaklava (dit. Erbil), 1000 m., 7 May 1893, *Bornmüller* 1136. Kani Dolman hills, Kirkak, 390 m., 30 Apr. 1933, *Guest* 4334. Sulaimaniyah, Apr. 1920, *Graham*. Jarmo, camp wadi, 1 Apr. 1955, *Helbaek* 560. Jebel Baradost near Diana Rowandiz, 28–29 June 1934, *Field & Lazar*. In gramin. Dara, Apr. 1867, *Hausknecht*.

IRAN. 16 m. S. Burujird, 1350 m., fl. crimson, 12 Apr. 1929, *Cowan & Darlington* 1073. Tang-i-Dochis, 3 May 1885, *Stapf*. Luristan, *Bell*. In promontorio pr. Dalechi (S. Iran), Mar. 1842, *Kotschy* 195. Prov. Luristan, Canguleh, 2 Apr. 1948, *Behbudi* 80.

Habitat: Grassy places in waste lands, cornfields, along roadsides, hill-slopes, etc., on clayish, calcareous as well as rocky limestone slopes; from sea level to 1000 m. Flowering March–June.

Distribution: S. Greece, Aegean Is.

Specimens of this species from Turkey, Syria, Palestine, Iraq and Iran vary from 8 to 25 cm. in height. While the majority of these are dwarfier than those (20–35 cm.) from the Aegean islands and Cyprus, the variation is not discontinuous, nor is the distribution of the dwarf forms clear cut. Generally, however, the dwarf and depauperate forms occur in the inland district where climatic and edaphic conditions are less favourable. Forms growing in the Mediterranean climate of the islands and of the coastal districts are usually tall and luxuriant.

39. *T. clypeatum* L., Sp. Pl. ii, 769 (1753); Boissier, Fl. Or. ii, 129 (1872); Hayek, Prodr. Fl. Balc. i, 864 (1926); Post, Fl. Syr. Pal. Sin. ed. 2, i, 341 (1932). *Icon.*: Sibth. & Sm., Fl. Graeca, viii, t. 751 (1883); Gardner in Journ. Agri. West. Austral. Ser. III, vi (2), 183, f. 32 (1957).

TURKEY. Smyrna (Izmir), May 1842, *Boissier*; inter arboreta Smyrne, Mar. 1827, *Fleischer*; Smyrne, 21 Apr. 1854, *Balansa* 168. Prov. Hatay: Antakya, near St. Peter's Church, 300 m., 27 Apr. 1957, *Davis & Hedge* (D.27227); *ibid.*, *Davis* 27241.

SAMOS. Cartovasi, 8 May 1940, *Davis* 1708. In olivetis lapidosis inter Vathy and Kap Kotsikas, 30 Mar. 1934, *K. H. & F. Rechinger* 3237. In phrygana, inter Malagari & Kokkari, 8 Apr. 1934, *K. H. & F. Rechinger* 3825.

CHIOS. The Kampos, 50 m., 25 Mar. 1939, *Platt* 10. Prope Crya Vryssi, rare, 14–26 Apr. 1856, *Orphanides* 602.

RHODES. Pélouses près Rhodes, 28 Apr. 1870, *Bourgeau* 43.

CYPRUS. Sub rupibus in mte. Pentedactylos, 2 Apr. 1880, *Sintenis & Rigo* 420. Kyrenia mountains, St. Hilarion, 714 m., 22 July 1938, *Kennedy* 1072. Kyrenia range, Yaila, 750 m., 28 Mar. 1941, *Davis* 2885. Lefka, 4 Apr. 1932, *Syngrassides* 241. Stroumbi près Paphos, à près de 600 m., 25–30 May 1913, *Haradjian* 783. Agios Philon nr. Rizarkarpaso, near sea level, 19 Feb. 1941, *Davis* 2205. Near Nicosia, 2 Apr. 1930, *Rogers* K.50. Fama-gusta moat, 20 m., 21 Feb. 1936, *Syngrassides* 880. Halefka forest station, 450 m., 4 Apr. 1950, *Chapman* 120.

SYRIA. Monts Nusairy, Bahamra, 15 miles à l'Est de Ladikie (Latakia), c. 300 m., Apr. 1909, *Haradjian* 2828.

LEBANON. Garden near Tripoli, 3 May 1865, *Post*. Prope Beirut, *Gaillardot*. Lisière des jardins, à l'est de Saida, 11 Mar. 1853, *Blanche* 12. Ex clivo occidentali Montis Libani prope Gazzin (versus Muktarrah), c. 1000 m., 14 May 1877 *Ball* 1775.

PALESTINE. Magdala, 1863–64, *Lowne*. Tiberias—Migdal, 3 Apr. 1942, *Davis* 4254. Nr. Waldheim (d. Haifa), 28 Mar. 1942, *Davis* 4218. Ain Karim, Mar. 1928, *Edwards* 78 and 170. Jerusalem, 800 m., 31 Mar. 1903, *Meyers* 595; *ibid.*, 700–800 m. alt., *Bornmüller* 433. Near Deir Ballut et Kafr & Kibbiah (35°E. 32°N.), 26 Apr. 1919, *Ogilvie*. In declivitatibus montis Carmel (solo calc.), 100–300 m., 3 May 1897, *Bornmüller* 435. Ruins of Medaba, 770 m., 26 Apr. 1911, *Meyers & Dinsmore* M.1401. Zemarin, 100 m., 27 Mar. 1911, *Dinsmore* 9401.

Habitat: Grassy slopes in the forests, among luxuriant herbage on the hillsides, ruins, rocky limestone slopes, mountain cliffs and declivities, road sides, fallow fields, in the open as well as shady places. Alt. 0–1000 m. Flowering March–April.

Distribution: S. Greece, Aegaeon Is. The area of the species is limited to the islands and coastal districts of the Eastern Mediterranean region.

The stem is usually covered with long reflexed hairs. The calyx-lobes are very unequal, spreading more or less like wings in the fruiting-calyx and many nerved. The calyx-tube is deeply sulcate.

40. *T. scutatum* Boiss., *Diagn. Ser. I* (2), 27 (1843) et *Fl. Or. ii*, 129 (1872); *Post*, *Fl. Syr. Pal. Sin. ed. 2*, i, 340 (1932). *Icon.*: Gib. & Belli in *Mem. Accad. Sc. Torino, Ser. II*, xxxix, 412, t. 2 (1889).

Syn.: *T. plebium* Boiss. *Diagn. Ser. I* (9), 23 (1849)!

Type—"In montosis Smyrnae supra Bournabat, unicum specimen florum fructiferumque Maio 1842", *Boissier* (G!).

TURKEY. Smyrne (Izmir), 8 May 1854, *Balansa* 169; *ibid.*, in collibus prope Kokarialu et Giostepe, 3 May 1906, *Bornmüller* 9337. Prov. Mersin, dist. Anamur: Anamur—Gilindere, 20 m., 14 Apr. 1956, *Davis & O. Polunin* (D.25983); *ibid.*, *Davis* 26006. Prov. Adana, dist. Osmaniye: Toprakkale,

80 m., 20 Apr. 1957, *Davis & Hedge* (D.26906). Prov. Hatay: Yayladağ, 600 m., 28 Apr. 1957, *Davis & Hedge* (D.27187A). Gaziantep to Marash, 1050 m., 28 Apr. 1934, *Balls* 892.

CYPRUS. Pergamos, 105 m., 4 Mar. 1955, *Merton* 1984. Kyrenia, sea level, 15 Jan. 1956, *Atherton* 835; *ibid.*, *Atherton* 1083 and 1298; *Casey* 1686; *Syngrossides* 296 and 178. North of Hilarion, 600 m., 1 Apr. 1951, *Merton* 357. Cape Karnakiti, 6 m., 30 Mar. 1956, *Merton* 2586.

LEBANON. Champs calcaires, près de Dekkan-el-Kacis, entre Beyrouth et Saïda, 7 May 1853, *Blanche* 61.

PALESTINE. Carmel etc., April 1846, *Boissier*. Galilaea, ad pag. Hunin dit. Safed, 700 m., 22 Apr. 1897, *Bornmüller* 422. Kura Hatin, 270 m., 5 Apr. 1911, *Meyers & Dinsmore* 2394.

Habitat: Sandy and rocky places in the uncultivated fields, valleys, along roadsides, hill-slopes, etc. Alt. 0–1000 m. Flowering March–April.

Boissier's T. plebeium seems to be based on depauperate forms of *T. scutatum* growing in the drier inland districts. Such forms consist of plants smaller in all their parts than those growing in the Mediterranean region and have narrower calyx-lobes and adpressed-hirsute calyx-tube (cf. the isotype of *T. plebeium* at Kew and *Bornmüller* 422). The foliar and floral parts of *T. scutatum* are conspicuously smaller than those of *T. clypeatum*.

41. *T. striatum* L., Sp. Pl. ii, 770 (1753); *Boissier*, Fl. Or. ii, 130 (1872); *Hayek*, Prodr. Fl. Penins. Balc. i, 859 (1926). *Icon.*: *Reichenbach*, Ic. Fl. Germ. Helv. xxii, t. 100 (1903); *Hegi*, Ill. Fl. Mittel-Eur. iv (3), t. 163, f. 3 & 1325 f. 1409 (1923); *Javorka & Csapody*, Ic. Fl. Hungar. 279, f. 2023 (1931); *Ross-Craig*, Drawings Brit. Pl. pt. vii, pl. 31 (1954).

Syn.: *T. striatum* L. var *macrodontum* Boiss., Fl. Or. ii, 130 (1872).

TURKEY. Phrygia, Sultandagh, in reg. subalpin. mont. supra Akscheher (Akşehir, Prov. Konya), 1500 m., 21 June 1899, *Bornmüller* 4341; *ibid.*, 1600 m., *Bornmüller* 4342.

CYPRUS. Trypilos, in the Cedar forest, 1140 m., 17 May 1941, *Davis* 3485. Platres, fallow land, 1125 m., 15 May 1938, *Kennedy* 1280. Yaila, 75 m., 10 Apr. 1955, *Merton* 2119. Prodhromos, 1320 m., 29 May 1955, *Merton* 2393.

IRAN. Lahijan, Guilan, May–June 1937, *Lindsay* 822 and 959.

Habitat: Pine and cedar forests, fallow fields, roadsides, dry banks, mountain cliffs, etc.

Distribution: Scandinavian Penins., Denmark, British Is., France, Iberian Penins., Italy, Balkan Penins., Germany, Poland, Hungary, Romania, Crimea, Caucasus.

Although the free vexillum in *T. striatum* is in sharp contrast to that in all other species of the subgenus *Trifolium* (where the claws of all the petals are united with the staminal column into a tube), the habit of the plants, the ebracteate flowers and the stiff, durable calyx with aristate teeth leave no doubt that its true affinity is here.

The species varies considerably in habit and in the relative lengths of the tube and the teeth of its calyx. Usually the teeth (at least the upper ones) are shorter than the tube, but occasionally they are as long or rarely even

slightly longer. The stems are rigid and mostly ascending, but sometimes extremely dwarf and procumbent.

Subgen. 2. *Calycomorphum* (Presl) Hossain, stat. nov.

Basionym: *Calycomorphum* Presl, Symb. Bot. i, 50 (1832).

Syn.: *Trifolium* Sect. *Trichocephalum* Koch, Synops. 171 (1837).

Trifolium Sect. *Calycomorphum* (Presl) Gren. & Godr. Fl. France, i, 413 (1849).

Lectotype: *T. subterraneum* L.

Annuals. Leaflets always $\pm$ obtriangular with rounded or retuse apices. Inflorescence capitate, $\pm$ medusoid after maturation. Flowers sessile, ebracteate, outer ones complete, inner ones consisting only of "Hydra"-like sterile calyces, outer and inner flowers developing simultaneously or successively, all reflexed after maturation. Calyx (except in *T. chlorotrichum*) hairy, tube longitudinally striate with many thin nerves, throat open, lobes $\pm$ filiform. Petals united and tubular at their long claws. Pod $\pm$ rounded or ovoid, usually included within the calyx-tube (except in some strains of *T. subterraneum* in which pods reach beyond the calyx-tube).

Key to the Species

- 1a. Sterile flowers appearing at first only as a central nodule but developing after the maturation of the fertile flowers; mature capitula adpressed to the soil or subterranean:
 - 2a. Corolla whitish; vexillum 8–14 mm. long, usually with purple longitudinal nerves; leaflets obcordate-cuneate: ($2n = 16$)
42. *T. subterraneum*
 - 2b. Corolla red or violet; vexillum 14–18 mm. long; leaflets obovate- or retuse-cuneate: ($2n = 12$)
43. *T. israeliticum*
- 1b. Sterile flowers developing simultaneously with the fertile flowers; mature capitula always aerial:
 - 3a. Stems, leaves & calyx-tubes glabrous; calyx-lobes glabrescent
44. *T. chlorotrichum*
 - 3b. Stems, leaves, calyx-tubes and calyx-lobes densely hairy:
 - 4a. Fertile flowers usually 10–15, biseriate; mature capitula 20–25 mm. in diameter. Stems and peduncles with long spreading hairs; peduncles much longer than the subtending leaf; corolla a little longer than the calyx; lobes of sterile calyx hirsute
45. *T. globosum*
 - 4b. Fertile flowers usually 1–6, uniseriate; mature capitula 8–15 mm. in diam.:
 - 5a. Fertile flowers usually 2, rarely 1; corolla white, $\pm$ equal to the calyx, 6–7 mm. long; mature capitula c. 10 mm. in diameter. Lobes of sterile calyces extremely fine, thread-like and densely plumose
49. *T. pilulare*
 - 5b. Fertile flowers usually 4–6; corolla mostly purple, rarely whitish, longer than the calyx, 10–15 mm. long; mature capitula usually c. 15 mm. in diameter:
 - 6a. Corolla twice as long as the calyx, c. 15 mm. long; stems and peduncles with spreading hairs
48. *T. meduseum*

- 6b. Corolla up to $1\frac{1}{2}$ times as long as the calyx, 10–12 mm. long; stems and peduncles usually with adpressed or subadpressed hairs:
- 7a. Sterile flowers pannose with white cottony hairs; peduncles longer than the subtending leaves . . . 47. *T. eriosphoerum*
- 7b. Sterile flowers densely plumose (never pannose); peduncles $\pm$ equal to the subtending leaves . . . 46. *T. pauciflorum*
42. *T. subterraneum* L., Sp. Pl. ii, 767 (1753); Boissier, Fl. Or. ii, 133 (1872); Hayek, Prodr. Fl. Balc. i, 873 (1926); Post, Fl. Syr. Pal. Sin. ed. 2, i, 341 (1932)—excl. var.
- 1a. Stems lax, flagelliform, usually 15–20 cm. long; peduncles usually 25–35 mm. long, $\pm$ as long as the subtending leaves
var. *subterraneum*
- 1b. Stems dwarf, usually 4–6 cm. long; peduncles usually 10–15 mm. long, shorter than the subtending leaves. Plants appearing like rosettes
var. *brachycladum*
- var. *subterraneum*. *Icon.*: Reichenbach, Ic. Fl. Germ. Helv. xxii, t. 108 (II), (1903); Bobrov in Acta Inst. Bot. Acad. Sc. URSS, Ser. I (b), 326 (1947).
- Syn.: *T. subterraneum* L. var. *longipes* Gay, Bull. Assoc. France Avanc. Sc. 500 (1889).
- TURKEY. In proximitatibus Constantinopolis (Istanbul), June 1850, *Clementi*. Bithynia, Brussa (Bursa), in saxosis inferioris montis Kesis dagh (Uludağ) ad pagum Tschekirge, c. 200 m., 21 May 1899, *Bornmüller* 4345. Prov. Muğla: Marmaris, 5 m., 24 Mar. 1957, *Davis & O. Polunin* (D. 25307).
- IRAN. Lahijan, Guilan, May–June 1937, *Lindsay* 763.
- Habitat: Edge of fields, sandy silt soil, stony places, etc.
- Distribution (var. *subterraneum*): England, Balearic Islands, France, Corsica, Sicily, Italy, Istria, Dalmatia, Serbia, Greece, Romania.
- Var. *subterraneum* varies considerably (especially in Europe) in indumentum, relative lengths of the peduncles and the petioles of the subtending leaves and those of the calyx and the corolla.
- var. *brachycladum* Gib. & Belli in Mem. Accad. Sc. Tor. Ser. II. xliii, 183 (1893). *Icon.*: Sowerby & Sm. Engl. Bot. xv. t. 1048 (1802); Ross-Craig, Drawings Br. Pl. pt. vii, pl. 23 (1954).
- Lectotype: Constantinople, *Aucher* 1223 (FI, K!).
- TURKEY. Prov. Çanakkale: Thymbra (nr. Erenköy), Apr. 1883, *Sintenis* 56. Prov. Istanbul: Burgaz Ada (Antigoni), 5 m., 24 Mar. 1957, *Davis & Hedge* (D.26209); *ibid.*, Mar. 1846, Noë (as *T. suffocatum*). Prov. Izmir: Torbali—Ephesus, 50 m., 22 Mar. 1957, *Davis & O. Polunin* (D.25154). Lycia, Antiphellus, *Forbes* 240. Prov. Adana, dist. Bahçe (N. Amanus): Dumanli Dağ, above Haruniye, 800 m., 19 Apr. 1957, *Davis & Hedge* (D.26874).
- CYPRUS. Kryos Potamos, 945 m., 24 Mar. 1937, *Kennedy* 564. Kyrenia Range, near Kurtella peak above Kurmi village, 810 m., 3 Apr. 1949, *Casey* 357. Komos, 28 Mar. 1954, *Merton* 1863. Komopetra forest, above Kliron, 510 m., 26 Feb. 1956, *Merton* 2492.

Habitat: Mainly rocky and grassy slopes on the hills, in the forests etc., often along pathsides in the plains. Alt. 0–945 m. Flowering February–April.

Distribution (var. *brachycladum*): England, Italy (Naples), Istria (Pola), Serbia, Bulgaria, Thessalia.

One of the three sheets of *Sintenis* 56 at Edinburgh consists of a mixed gathering of var. *subterraneum* and var. *brachycladum*. The latter, easily recognizable by its dwarf rosette-like habit, is nearly as widely distributed as the other. There are few intermediates between the two suggesting that there may be some reproductive barrier prevailing. It is possible that var. *brachycladum* (like *T. israeliticum*, which follows), may have a chromosome number different from that of var. *subterraneum*. In that case, var. *brachycladum* could, *a fortiori*, be considered as a species distinct from *T. subterraneum*. *T. subterraneum* (especially its var. *subterraneum*) is naturalized in Australia where it is extensively grown as a pasture-plant.

43. *T. israeliticum* D. Zoh. & Katzn. in Austral. Journ. Bot. vi (2), 179 (1958).

Syn.: *T. subterraneum* L. var. *tel-avivensis* Eig, Second Contrib. Knowledge Fl. Palest. 25 (1927).

Type: Palestine: Sharon Plain, between Pardes-Hanna and Karkur, c. 100 m., on top of red sandy loam hill with open herbaceous vegetation and few bushes of *Calycotome villosa*, D. Zohary Ts.—701 (HUJ, n.v.).

PALESTINE. Pardes-Hanna, sandy silt soil, 16 Mar. 1951, D. Zohary ("Cotype", K!). Endemic.

T. israeliticum is cognate with *T. subterraneum* and has the same method of flowering and fruiting. In habit it resembles *T. subterraneum* var. *subterraneum* (stems lax flagelliform; peduncles long). The main differences between the two are tabulated below:

<i>T. subterraneum</i> var. <i>subterraneum</i> (2n = 16)	<i>T. israeliticum</i> (2n = 12)
1. Flowers whitish to cream with thin longitudinal violet nerves.	1. Flowers red to violet (fading cream and violet when dry).
2. Mature pods longitudinally netted.	2. Mature pods transversely wrinkled.

Some of the leaflets in the "cotype" at Kew are $\pm$ rounded at the apex, others are distinctly retuse. The "thick basal runners" and "short basal internodes" (two of the distinguishing features mentioned with the original description), are also found in *T. subterraneum* var. *subterraneum* (cf. *Davis* 25307 and the mixed sheet of *Sintenis* 56; see note under *T. subterraneum*).

44. *T. chlorotrichum* Boiss. & Bal. in Boiss. Diagn. Ser. II (6), 48 (1859); Boissier, Fl. Or. ii, 133 (1872); Gibelli & Belli in Mem. Accad. Sc. Tor. Ser. II, xliii, 205, 224, t. 1, (1893).

Holotype—Turkey: Ad Kaiaguel Dere, à 2 lieues au SSO d'Ouchak (Phrygie), 29 Mai 1857, *Balansa* (G!).

T. chlorotrichum differs from all other species of the subgenus by its lack of hairs on the stems, leaves and calyx-tubes of both fertile and sterile

flowers. Usually, however, the calyx-lobes of both outer and inner flowers bear a few fine scattered hairs; but these are very inconspicuous and the whole capitulum looks totally glabrous. The fertile flowers are uniseriate. Their number could not be ascertained, as most of the capitula in the type specimen are mature and the pods are hidden from view by the reflexed sterile flowers. However, in one young capitulum there are 7 fertile flowers. This number is close to the range (8-10) recorded by Boissier in the *Flora Orientalis*. As Gibelli and Belli have already pointed out, the sterile flowers develop before the maturation of the fertile flowers and not after it as in *T. subterraneum*.

45. *T. globosum* L., Sp. Pl. ii, 767 (1753); Boissier, Diagn. Ser. I (2), 28 (1843). *Icon.*: Sibth. & Sm. Fl. Graeca, viii, t. 744 (1833).

Syn.: *T. radiosum* Wahlenb. in Berggren, Resor uti Europa och Oesterlanderne, ii, Bih. (1827) 43; et in Oken, Isis, xxi, 992 (1828).

T. nidificum Griseb., Spicil. Fl. Rum. i, 32 (1843).

T. globosum L. subsp. *radiosum* (Wahlenb.) Gib. & Belli in Mem. Accad. Sc. Tor. Ser. II, xliii, 208, t. 3 (1893).

T. globosum L. var. *radiosum* (Wahlenb.) Bornm. in Mitteil. Thur. Bot. Verein. xxiv, 38 (1909).

TURKEY. Dardanelles, May 1883, *Sintenis* 55. In agro Byzantino, *Noë*. Smyrne (Izmir), sur les collines incultes, 20 Apr. 1854, *Balansa* 160; *ibid.*, in collibus prope "Kokarialu" et Giostepe, 7 May 1906, *Bornmüller* 9342 (as *T. globosum* var. *radiosum*). Adalia (Antalya), in graminosis, 17 Apr. 1860, *Bourgeau* 98. Giaur—Kioi, près de Mersina, région chaude, 17 Apr. 1955, *Balansa* 451.

CYPRUS. Near Drousha (dist. Paphos) on Vouni, 600 m., 1 May 1941, *Davis* 3213.

Habitat: Grassy places on hills and hill-slopes etc. Alt. c. 600 m. Flowering April-May.

Distribution: Greece (Attica, Euboea, Macedonia, Thasos Island and Thrace).

The species is also widely known under one or the other of its synonyms: *T. radiosum* Wahlenb. and *T. nidificum* Griseb.

The lobes of the sterile calyces of *T. globosum* are characteristically thick, wire-like and densely hirsute. These are much thicker than those of *T. pauciflorum*, *T. meduseum*, *T. eriosphoerum* and *T. pilulare*.

46. *T. pauciflorum* Urv. in Mém. Soc. Linn. Par. i, 350 (1822) et Enum. 94 (1822). *Icon.*: Gibelli and Belli in Mem. Accad. Sc. Tor. Ser. II. xliii, 226. t. 2 (1893)—as *T. globosum* L.

Syn.: *T. oliverianum* Ser. in DC. Prodr. ii, 197 (1825).

T. globosum auct. non L.

Type: Constantinople, flowers purple, May 1820, *D'Urville* (holo. CN, n.v.; iso. K!).

TURKEY. In agro Constantinopolis (Istanbul), aestate 1850, *Clementi*; *ibid.*, *Heldreich* 2845. In agro Byzantino, in collibus apricis ad Bujukdere, May 1874, *Pichler* 1 (as *T. hirtum* All.); *ibid.*, in declivibus montium ad Bosphorum prope Boumili Kovak, 3 June 1890, *Degen*; *ibid.*, in "silva belgradensi", 7 May 1899, *Bornmüller* 4346. Prov. Izmir: in umbrosis

montium Lydiae, June 1842, *Boissier*; Smyrne (Izmir), sur les collines incultes, 20 Apr. 1854, *Balansa* 161; *ibid.*, Ilidja, in valle Soghan Dere, 5 May 1906, *Bornmüller* 9346. Prov. Kayseri: Bakir Dağ, near Akoluk Yayla, above Kisge, 2000 m., 30 June 1952, *Davis*, *Dodds* & *Çetik* (D. 19359). Prov. Adana, dist. Feke: Sencan dere nr. Gürümze, 1300 m., 30 June 1952, *Davis*, *Dodds* & *Çetik* (D. 19676); *ibid.*, dist. Osmaniye: Toprakkale, 80 m., 20 Apr. 1957, *Davis* & *Hedge* (D. 26912). Prov. Maraş: 10 km. S. of Maraş, 550 m., 1 May 1957, *Davis* & *Hedge* (D. 27345); *ibid.*, dist. Pazarcik: between Narli & Karabiyikli, 600–700 m., 11 May 1957, *Davis* & *Hedge* (D. 27781). Prov. Gaziantep: Gaziantep—Maras, 1050 m. alt., 28 Apr. 1934, *Balls* 893. Prov. Urfa: 5 km. west of Urfa, 800 m., 17 May 1957, *Davis* & *Hedge* (D. 28182). Prov. Diyarbakir, Karadja dagh, 26 May 1888, *Sintenis* 715.

SYRIA. Monts Nusairy, Ain Halakin, 750–900 m., June 1910, *Haradjian* 3514. Pont de Murad Pascha et verges du lac de Baluk Gol, 45 m., 8–15 May 1911, *Haradjian* 4158.

LEBANON. Above Baynu, 600 m., 25 Apr. 1943, *Davis* 5963; *ibid.*, 750 m., 26 Apr. 1943, *Davis* 5990.

PALESTINE: Gilead & Auranitica, Jokhadar, 700 m., 8 May 1911, *Meyers* & *Dinsmore* G 1772. N. Palestine, near Bano, 26 May 1865, *Post*. Galilaea borealis, dit. Safed ad pag. Hunin, c. 900 m., 22 Apr. 1897, *Bornmüller* 438.

Habitat: In sunny as well as shady places in the fields, on the hills, on mountain slopes, among oak scrubs, on rocky limestone slopes, etc. Alt. 45–2000 m. Flowering April–May.

Distribution: Aegaeon Is., Thrace (Greece).

T. pauciflorum Urv. is widely known as *T. globosum* L. However, it differs from the latter in the following features:

1. Stems and peduncles adpressed or sub-adpressed hirsute,
2. peduncles $\pm$ equal to the subtending leaves,
3. capitula smaller with 4–6 uniseriate fertile flowers,
4. sterile flowers densely plumose, their lobes much thinner.

47. *T. eriosphoerum* Boiss. Diagn. Ser. I (9), 25 (1849); *Boissier*, Fl. Or. ii, 134 (1872); *Post*, Fl. Syr. Pal. Sin. ed. 2, i, 342 (1932).

Syn.: *T. globosum* L. subsp. *eriosphoerum* (Boiss.) Gib. & Belli in Mem. Accad. Sc. Tor. Ser. II. xliii, 208, t. 1 (1893)!

T. globosum L. var. *eriosphoerum* (Boiss.) *Post*, Fl. Syr. Pal. Sin. 239 (1896)!

Type—"In herbis Palaestinae prope Hierosolymam", Apr. 1846, *Boissier* (holo. G! iso. K!).

SYRIA. Jebel Drouze, 28 Apr. 1933, *Meinertzhagen*. Anti-Lebanon, Mes-salome, 1200 m., 3 May 1933, *Meinertzhagen*.

PALESTINE. Mt. Gilboa, above Beit Alfa, 18 Mar. 1942, *Davis* 4146. Mt. Tabor, 610 m., 6 Apr. 1911, *Meyers* & *Dinsmore* 6575. Tiberias, a. 1863–64, *Lowne*. Capernaum, March 1928, *Edwards* 75. Jerusalem, 800 m., 13 Mar. 1909, *Dinsmore* 2575; prope Hierosolymam (Jerusalem), April, *Roth*; *ibid.*, 700–800 m., 3 Apr. 1897, *Bornmüller* 440; Ain Karim, 1928, *Edwards* 74. Nagb Kureitein, Judaeon desert, calcareous, 23 Mar. 1929, *Gabrielith* 47.

Habitat: Fields, hills, etc. Alt. 600–800 m. Flowering March–April.

T. eriosphaerum differs from all other species of the subgenus by the dense cottony (white) hairs on its sterile calyces which become closely interwoven and pannose in the mature capitula. From *T. pauciflorum* it can be distinguished further, by its peduncles being much longer than the subtending leaves and by the calyx-tubes of its fertile flowers being more densely hairy. The flower colour in *T. eriosphaerum* is usually purple but is sometimes whitish.

48. *T. meduseum* Bl. ex Boiss., Fl. Or. ii, 134 (1872).

Syn.: *T. globosum* L. subsp. *meduseum* (Bl. ex Boiss.) Gib. & Belli in Mem. Accad. Sc. Tor. Ser. II. xliii, 210, t. 2 (1893).

T. globosum L. var. *meduseum* (Bl. ex Boiss.) Post, Fl. Syr. Pal. Sin. 239 (1896).

Lectotype—Mt. Leban, Djurd Hadet, 8 Mai 1866, *Blanche* 136 (G!).

LEBANON. Sables ferrugineux, village de Haramoun, *Gaillardot* 2645 (syntype G!). Sables et grès ferrugineux, Ain Hata, Antilibanon, entre Racheya et Hasbeya, *Gaillardot* 1733 (syntype G!); *ibid.*, 9 Apr. 1877, *Post* 297.—Endemic.

T. meduseum is allied to *T. eriosphaerum*. The main differences between the two species are as follows:

<i>T. meduseum</i>	<i>T. eriosphaerum</i>
1. Stems and peduncles with spreading hairs.	1. Stems and peduncles with adpressed, rarely subadpressed hairs.
2. Stipules comparatively thick and (except at the base) green.	2. Stipules membranaceous, whitish, often with greenish longitudinal nerves.
3. Corolla twice as long as calyx.	3. Corolla up to $1\frac{1}{2}$ times as long as the calyx.
4. Sterile flowers densely villose.	4. Sterile flowers cottony.

The species is also close to *T. pauciflorum* from which it differs by (1) the spreading hairs of the stems and peduncles, (2) the peduncles being longer than the subtending leaves, (3) the corolla being twice as long as the calyx.

49. *T. pilulare* Boiss. Diagn. Ser. I (2), 29 (1843); Boissier, Fl. Or. ii, 135 (1872); Post, Fl. Syr. Pal. Sin. ed. 2, i, 342 (1932).

Syn.: *T. globosum* L. subsp. *pilulare* (Boiss.) Gib. & Belli in Mem. Accad. Sc. Tor. Ser. II. xliii, 211, t. 2 (1893)!

Lectotype—Turkey: in umbrosis montium Lydiae, Mai 1842, *Boissier* (G, K!).

TURKEY. Thymbra (Prov. Çanakkale: nr. Erenköy), 4 May 1883, *Sintenis* 54. Prov. Izmir: coteaux pierreux bordant la partie nord du golfe de Smyrne, 22 Apr. 1954, *Balansa* 162; *ibid.*, prope pagum Thomaso, 1 May 1906, *Bornmüller* 9333. Prov. Gaziantep, dist. Pazarcik: between Narli

& Karabiyikli, 600–700 m., 11 May 1957, *Davis & Hedge* (D.27780); *ibid.*, Gaziantep to Maraş, 1200 m., 28 Apr. 1934, *Balls* 884; *ibid.*, Kara Tash, 990 m., 3 May 1935, *Balls* 2227. Prov. Diyarbakir: Diyarbakir—Çinar, 8 km. from Diyarbakir, 650 m., 31 May 1957, *Davis & Hedge* (D.28776). Prov. Mardin: 12 km. from Mardin towards Nusaybin, 750 m., 22 May 1957, *Davis & Hedge* (D.28474).

IKARIA. In ditone pagi Hagios Kirkykos, in lapidosis versus pagum Hag. Nikolas, 18–24 Apr. 1934, *K. H. & F. Rechinger* 4754.

RHODES. In collibus prope Speluscom Draionis, 4 Apr. 1889, *Pichler*.

CYPRUS. Kyros Potamos, 945 m., 21 Apr. 1937, *Kennedy* 563. Agios Theodorus (dist. Limasol), 1050–1200 m., 10 Apr. 1941, *Davis* 3071. Kornos (Kyrenia range), above Larnaca-tis-Lapithou, 450 m., 4 Apr. 1941, *Davis* 3040. Mt. Troodos, Platania forest station, 1050–1200 m., 4 May 1947, *Mavromoustakis*. Kalokhorio, Macherax, 600 m., 10 Apr. 1950, *Chapman* 318. Yiala (above Kythraea), 150 m., 10 Apr. 1955, *Merton* 2161.

SYRIA. Near Aleppo, 390 m., 25 Mar. 1865, *Haussknecht*. Syria/Lebanon: Ex vertice meridionali Mt. Libani Tom Niha dicto, 1500–1850 m., 13 May 1877, *Ball* 1706 (as *T. meduseum* Bl.).

LEBANON. Beyrut, *Somerville*.

PALESTINE. Nazareth—El Reina, 27 Mar. 1942, *Davis* 4273. Near Waldheim (dist. Haifa), 28 Mar. 1942, *Davis* 4215B. Mt. Tabor, 610 m., 5 Apr. 1911, *Meyers & Dinsmore* 2614. Galilaea, in saxosis ad Safed, c. 900 m., 17 Apr. 1897, *Bornmüller* 441. Magdala, a. 1863–64, *Lowne*. Jerusalem, 800 m., 6 Apr. 1903, *Meyers* 614; *ibid.*, a. 1846, *Boissier*. Ain Hesban—Amman, 29 Apr. 1886, *Herb. Post.* Between Ajlun and Mar Elias, 2 May 1945, *Davis* 9447.

IRAQ. In montis Kuh-Sefin (ditionis Erbil) reg. super., 1200 m., 19 May 1893, *Bornmüller* 1141. Mosul liwa, Bekhair, 1000 m., 7 May 1947, *Rawi* 8455. Suleimaniya, Khormal, 800 m., 21 Apr. 1947, *Rawi* 8966. Jebel Khatchra, near Balad Sinjar, 5 June 1934, *Field & Lazar* 650.

Habitat: Dry, grassy as well as rocky (lime-stone, basalt) places in fields, garigue and forests, along roadsides, hill-slopes, mountain-sides, etc., in the open as well as shady places. Alt. 150–1200 m. Flowering March-May.

var. *mirennae* Mattei in *Malpighia*, xxiv (3), 256–257 (1911).

Type—Cyclades: Tenos island, Nov. 1910, *Mirena*.

No specimen of this variety was available for study. From its original description, var. *mirennae* seems to differ from the “type” variety (var. *pilulare*) only by its caespitose habit and “caulibus patenter (nec adpressiuscule) hirtellis”. The word “Serotinus (?)” in the diagnosis suggests that the variety may have been based on a late-growing (November) and slightly unusual form of the species.

Subgen. 3. *Paramesus* (Presl) Hossain, stat. nov.

Basionym: *Paramesus* Presl, *Symb. Bot.* i, 45 (1832).

Syn.: *Trifolium* L. Sect. *Melilotea* Bertol., *Fl. Ital.* viii, 99 (1850).

Trifolium L. Sect. *Paramesus* (Presl) Gren. & Godr., *Fl. France*, i, 416 (1849).

Lectotype: *T. strictum* L.

Annuals; stipules always denticulate. Inflorescence capitate, with a minute involucre of bracts. Flowers sessile, minutely bracteate; calyx glabrous, tube 10-nerved, campanulate, throat open, teeth lanceolate, lowermost slightly longer. Petals united and tubular at their long claws. Ovary usually 2-ovuled. Pod slightly exceeding the calyx-tube, 1-seeded.

Key to the Oriental Species

1a. Stipules, leaflets and calyx-teeth with short stipitate glands at the margins 50. *T. glanduliferum*

1b. Stipules, leaflets and calyx-teeth without any glands

51. *T. nervulosum*

50. *T. glanduliferum* Boiss., Diagn. Ser. I (2), 30 (1843) et Fl. Or. ii, 141 (1872); Post, Fl. Syr. Pal. Sin. ed. 2, i, 347 (1932).

1a. Corolla about thrice as long as the calyx; stems usually 8–15 cm. long; leaflets (except those of basal leaves) usually oblong-obovate

var. *glanduliferum*

1b. Corolla up to twice as long as the calyx; stems c. 30 cm. long; leaflets (except those of basal leaves) usually narrowly lanceolate

var. *tmoleum*

var. *glanduliferum*. Icon.: Gibelli & Belli in Mem. Accad. Sc. Tor. Ser. II, xli, 220, t. 2 (1891); Meikle, Kew Bull. (1954) 119, f. 5.

Syn.: *T. glanduliferum* Boiss. var. *albiflorum* Feinbr. in Pal. Journ. Bot. iv (4), 237 (1949).

Lectotype—Turkey: “Pineta montium Lydiae et Cariae”, June 1842, Boissier (G, K! E!).

TURKEY. Prov. Izmir: Sinus Smyrnaeus, in reg. pinetorum mont. Yamanlar dagh, 900 m., 13 May 1906, Bornmüller 9352. Prov. Kutahya: vallée d’Yachmichlar Keui, au nord d’Ouchak (Uşak), 3 June 1857, Balansa 1194. Caria, a. 1843, Pinard.

PALESTINE. Jerusalem, 800 m., 17 Apr. 1903, Meyers 698.

Habitat: Pinewoods on the mountains. Alt. 800–900 m. Flowering April–June.

var. *tmoleum* Boiss., Fl. Or. ii, 141 (1872).

Lectotype—Turkey: Yaila de Bozdagh (Tmolus occidentalis), dans les prairies, 21 July 1854, Balansa 175 (as *T. tmoleum* Boiss., E!).

Through a misprint, the above specimen appears in the citation under the variety in Flora Orientalis as Balansa 179, which is *Trigonella gladiata* Stev. (E!), cited by Boissier.

Habitat: mountain meadows. Flowering July.

Distribution (var. *tmoleum*): W. Turkey, Palestine.

51. *T. nervulosum* Boiss. & Heldr. in Boiss. Diagn. Ser. I (9), 25 (1849); Boissier, Fl. Or. ii, 141 (1872); Hayek, Prodr. Fl. Balc. i, 855 (1926); Post, Fl. Syr. Pal. Sin. ed. 2, i, 347, f. 235 (1932). Icon. Gibelli & Belli in Mem. Accad. Sc. Tor. Ser. II, xli, 220, t. 2 (1891).

Syn.: *T. galilaeum* Boiss., Diagn. Ser. I (9), 26 (1849)!

T. nervulosum Boiss. & Heldr. var. *galilaeum* (Boiss. & Heldr.)

Boiss. Fl. Or. ii, 142 (1872)!

Lectotype—Turkey: "In herbis siccis collium ad Alaya Pamphyliæ, 1845, *Heldreich*" (G, K! E!)

TURKEY. Prov. Çanakkale: (? nr. Erenköy), in monte Ulu Dag, 24 April 1883, *Sintenis* 366. Prov. Antalya: Kumköy, between Antalya and Serik, 20 m., 6 Apr. 1956, *Davis & O. Polunin* (D.25725); Manavgat—Kara Point, 3 m., 10 Apr. 1956, *Davis & O. Polunin* (D.25837); Alanya bay, 2 m., 12 Apr. 1956, *Davis & O. Polunin* (D.25916).

SYRIA. Jebel Druze, 27 Apr. 1933, *Meinertzhagen*. Galilaea, pr. Banias, May 1846, *Boissier* (type of *T. galilaeum* Boiss.).

LEBANON. In reg. subalp. jugi Sanin, 1600 m., 15 June 1897, *Bornmüller* 455. Ex clivo montis Libani juxta Ain Zahalta, 11–1300 m., 26 May 1877, *Ball* 2199.

PALESTINE. East of Jordan river, 1873, *Paine*. Savada, 3 Apr. 1877, *Post* 301 & 303. Huleh, 4 Apr. 1877, *Post* 302. Jebel-es-Soki, Apr. 1877, *Post* 306. E. of Es-Salt, 830 m., 29 Apr. 1911, *Meyers & Dinsmore* M.1565. S. of Ramleh, 50 m., 5 Apr. 1911, *Dinsmore* 4698. Even Yehuda, 13 Mar. 1942, *Davis* 4088. Ramath-Gan nr. Tel-Aviv, 19 Mar. 1928, *Feinbrun & Soltchansky* 68. Jaffa, 7 Apr. 1987, *Bornmüller* 454.

Habitat: Sandy places along the coasts (fixed dunes, maquis, fallow fields, roadsides, etc.) and heavy clay soil on inland hills. Alt. 0–1600 m. Flowering March–May.

Distribution: Thrace, Albania.

In Turkey, *T. nervulosum* occurs in the districts bordering the North-West and South coasts where *T. glanduliferum* is absent. But it is absent in Western Turkey (Prov. Izmir and neighbourhood) where *T. glanduliferum* is rather common. *Feinbrun* (Pal. Journ. Bot. iv (4), 237; 1949) noted a similar condition in Palestine; "*T. glanduliferum* grows in the Batha on terra-rossa soil in the Judæan mountains, in Moab and Gilead, whereas *T. nervulosum* is confined to sandy habitats of the coastal Plain of the country—(Negeb, Shefela, Sharon, Acre Plain, Upper-Galilee)". Even if *T. nervulosum* is not always limited to the coastal Plains (cf. *Meyers & Dinsmore* M. 1565 and *Paine* from east of Jordan River), there is little doubt that it has a different ecological preference.

Subgen. 5. *Galearia* (Presl) Hossain, stat. nov.

Basionym: *Galearia* Presl, Symb. Bot. i, 49 (1832).

Syn.: *Trifolium* L. Sect. *Fragifera* Koch, Synops. 171 (1837).

Trifolium L. Sect. *Galearia* (Presl) Gren. & Godr., Fl. France, i, 413 (1849).

Lectotype: *T. fragiferum* L.

Annuals or perennials. Inflorescence capitate. Flowers sessile, minutely bracteate (except in *T. fragiferum* with rather prominent bracts), reflexed after maturation. Calyx bilabiate, upper 2 teeth narrow and often antenna-like, lower 3 dentoid, upper part of the tube usually rather densely hairy, much inflated (gibbous), scarious and reticulate after maturation, lower part glabrous or glabrescent, unchanged even when mature, throat

unthickened. Petals (except in *T. physodes* & *T. tumens*) united and tubular at the long claws, often resupinate. Pod $\pm$ ovoid, always included within the gibbous calyx, 1-2 seeded.

Key to the Species

- 1a. Perennial (usually with a thick root-stock):
 - 2a. Capitula distinctly involucrate; stems creeping or $\pm$ caespitose. Petals connate and tubular at the claws 52. *T. fragiferum*
 - 2b. Capitula without any conspicuous involucre; stems decumbent or caespitose:
 - 3a. Petals connate and tubular at the claws; plants caespitose 53. *T. modestum*
 - 3b. Vexillum free from the other petals or slightly united at the base; stems decumbent:
 - 4a. Vexillum free; ovary glabrous. Flowers 10-13 mm. long; lower lobes of the calyx subulate, 2-3 mm. long; capitula dense 54. *T. physodes*
 - 4b. Vexillum slightly united at the base with the other petals; ovary hairy above (especially at the ventral suture). Flowers 6-8 mm. long; lower lobes of the calyx dentate, c. 1 mm. long; capitula loose 55. *T. tumens*
- 1b. Annuals. Corolla resupinate:
 - 5a. Mature capitula star-shaped; inflated part of the calyx pyriform, the two "antennae" of the upper lip (c. 2 mm. long) distinctly exerted and divergent; young calyx adpressed villose at the back; peduncles much longer than the subtending leaf 56. *T. resupinatum*
 - 5b. Mature capitula globose; inflated part of the calyx globose, the two "antennae" of the upper lip (1-1.5 mm. long) bent inwards or slightly exerted and recurved; young calyx woolly at the back; peduncles usually shorter than the subtending leaf, rarely longer 57. *T. tomentosum*

52. *T. fragiferum* L., Sp. Pl. ii, 772 (1753); Boissier, Fl. Or. ii, 135 (1872); Hayek, Prodr. Fl. Balc. i, 858 (1926); Post, Fl. Syr. Pal. Sin. ed. 2, i, 343 (1932).

- 1a. Plants caespitose, with a thick vertical or rhizomatous rootstock; leaflets usually $5-8 \times 4-5$ mm., petioles usually 10-20 mm. and peduncles 20-40 mm. long var. *pulchellum*
- 1b. Plants with relatively narrow, long, creeping stems; leaflets usually c. 15×10 mm., petioles usually 50-80 mm. and peduncles 90-130 mm. long var. *fragiferum*

var. *fragiferum*. *Icon.*: Reichenbach, Ic. Fl. Germ. Helv. xxi, t. 106 (1903).

LEBANON. Beirut, May 1871, *Herb. Post.*

PALESTINE. Nablus, 600 m., 11 Aug. 1912, *Meyers & Dinsmore* 4147b.s. Jerusalem, 800 m., 12 Sept. 1913, *Meyers & Dinsmore* 6147b.s. Judean Mountains, Acua Bella, west of Jerusalem, 5 Aug. 1954, *A. Grizi*. Kulonieh, 200-800 m., 8 July 1902, *Meyers* 147.

IRAQ. c. 40 m. N. of Bagdad, May-June 1956, *Robertson* 7. Amara: margin of the Masharrah canal, 3 May 1918, *Evans* M/259.

Habitat: Damp or marshy places along roadsides, irrigation canals, river-margins, hill-slopes, mountain valleys, etc. Alt. 0-800 m. Flowering May-August.

Distribution (var. *fragiferum*): the whole of Europe, N. Africa, Egypt, Caucasus, Afghanistan, W. Pakistan, S. Arabia, N. Abyssinia.

var. *pulchellum* Lange, Meddel. Nat. Forenzig. 2, vii, 169 (1865).

Type—? *J. Lange* (C, n.v.).

TURKEY. Troad (Prov. Çanakkale): Seisinly, ad rivulos, 25 June 1883, *Sintenis* 724. Prov. Niğde: Aksaray—Sultanhanı, c. 10 km. E. of Sultanhanı—Tuz Gölü, N.W. of Ulukışla, 900-950 m., 1 Sept. 1957, *Davis & Hedge* (D.32820). Prov. Seyhan: Gaziantep—Adana, W. side of summit of Amanus, 1150 m., 13 Sept. 1956, *McNeill* 162. Prov. Van: Artos Dağ above Gevaş, 1950 m., 14 July 1954, *Davis & O. Polunin* (D.22694). Armenia, c. 1867, *Calvert & Zohrab*.

LEBANON. River Leontes, ? *Maclyon*.

PALESTINE. Jaffa, 1-20 m., 15 July 1910, *Meyers & Dinsmore* 8147.

IRAQ. Amara, dry banks of the Chahalal canal, 26 Oct. 1917, *Evans*.

Habitat: Dampish trodden ground, river-margins, canal-sides, salt-steppes, mountain-slopes, etc. Alt. 0-1950 m. Flowering June-September.

Distribution (var. *pulchellum*): the variety occurs scattered almost all over the range of the "type" variety.

The position of var. *pulchellum* is not clear. Although the extreme forms of the two varieties are quite distinct, intermediates between them are not uncommon. From its distribution and from collectors' notes on the specimens it seems possible that var. *pulchellum* represents but depauperate habitat forms growing in much-trodden or over-grazed areas.

One of the most important characteristics of the species is the presence of involucre bracts on its capitula. These are green and indented at the tips, and can be seen only when the capitula are young. In mature capitula they are obscured by the swollen calyces of the reflexed flowers.

In all the specimens seen from the Orient, the persistent corolla protrudes beyond the inflated calyx. In some continental specimens, however, the inflated calyx is comparatively large and completely engulfs the persistent corolla.

53. *T. modestum* Boiss., Diagn. Ser. I (9), 27 (1849) et Fl. Or. ii, 137 (1872); Post, Fl. Syr. Pal. Sin. ed. 2, i, 344 (1932).

Syn.: *T. fragiferum* L. var. *modestum* (Boiss.) Gib. & Belli in Mem. Accad. Sc. Tor. Ser. II, xli, 168 (1891).

Type—"In declivibus Libani supra cedros", July 1846, *Boissier* (G).

LEBANON. In Libano ad Bscherre et circa Cedretum, in jugo montis Makmel, 2400 m., 23 July 1855, *Kotschy* 296.—Endemic.

Kotschy 296 consists of a perennial caespitose plant with thick rhizomatous rootstocks and tufted leaves. The stipules are membranaceous and scarious, the leaflets obconical, retuse, c. 5 mm. × c. 4 mm., prominently veined and rather thick. (There is a single rudimentary capitulum

which, however, was not suitable for detailed study.) The species is allied to *T. fragiferum* but differs from it by its fewer-flowered and non-involucrate capitula and shorter peduncles.

54. *T. physodes* Stev. ex M.Bieb Fl. Taur. Cauc. ii, 217 (1808); Boissier, Fl. Or. ii, 136 (1872); Hayek, Prodr. Fl. Balc. i, 857 (1926); Post, Fl. Syr. Pal. Sin. ed. 2, i, 343 (1932).

- 1a. Gibbous part of the calyx-tube densely hairy var *physodes*
 1b. Gibbous part of the calyx-tube glabrous or rarely with a few scattered hairs var. *psilocalyx*

var. *physodes*. *Icon.*: Gibelli & Belli in Mem. Accad. Sc. Tor. Ser. II. xli, 218 (1891); Fiori & Paol., Ic. Fl. Ital. 237 (1899).

Syn.: *T. alatum* Biv., Stirp. Rar. iv, 14 (1816).

T. cupani Tineo, Pl. Rar. Sicil. Pugill. i, 16 (1817).

T. ovatifolium Bory & Chaub., Nouv. Fl. Pelop. 51, t. xxviii, f. 1. (1838)!

? *T. fragiferum* L. var. *sericocalyx* Gib. & Belli in Mem. Accad. Sc. Tor. xli, 177 (1891)

Type—Iberia, Steven (Helsinki; "cotype" LE, n.v.)

TURKEY. Ponti in maritimis pr. Samsun, 2 June 1889, *Bornmüller* 220. Armenia Turcica: Kharput, Susnas, 8 May 1889, *Sintenis* 576. Anatolia, *Wiedemann*. Smyrna (Izmir), *Whittall*. Prov. Antalya: Kumköy, between Antalya and Serik, 20 m., 6 Apr. 1956, *Davis & O. Polunin* (D.25728); *ibid.*, ad marginem saltuum montis Scharyklar, 20 April 1860, *Bourgeau*. Prov. Adana: Misis, 30 m., 11 Apr. 1934, *Balls & Gourlay* B.724; *ibid.*, dist. Feke, Bakir Dağ, in Sencan dere between Gürümze and Süphandere, 1000–1200 m., 1 July 1952, *Davis, Dodds & Çetik* (D.19434). Prov. Kayseri: Bakir Dağ, between Kısge and Bakir Oluk Y., 1700 m., 28 June 1952, *Davis, Dodds & Çetik*, (D.19491); *ibid.*, above Kısge, 1400–1700 m., 28th June 1952, *Davis, Dodds & Çetik* (D.19312). Prov. Elazığ: Maden, 1300 m., 2 June 1957, *Davis & Hedge* (D.29080).

CYPRUS. Papusta (Agiros), 1050 m., dry igneous slopes above Palaichori, 9 Apr. 1941, *Davis* 3107. Platres, 1200 m., 10 Apr. 1941, *Davis* 3153; *ibid.*, 10 Apr. 1941, *Davis* 3177; *ibid.*, 1080 m., 30 May 1937, *Kennedy* 559. Circa Prodomo in Mte. Troodos, 20 June 1880, *Sintenis & Rigo* 819.

LEBANON. Ex clivo Montis Libani juxta Ain Zahalta, 1100–1300 m., 26 May 1877, *Ball* 2200; *ibid.*, reg. alp. in decliv. occident. in Cedreto supra Ain Zahalta, 1700–1800 m., 13 and 19 June 1910, *J. & F. Bornmüller* 11654; *ibid.*, 1050–1100 m., in rupestribus Wadi Hammana, 6 June 1910, *J. & F. Bornmüller* 11655.

PALESTINE. Jordan, between Suf & Ain Jenneh, 800 m., damp places, 4 May 1911, *Meyers & Dinsmore* G.1742.

Habitat (var. *physodes*). Sandy soil along sea coasts; among maquis on waste ground; roadsides; forests margins; garigues; dry igneous slopes along hillsides, mountain declivities, etc. Alt. 0–1800 m. Flowering April–June.

Distribution (var. *physodes*): Portugal, Sicily, Italy (Calabria), Dalmatia, Corfu, Albania, Greece, Crete.

Var. *physodes* shows considerable variability. The stems are usually glabrous or glabrescent, but in many specimens from Cyprus they are sparingly pilose. The size of the leaflets varies from as small as 8×6 mm. to as large as 20×12 mm. The hairs on the "hump" of the calyx are usually relatively thin in the specimens from S.E. Turkey, Lebanon and Palestine. These latter specimens, along with those still more thinly hairy specimens of var. *psilocalyx* (which follows) from the same area, constitute intermediates between var. *physodes* and var. *psilocalyx*.

var. *psilocalyx* Boiss., Fl. Or. ii, 136 (1872).

Syn.: *T. sclerorrhizum* Boiss., Diagn. Ser. I. (9), 28 (1849).

T. germanicae Post, Fl. Syr. Pal. Sin. 344 (1896).

T. fragiferum L. var. *balansae* Gib. & Belli in Mem. Accad. Sc. Tor. Ser. II. xli, 176 (1891)!

T. physodes Stev. ex M.B. var. *sclerorrhizum* (Boiss.) Dinsm. in Post, Fl. Syr. Pal. Sin. ed. 2, i, 344 (1932).

Type—Antilebanon prope Rascheya, June 1846, Boissier (holo. G, iso. K!).

TURKEY. Village de Sedichig, à 2 lieues au NO. de Mersina (Mersin), 24 Apr. 1955, *Balansa* (as *T. ovatifolium* Bory & Chaub.; iso. var. *balansae*). Prov. Adana, dist. Bahçe (N. Amanus): Haruniye—Fevzipaşa, 700 m., 18 Apr. 1957, *Davis & Hedge* (D.26811); *ibid.*, Dumanlı dağ above Haruniye, 800 m., 19 Apr. 1957, *Davis & Hedge* (D.26850); *ibid.*, région de Düdül, 1500–2100 m., July 1908, *Haradjian* 2386. Prov. Hatay, dist. Belen: Karlıç tepe above Soğuk Oluk, 900 m., 24 Apr. 1957, *Davis & Hedge* (D.27067). Prov. Gaziantep: Dülük Baba, c. 7 km. N of Gaziantep, 1100 m., 13 May 1957, *Davis & Hedge* (D.28060). Prov. Mardin: 12 km. from Mardin towards Diyarbakir, 1000 m., 27 May 1957, *Davis & Hedge* (D.28721).

SYRIA. Montagnes du Kurd dağ, 1200–1500 m., May 1907, *Haradjian* 1128.

LEBANON. Khan Medeiridj, 4 June 1877, *Gaillardot* 1740. Ex vertice meridionalis Montis Libani Tom Niha dicto, 1500–1800 m., 13 May 1877, *Ball* 1704.

PALESTINE. J. Jermak, 900 m., 9 May 1942, *Davis* 4695. Magdala, a. 1863–64, *Lowne*. Gilead, *Post*. Galilaea borealis, dit. Safed ad pag. Hunin, c. 900 m., 22 Apr. 1897, *Bornmüller* 444.

IRAQ. Near Amadia, fodder plant, 1932, *Majid Mustafa* 3599.

Habitat: *Quercus* maquis, shrubby banks, pastures, disturbed calcareous steppes, shady hillsides, etc. Alt. 0–2100 m. Flowering April–June.

In all the Turkish and Palestinian specimens of this variety the "hump" of the calyx is totally glabrous. In some Lebanese specimens, however, it bears a few scattered hairs.

55. *T. tumens* Stev. ex M.Bieb., Fl. Taur.—Cauc. ii, 217 (1808); Ledebour, Fl. Ross. i, 550 (1843); Boissier, Fl. Or. ii, 136 (1872). *Icon.*: Gibelli & Belli in Mem. Accad. Sc. Tor. Ser. II xli, 220 (1891).

Syn.: *T. tumens* M.Bieb. var. *majus* Boiss., Fl. Or. ii, 137 (1872).

Type—"In Iberia ad fluvios Iberum et Alazonium", *Steven* (H, n.v.).

IRAN. Ditionis Resht prope Pirebozar, 26 Apr. 1902, *Bornmüller* 6597; *ibid.*, Lihijan, Guilan, April-May 1937, *Lindsay* 815A & B; *ibid.*, inter Pehlevi & Resht, 13-14 May 1937, *Rechinger* 7. In valle Sheheristanek montium Elburz, c. 2200 m., 6 June 1902, *Bornmüller* 6599. Astara Pass, 1350 m., 15 June 1929, *Cowan & Darlington* 1703. Prov. Mazanderan, in valle fluvii Calus, c. 2400 m., 19 June 1937, *Rechinger* 1925. C. Iran: Elika, 2600 m., 3 July 1941, *Parsa* 360.

Habitat: River valleys, open grassy places in the woods, etc. Alt. 0-2200 m. Flowering April-June.

Distribution: Transcaucasia (Georgia, Talysh).

T. tumens is allied to *T. physodes*. The main distinguishing features between the two are tabulated below:

<i>T. tumens</i>	<i>T. physodes</i>
1. Capitulum few-flowered, loose, 10-15 mm. in diam.	1. Capitulum many-flowered, dense, 15-20 mm. in diam.
2. Flowers 6-8 mm. long.	2. Flowers 10-12 mm. long.
3. Lower lobes of the calyx dentate.	3. Lower lobes of the calyx narrowly subulate.
4. Vexillum slightly united at the base with other petals and the staminal column.	4. Vexillum free.
5. Alae slightly longer than the carina.	5. Alae much longer than the carina.
6. Ovary hairy towards the top, especially on the ventral suture.	6. Ovary glabrous.

56. ***T. resupinatum*** L., Sp. Pl. ii, 771 (1753); Boissier, Fl. Or. ii, 137 (1872); Hayek, Prodr. Fl. Balc. i, 858 (1926); Post, Fl. Syr. Pal. Sin. ed. 2, i, 344 (1932).

1a. Stems several, 10-15 (-17) cm. high, 1.5-2 mm. thick, slender

var. *minus*

1b. Stems usually few, (20-) 30-55 cm. high, 1.5-5 mm. thick:

2a. Stems 1.5-2 mm. thick, (20-) 30-40 cm. high, slender, procumbent or ascending

var. *resupinatum*

2b. Stems 3-5 mm. broad (distinctly fistulose), 25-55 cm. high, relatively strong and ascending

var. *majus*

var. ***resupinatum***. *Icon.*: Sturm, Deutsch. Fl. IV. xvi, t. 249 (1804).

TURKEY. Prov. Izmit (Kocaeli): Uskudar-Izmit, 100 m., 20 July 1956, *McNeill* 198. In umbrosis humidis Smyrnae, Apr. 1827, *Fleischer*. Prov. Adana, dist. Feke: Sencan dere, between Gürümze and Süphandere, 1000 m., 1 July 1952, *Davis, Dodds & Çetik* (D.19620); *ibid.*, 1200-1000 m., (D.19598). Prov. Hatay, dist. Iskenderun: 1-2 miles N. of Iskenderun, near sea level, 21 Apr. 1957, *Davis & Hedge* (D.26953).

LEBANON. Without locality, *Keddie*.

PALESTINE. Jordan: Huleh, 2 m., 12 May 1911, *Meyers & Dinsmore*

B.2147. Jaffa, 1–20 m., 26 Apr. 1912, *Meyers & Dinsmore* 2650^b. Jerusalem, 800 m., 6 Apr. 1903, *Meyers* 650.

Habitat: Damp and wet places, edges of marsh, etc. Alt. 0–1200 m. Flowering April–July.

var. *minus* Boiss., Fl. Or. ii, 137 (1872). *Icon.*: Reichenbach, Ic. Fl. Germ. Helv. xxii, t. 107 (1903).

Syn.: *T. clusii* Gren. & Godr., Fl. France, i, 414 (1849)

T. resupinatum L. var. *clusii* (Gren. & Godr.) Dinsmore in Post, Fl. Syr. Pal. ed. 2, i, 345 (1932).

Type: Herb. Boiss. (G!).

TURKEY. Troad (Prov. Çanakkale): Renkoei, 3 May 1883, *Sintenis* 173. Prov. Adana, dist. Osmaniye: Toprakkale, 80 m., 20 Apr. 1957, *Davis & Hedge* (D.26915).

CYPRUS. Between Drousha & Terra, 2 May 1941, *Davis* 3270. Platres, 1200 m., 10 Apr. 1941, *Davis* 3175.

LEBANON. Beirut, *Somerville*.

PALESTINE. Jaffa, 1–20 m., 11 March 1911, *Meyers & Dinsmore* 2650. Wadi-el-Kafrein, 200 m., 21 Apr. 1911, *Meyers & Dinsmore* B 4650; *ibid.*, *Meyers & Dinsmore* 7496.

Habitat: Damp or wet places along roadsides, banks, etc. Alt. up to 1200 m. Flowering March–May.

var. *majus* Boiss., Fl. Or. ii, 137 (1872).

Syn.: *T. suaveolens* Willd., Hort. Berol. i, 108 (1816).

T. resupinatum L. var. *suaveolens* (Willd.) Dinsmore in Post, Fl. Syr. Pal. ed. 2, i, 345 (1932).

TURKEY. Prov. Ankara: Ravli—Kalecik, 1000 m., 4 June 1954, *Davis* 21415. Prov. Adana: Ceyhan—Osmaniye, 500 m., 17 May 1957, *Davis & Hedge* (D.26710). Armenia, c.a. 1867, *Calvert & Zohrab*. Prov. Bitlis: Tatvan, 1750 m., 4 July 1954, *Davis & O. Polunin* (D.23605).

IRAQ. Amara, by the Masharrah canal, 21 April 1918, *Evans* M/258.

PALESTINE. Jordan: Huleh, 2 m., 12 May 1911, *Meyers & Dinsmore* 4650. Near Lake Tiberias, May 1877, *Ball* 1453. Binyamina-Caesarea, 8 Apr. 1942, *Davis* 4431. Jordan valley, Deir Alla, 26 Mar. 1952, *Trought*. Samriyeh, 160 m., 25 Apr. 1935, *Dinsmore* 10650. Kefrein, 200 m., 21 April 1911, *Meyers & Dinsmore* (1635) 650^b.

Habitat: Damp or marshy places in the fields, at the edge of stream, canal, etc. Alt. up to 1750 m. Flowering April–July.

Distribution (of the species): British Is., Iberian Penins., France, W. Mediterranean Is., Italy, Balkan Penins., Belgium, Austria, Hungary, Southern URSS., Afghanistan, Beluchistan, Egypt, N. Africa, Canaries, Azores, Madeira.

T. resupinatum is closely related to *T. tomentosum* but is easily recognizable by its characteristic pyriform fruiting calyces with long, protruding and divergent “antennae”. Further, in this species the fruiting calyces are more or less glossy and their hairs inconspicuous, while those in *T. tomentosum* are mostly woolly.

57. *T. tomentosum* L., Sp. Pl. ii, 771 (1753); Boissier, Fl. Or. ii, 138 (1872); Hayek, Prodr. Fl. Balc. i, 859 (1926); Post, Fl. Syr. Pal. Sin. ed. 2, i, 345 (1932).

1a. Stems extremely abbreviated; capitula crowded into a ball. Petioles much exceeding the sessile capitula . . . var. *chthonocephalum*

1b. Stems well-developed; capitula separate and $\pm$ remote from one another:

2a. Peduncles shorter than or $\pm$ equal to the subtending leaves:

3a. "Antennae" of the upper lip of the inflated calyx bent inwards and hidden:

4a. Inflated calyx glossy, bearing minute inconspicuous hairs, sometimes glabrous . . . var. *bullatum*

4b. Inflated calyx usually dirty white and conspicuously hairy (mostly woolly) . . . var. *tomentosum*

3b. "Antennae" of the upper lip of the inflated calyx exerted and recurved . . . var. *curvisepalum*

2b. Peduncles much longer than the subtending leaves

var. *longipedunculatum*

var. *tomentosum*. Icon.: Moris, Fl. Sard. i, t. 64 (1837); Reichenbach, Ic. Fl. Germ. Helv. xxii, t. 107 (1903).

Syn.: *T. tomentosum* L. var. *pedunculatum* Nábělek in Publications Fac. Sc. Univ. Masaryk, Brno, No. 35, 71 (1923).

TURKEY. Troad (Prov. Çanakkale), Renkoei, 3 May 1883, *Sintenis* 368. Ad vias Smyrnae (Izmir), March-Apr. 1827, *Fleischer*. Prov. Muğla, dist. Fethiye: Kalkan, 30 m., 30 Mar. 1956, *Davis & O. Polunin* (D.25516). Prov. Antalya: Kumköy, between Antalya and Serik, 20 m., 6 Apr. 1956, *Davis & O. Polunin* (D.25734). Prov. Mersin, dist., Anamur: Anamur—Gilindire, 20 m., 14 Apr. 1956, *Davis & O. Polunin* (D.26015). Prov. Adana: Toprakkale, near Ceyhan, 60 m., 11 Apr. 1934, *Balls* 735. Gaziantep, 900 m., 21 Apr. 1934, *Balls* 809. Prov. Urfa, 600 m., 14 May 1957, *Davis & Hedge* (D.27984).

CYCLADES. Amorgos, Langadha, 12 Apr. 1940, *Davis* 1461.

CYPRUS. Kyrenia, 8 Apr. 1956, *Atherton* 1297. Near Ayios Epiktitos, 60 m., 8 Apr. 1956, *Casey* 1707. Kantara, 540 m., 18–25 Apr. 1956, *Hughes*. Nicosia, 180 m., 12 May 1927, *Huddle* 41. Larnaca Aerodrome, 29 Mar. 1950, *Chapman* 25. Akrotiri, 1 Apr. 1927 *Huddle* 40.

SYRIA. Prope Aleppo, 6 Apr. 1841, *Kotschy* 75; *ibid.*, 360 m., 2 Apr. 1865, *Haussknecht*. Jebel Druz, 29 Apr. 1933, *Meinertzhagen*.

LEBANON. Ex clivo occidentali Libani pr. Muktarrah, 15 May 1877, *Ball* 1832.

PALESTINE. Mt. Carmel, a. 1863–64, *Lowne* (p.p.).

IRAQ. Qaraghan, on marshy flats by the Royala river, 30 Mar. 1932, *Guest* 1876. Makhlut, 180 m., 29 Apr. 1933, *Guest* 4258. Mosul-Zakho, c. 250 m., 5 May 1954, *Guest* 13282. Badra, 120 m., 18 Mar. 1947, *Gillett* 6606. Jarmo, 23 Mar. 1955, *Helbaek* 434.

IRAN. Masjid-i-Sulaimani, Mar. 1927, *Macmillan* 101. Khossomobad, 750 m., 17 Apr. 1936, *Trott* 453. Inter Abushir & Shiraz, Mar. 1842, *Kotschy* 202.

Habitat: Fallow fields, roadsides, wadi beds, disturbed calcareous steppes, among maquis, rocky limestone slopes along low hills, etc. Alt. 0-750 m. Flowering March-April.

Distribution: British Is., Portugal, Spain, Balearic Is., S. France, Corsica, Sardinia, Sicily, Italy, Yugoslavia, Albania, Greece, Aegaeon Is.

var. **bullatum** (Boiss. & Hausskn.) Hossain, **comb. et stat. nov.**

Basionym: *T. bullatum* Boiss. & Hausskn. in Boiss., Fl. Or. ii, 138 (1872). Lectotype—Syriaco-Armeniacum, in deserto fluv. Chabur, 6 Mar. 1867, *Haussknecht* (G! K!).

TURKEY. Prov. Mardin: 24 km. from Mardin towards Diyarbakir, 1000 m., 27 May 1957, *Davis & Hedge* (D.28739). Gaziantep, Karatash, 990 m., 3 May 1935, *Balls* 2226.

LEBANON. Ex clivo occidentali montis Libani, pr. Gezzin, c. 1000 m., May 1877, *Ball* 1621. Near Ain Zahalta, c. 1100-1300 m., 26 May 1877, *Ball* 2203. Near Ain Besaba, among pine trees, 15 May 1865, *Post* (as *T. clusii*, K!).

Habitat: Non-lime soil on dry sunny banks, limestone gully in open *Quercus aegilops* scrub, river valleys, mountain declivities, etc. Alt. 990-1300 m. Flowering March-May.

Post's specimen mentioned above is probably a duplicate of a syntype of *T. bullatum* var. *glabrescens* *Post* (Fl. Syr. Pal. Sin. 241: 1896). The inflated calyces in this specimen are glabrous. However, this seems to be but an extreme form of var. *bullatum*.

var. **curvisepalum** (V. Tackh.) Hossain, **comb. et stat. nov.**

Basionym: *T. curvisepalum* V. Tackh. in Svensk Bot. Tidskr. xxvi, 373, f. 3 and 5 (1932).

Lectotype—Sinai: Rafa, Bir el Maleha, at the coast, 23 Mar. 1928, *V. & G. Tackholm* (Cai., n.v.).

CYPRUS. Agia Irini (Morphou), fallow fields, 11 Mar. 1941, *Davis* 2553.

PALESTINE. Jaffa, Apr. 1877, *Ball* 606. Ramleh to Yebneh, 30 m., 30 Mar. 1911, *Dinsmore* 4575. S. of Ramleh, 60 m., 5 Apr. 1911, *Dinsmore* 3496.

Habitat: Fallow fields and sandy places along the sea coasts. Flowering March-April.

Var. *curvisepalum* seems to be the same as the plant that Bornmüller called var. *orientale*. But Bornmüller's epithet, which appeared at first on his Herbarium sheets, was only casually referred to in print (in Verh. K.K. Zool.-Bot. Gesell. Wien, xlviii, 581: 1898) and was never validly published.

Var. **longipedunculatum** Hossain, **var. nov.** Pedunculi foliis multo longiores; calyces fructiferi ut flores majores.

PALESTINE. Jordan, Jebel Attarus, 600-690 m., 24 Apr. 1945, *Davis* 8712 (holo. E!). Lake of Tiberias, 200 m. 30 Mar. 1911, *Meyers & Dinsmore* 5496. Ayun Musa, 500 m., 22 Apr. 1911, *Meyers & Dinsmore* M.650.

Habitat: Fields.

var. *longipedunculatum* resembles *T. resupinatum* in its long peduncles but differs from the latter in its fruiting calyces being more or less woolly

and the "antennae" of the upper lips being much shorter and hardly protruding.

var. *chthonocephalum* Bornm. in Beih. Bot. Centralbl. xxxi (2), 204 (1914).
Lectotype:—Lebanon: "Ad Antilibani radices occidentales, in declivitatibus supra Baalbek, 1150–1130 m." 19 May 1910, J. & F. Bornmüller 11671 (E!).

LEBANON. Anti-Lebanon, near Ain Budari & Baalbek, 1250–1300 m., 29 May 1910, Bornmüller 11670^b. (K! syntype).

CYRENAICA. Derna, 4 Apr. 1887, Taubert 174 (K! as *T. bullatum* Boiss. & Hausskn.)

The following seems to be an abnormal form of var. *chthonocephalum*: Jerusalem, 800 m. alt., 18 Apr. 1905, Dinsmore 4744 (E!). In this specimen there are several stems, all arising from a common root, but weak and procumbent and only 4–6 cm. long. The most extraordinary feature, however, is the length of its petioles; they are 4–6 cm. long and exceed far beyond the stems. The capitula are sessile and about 10 mm. in diam. Although they are separate from one another, most of them occur closely approximated in the basal regions of the stems.

Subgen. 6. *Mistyllus* (Presl) Hossain, stat. nov.

Basionym: *Mistyllus* Presl, Symb. Bot. i, 49 (1832).

Syn.: *Trifolium* L. Sect. *Mistyllus* (Presl) Gren. & Godr., Fl. France, i, 415 (1849).

Trifolium L. Sect. *Trigantheum* Gib. & Belli in Mem. Accad. Sc. Tor. Ser. II. xlii (1892).

Lectotype: *T. spumosum* L.

Annuals. Leaflets usually prominently nerved, argute-margined. Inflorescence capitate globose. Flowers sessile, with prominent, glumaceous, longitudinally striate bracts. Calyx usually glabrous, tube longitudinally striate, 20- or more-nerved, slightly to considerably inflated on all sides after maturation, inflated calyx often with transverse striations in between longitudinal nerves, usually $\pm$ turbinate or pyriform, throat unthickened, teeth $\pm$ awn-like, usually recurved. Petals longitudinally striate, vexillum free from the other petals.* Pods ovate to oblong, included within the calyx-tube, 1–4 seeded.

Key to the Species

- 1a. Calyx-tube much inflated (pyriform) when mature, longitudinally as well as transversely striate; corolla only a little longer than the calyx; leaflets inversely triangular or broadly obovate-cuneate, denticulate 58. *T. spumosum*
- 1b. Calyx-tube slightly inflated (tubular or $\pm$ pyriform) when mature, only longitudinally striate; corolla much longer than the calyx; leaflets usually obovate or broadly elliptic, with sharply toothed margins:

* Presl erroneously described the corolla as gamopetalous below the middle.

- 2a. Calyx-teeth ciliate at the base, abruptly narrowed and finely setaceous above, equal to the tube or slightly longer (3–3.5 mm.); vexillum sharply acute 60. *T. setiferum*
- 2b. Calyx-teeth glabrous at the base, narrowly lanceolate, distinctly shorter than the tube; vexillum $\pm$ obtuse:
- 3a. Calyx-tube with two longitudinal rows of hairs, c. 4 mm. long; corolla usually bicolorous (vexillum pink to purple, alae and carina whitish to rose) when dry, rarely (in var. *cruentum*) only purple. Outermost bracts obscuring the calyx-tubes, nearly as long as broad and with broad membranaceous margins; capitula $\pm$ ovate, usually 12–15 $\times$ 11–13 mm. compact 61. *T. argutum*
- 3b. Calyx-tube totally glabrous, c. 2.5 mm. long; corolla one-coloured (purple). Outermost bracts slightly shorter than the calyx-tube, longer than broad; capitula $\pm$ globose, usually c. 25 $\times$ c. 20 mm.: 59. *T. aintabense*

58. *T. spumosum* L., Sp. Pl. ii, 771 (1753); Boissier, Fl. Or. ii, 138 (1872) (excl. syn.); Hayek, Prodr. Fl. Penins. Balc. i, 857 (1926); Post, Fl. Syr. Pal. Sin. ed. 2, i, 345 (1932). *Icon.*: Sibth. & Sm., Fl. Graeca, viii, t. 753 (1833); Moris, Fl. Sard. t. 63 (1837).

TURKEY. Renkoei (Prov. Çanakkale), May 1883, *Sintenis* 170. In collibus Smyrnae (Izmir), Mar. 1827, *Fleischer*. Adalia (Antalya), 26 Apr. 1860, *Bourgeau*. Prov. Mersin, dist. Anamur: Anamur—Gilindire, 20 m., 14 Apr. 1956, *Davis & O. Polunin* (D.25984); Mersin, 19 Apr. 1855, *Balansa* 452. Prov. Hatay: above Iskenderun, 100–300 m., 23 Apr. 1957, *Davis & Hedge* (D.26980); dist. Belen, below Belen, 400 m., 23 April 1957, *Davis & Hedge* (D.27019). Prov. Diyarbakir: 8 km. from Diyarbakir towards Çinar, 650 m., 31 May 1957, *Davis & Hedge* (D.28763). Armenia, c. 1867, *Calvert & Zohrab*.

CYCLADES. Naxos, nr. Chora, 21 Apr. 1940, *Davis* 1574. Amorgos, Langedha, 12 Apr. 1940, *Davis* 1468.

CYPRUS. Carpass, circa monasterium Kantara, Apr. 1880, *Sintenis & Rigo* 421. Ay. Varvara (Stavrovouni), 180 m., 6 Apr. 1937, *Syngressides* 1495. Pergamos, 105 m., 4 Mar. 1955, *Merton* 1956. Kyrenia, 30 m., 11 Apr. 1956, *Casey* 1710. Gambo, *Druce* 142. Tricomo, 30 m., 7 Apr. 1950, *Chapman* 217. Larnaca aerodrome, 13 Apr. 1950, *Chapman* 409.

S. SYRIA. Baniyas, a. 1863–64, *Lowne*.

LEBANON. Beirut, 30 Mar. 1933, *Meinertzhagen*.

PALESTINE. Jaffa, 7 Apr. 1897, *Bornmüller* 448. Yabneh, 25 m., 5 Apr. 1911, *Dinsmore* 5380.

IRAQ. Kurdistan: in mont. Kuh-Sefin reg. infer. ad pag. Schaklava (dit. Erbil), 1000 m., 20 Apr. 1893, *Bornmüller* 1148. Khurmal, 900 m., 20 Apr. 1947, *Rawi* 8890. Dohuk, 8 June 1932, *Makki Beg* 3289.

Habitat: Grass-steppes, cultivated as well as uncultivated fields, pastures, roadsides, grassy and rocky places along hill slopes, rocky limestone slopes, etc., usually from sea level to 1000 m. alt. Flowering April-June. Distribution: S. Spain, S. France, Corsica, Sardinia, Sicily, Greece, Aegean Is.

In addition to the characters mentioned in the key, *T. spumosum* also differs from other species of the subgenus in habit (stems several, dwarfer and much weaker) and in the texture of the leaflets (thin and not or slightly nervose). The plants are totally glabrous.

59. *T. aintabense* Boiss. & Hausskn. in Boiss., Fl. Or. ii, 140 (1872); Post, Fl. Syr. Pal. Sin. ed. 2, i, 346 (1932). *Icon.*: Gibelli & Belli in Mem. Accad. Sc. Tor. Ser. II. xlii, 220 t. 2 (1892).

Type—Turkey: Prov. Gaziantep: "In gram. calc. ad Ispadrul pr. Aintab", 10 June 1865, *Haussknecht* (holo. G!).

T. aintabense is allied to *T. leiocalycinum* (Greece) but differs from it in the distinct longitudinal striations of the calyx-tube, which in *T. leiocalycinum* is smooth. The calyx-tubes of *T. aintabense* are longer (4–5 mm. long) than those of *T. setiferum* (c. 3 mm. long).

60. *T. setiferum* Boiss., Diagn. Ser. I (2), 32 (1843) et Fl. Or. ii, 139 (1872). *Icon.*: Gibelli & Belli in Mem. Accad. Sc. Tor. Ser. II. xlii, t. 1 (1892).

Syn.: *T. multistriatum* Koch, Synops. ed. 2, i, 190 (1843).

T. vesiculosum Savi var. *rumelicum* Griseb., Spicil. Fl. Rum. Bith. i, 35 (1843).

T. rumelicum (Griseb.) Halácsy, Consp. Fl. Graec. i, 399 (1900).

Lectotype—Turkey (Prov. Izmir): "Montagne de Jenidje", Mai 1842, *Boissier* (G!).

TURKEY. Prov. Izmir: in collinis c. Ephesus, May 1842, *Boissier* (syntype, G!); Mesogis valles infra Dervent, June 1842, *Boissier* (syntype, G!); Mesogis inter Dervent & Alasehir, June 1842, *Boissier* (syntype, G!); valles Mesogis & Tmoli, July 1842, *Boissier* (syntype, K!); in monte Gume dağ (Mesogis) supra oppid. Tire, 300–600 m., 14 June 1906, *Bornmüller* 9368. Caria, a. 1843, *Pinard*.

Habitat: Hills and mountain valleys, usually at 300–600 m.

Distribution: Bulgaria, E. & S. Greece, Albania, Serbia, Calabria (Italy) & Sicily. In the Orient the species is known only from the coastal hills of Western Turkey and Palestine (see Post, Fl. Syr. Pal. Sin. 1896 (Add.), as *T. multistriatum* Koch).

The names *T. setiferum* Boiss., *T. multistriatum* Koch, and *T. vesiculosum* Savi var. *rumelicum* Griseb. were all published in 1843. *Boissier*'s name was published, most probably, in or shortly after March 1843 (cf. Boiss., Diagn. Ser. I (2), 115: 1843), but nothing is known about the exact or even approximate dates of publication of the other two names.

T. setiferum is allied to *T. vesiculosum*, but the foliar and floral parts of the latter species are much larger. In addition, the mature calyces in *T. vesiculosum* are turbinate and bear distinct transverse striations in between longitudinal nerves.

T. setiferum is very variable in the European part of its range, but not so in the Orient. The variations occur mainly in the size and shape of leaflets, which often tend to be larger and more precisely elliptic than the usual obovate-cuneate or broadly-elliptic ones.

61. *T. argutum* Banks & Sol. in Russell, Aleppo, ed. 2, ii, 260 (1794); Eig in Journ. Bot. lxxv, 188 (1937).*

1a. Vexillum usually purple, alae and carina rose (the difference in colour more marked in dry specimens) var. *argutum*

1b. Petals deep purple, all of one colour. Capitula usually c. 11 × c. 7 mm. var. *cruentum*

var. *argutum*. Icon.: Gibelli & Belli in Mem. Accad. Sc. Tor. Ser. II. xlii, 220, t. 2 (1892)—as *T. xerocephalum*.

Syn.: *T. xerocephalum* Fenzl, Pugill. Pl. Nov. Syr. Taur. Occ. i, 5 (1842)!

T. moriferum Boiss., Diagn. Ser. I (9), 28 (1849).

T. xerocephalum Fenzl var. *minus* Boiss., Fl. Or. ii, 140 (1872).

T. xerocephalum Fenzl var. *moriferum* (Boiss.) Dinsm. in Post, Fl. Syr. Pal. Sin. ed. 2, i, 346 (1932).

Holotype: Syria prope Aleppo, P. Russell (BM!).

TURKEY. In monte Tauro, aestate 1836, Kotschy 139 (type of *T. xerocephalum* Fenzl, K!).

RHODES. Near Rhodes, 7 May 1870, Bourgeau 42.

CYPRUS. Paphos, Druce 131. Kissonerga (Ktima), 3 m., 11 Apr. 1955, Merton 2123.

LEBANON. Near Ain Besaba, 15 May 1865, Post. Taubus de la rive gauche du Nahr Barghout, près des Cavernes, à Saïda, 6 Apr. 1853, Blanche 13. Saïda, Gaillardot. Byblos, 27 Apr. 1943, Davis 5897.

PALESTINE. Gilead: Jisr Rukhad, 500 m., 8 May 1911, Meyers & Dinsmore G 658. Galilaea, ad Safed, c. 900 m., 25 Apr. 1897, Bornmüller 452. Magdala, a. 1863–64, Lowne. Ramleh, 50 m., 24 Apr. 1912, Dinsmore B 2728. Kulonieh, 26 Apr. 1905, Dinsmore 2728. Jordan: Ain et Tabighah, 200 m., 4 Apr. 1911, Meyers & Dinsmore 6728.

Habitat: Rocky places and fields. Alt. up to c. 900 m. Flowering April–May.

The capitula are variable in size and shape. They may be as small as those in var. *cruentum* (c. 11 × c. 7 mm.) but are normally a little larger (c. 15 × c. 12 mm.). The shape of the capitula is usually ovate but occasionally it may be ± oblong (cf. Post's specimen from Lebanon).

var. *cruentum* Bornm. in Verh. Zool.-Bot. Gesel. Wien, xlviii, 581 (1898).

Syntypes—Lebanon: Ain Sannin, Bornmüller 454. Palestine: near Jaffa, Bornmüller 450 & 451 (n.v.).

SYRIA. Beskinta, 5 June 1932, Gombault 1299.

Bornmüller considered his specimen No. 452 (see var. *argutum*) as representing transitional forms between var. *minus* and var. *cruentum*. The duplicate at Edinburgh, however, is rather typical of var. *argutum* (capitula ovate, c. 15 × 12 mm.; corolla bicoloured).

Balansa 453 from near Mersin, labelled *T. xerocephalum* Fenzl, is somewhat atypical. It differs from other specimens of the species by its bracts being not broadly hyaline at the margins and by its slightly longer and one-coloured petals.

* I am indebted to Dr. J. Lorch of the Department of Botany, Hebrew University, Jerusalem, for drawing my attention to the name.

Subgen. 7. *Amoria* (Presl) Hossain, stat. nov. (Incl. Sect. *Trifoliastrum* Ser.; Sect. *Lupinaster* (Adans.) Ser.; Sect. *Cryptosciadium* Čelak.; Sect. *Micrantheum* (Presl) Gib. & Belli).

Basionym: *Amoria* Presl, Symb. Bot. i, 47 (1832).

Type species: *T. repens* L.

Inflorescentia plerumque umbellata rare capitata, manifeste pedunculata (excl. *T. suffocato* et *T. glomerato* capitulis sessilibus). Flores pedicellati, rare sessiles vel subsessiles, bracteati. Calyx $\pm$ campanulatus, non inflatus, fauce nudus, tubo membranaceo 10-nervio rare 20-nervio (cf. subsect. *Loxospermum* (Hochst.) Čelak.), dentibus lanceolatis vel subulatis, saepe marginibus membranaceis, duobus superioribus plerumque ceteris paulo longioribus. Vexillum fere liberum, ad basin paulo connatum (excl. *T. unifloro* vexillo connato). Ovarium plerumque 2-4-ovulatum, rare c. 10-ovulatum (cf. *T. uniflorum*).

Key to the Sections of Subgen. Amoria in the Orient

- 1a. Petals long-clawed, united and tubular below; umbels 1-6 flowered; calyx-lobes $\pm$ equal Sect. 2. *Cryptosciadium*
- 1b. Petals shortly clawed, slightly united at the base but not tubular; capitula or umbels many-flowered; calyx-lobes unequal:
 - 2a. Capitula sessile Sect. 4. *Micrantheum*
 - 2b. Capitula or umbels pedunculate:
 - 3a. Bracts free, lanceolate-subulate or boat-shaped; flowers 7-10- (13-15) mm. long Sect. 3. *Amoria*
 - 3b. Bracts extremely reduced, obtuse, whitish, scale-like, connate wholly or only at the base; flowers verticillate, 15-25 mm. long Sect. 1. *Lupinaster*

1. Sect. *Lupinaster* (Adans.) Ser. in DC., Prodr. ii, 203 (1825).

Basionym: *Lupinaster* Adans., Fam. ii, 323 (1763).

Lectotype: *T. lupinaster* L.

Perennials. Inflorescence umbellate, long-peduncled. Flowers 5 or more, often in two whorls, subtended by an involucre of minute, scale-like connate bracts, c. 20 mm. long. Calyx 10-nerved, lower 3 teeth slightly longer than the upper 2. Vexillum free from the other petals. Pods 2-seeded.

62. *T. polyphyllum* C. A. Mey., Verz. Pfl. Cauc. 139 (1831); Ledebour, Fl. Ross. i, 551 (1843); Boissier, Fl. Or. ii, 148 (1872). *Icon.*: Bobrov in Fl. URSS. xi, 209, t. xiv. (1945).

Type—"In regione alpina Caucasi occidentalis (alt. 1200-1450 hexap.)" Meyer, (LE, n.v.).

TURKEY. In alpest. Lazistan, *Aucher* 1075. Sumila, Handsuka dağ, 2 Aug. 1889, *Sintenis* 1644. Kuzitashi, 2430 m., 2 July 1933, *Balls* 437. Prov. Gümüşane: N. of Bayburt, Sakarsu, 2700 m., 24 July 1934, *Balls* 1833. Prov. Çoruh (Artvin): Tiryal dağ above Murgul, 2300-2400 m., 23 June 1957, *Davis & Hedge* (D.29955); Şavval Tepe above Murgul, 2300 m., 13 Aug. 1957, *Davis & Hedge* (D.32364).

CAUCASUS. Fontes fluv. Teberda (confl. Kuban), in rupibus, 2400-3300 m., 3 July 1899, *Desoulavi*.

Habitat: Igneous rocky slopes, limestone scree, etc. Alt. 2300–3300 m. Flowering June–July.

T. polyphyllum is closely related to *T. alpinum*. The main differences between the two are tabulated below:

<i>T. polyphyllum</i>	<i>T. alpinum</i>
1. Leaflets 5–7 in number; usually 10–15 (–20) × 2–3 mm.	1. Leaflets always 3 in number; usually 15–20 (–35) × (3–) 5–7 (–8) mm.
2. Flower 3–6 per capitulum (umbel).	2. Flowers 9–11 per capitulum (umbel).
3. Calyx-tube 3–4 mm. and teeth 4–5 mm. long.	3. Calyx-tube c. 3 mm. and teeth 8–11 mm. long.

The two are also geographically separated: *T. polyphyllum* occurs in the Pontus (Lazistan) and the Caucasus, whereas *T. alpinum* grows in Spain, Pyrenees Or., Italian Alps, Swiss Alps and S. Tirol.

2. **Sect. *Cryptosciadium*** Čelak. in Oest. Bot. Zeit. xxiv, 42 (1874).

Type: *T. uniflorum* L.

Perennials. Infl. axillary, umbellate, 1–3 (–5)-flowered; peduncles usually very short, and covered by the sheathing leaf-bases, rarely conspicuous. Flowers bracteate, 15–20 mm. long, pedicels curled at the fruiting stage. Calyx long-tubular, 10-nerved. Corolla long-clawed and tubular below. Pods 6–10 seeded.

63. ***T. uniflorum* L.**, Sp. Pl. ii, 771 (1753); Boissier, Fl. Or. ii, 148 (1872); Hayek, Prodr. Fl. Balc. i, 856 (1926). *Icon.*: Alpini, Exot. t. 168; Sibth. & Sm., Fl. Graeca, viii, t. 752, (1833); Reichenbach, Ic. Fl. Germ. Helv. xxii, t. 114 (1903).

Syn.: *T. uniflorum* L. var. *sternbergianum* Ser. in DC. Prodr. ii, 203 (1825).

T. uniflorum L. var. *breviflorum* Boiss., Fl. Or. ii, 148 (1872).

T. uniflorum L. var. *macrodon* Hausskn. in Mitteil. Thur. Bot. Ver. N.F., v, 77 (1894).

T. uniflorum L. var. *varians* Vierh. in Verh. Zool.-Bot. Gesell. Wien, lxix, 206.

TURKEY. Prov. Istanbul: Heybeli Ada (Halki), 100 m., 24 Mar. 1957, Davis & Hedge (D.26231); Istanbul (golf course), 105 m., 29 Mar. 1934, Balls 600; in collibus, a. 1850, Clementi. Gallipoli, Kilia, 23–24 Apr. 1923, Ingoldby 105. Prov. Çanakkale: Renkoei, Apr. 1883, Sintenis 78. In pascuis Smyrne (Izmir), Mar. 1827, Fleischer; *ibid.*, 26 Apr. 1854, Balansa 176.

AEGAEAN IS. Andros, 300 m., Apr. 1938, Davis. Samos: Kap Kotsikas, ad monasterium, 30 Mar. 1934, K. H. & F. Reehinger 3495. Rhodes, Apr. 1883, Pichler.

Habitat: Pastures, waste lands, pathsides in the woods, etc. Alt. 100–300 m. Flowering March–April.

Distribution: Greece (Attica, S.E. Macedonia), Sicily, S. Italy, S. France, Cyrenaica (Libya).

T. uniflorum is very variable in indumentum, size and shape of the leaflets, length of the peduncles and of the corolla, length and breadth of the pedicels and calyx-teeth and in flower-colour. In most cases the peduncles are very short, and are hidden by the sheathing stipules of the subtending leaves. The pedicels vary from 2–3–10 mm. in length. The flower-colour is whitish, cream or pink or a combination of the three.

The following specimen from Macedonia, however, is extraordinary in its morphological features: "Near Cavalla, on rocky islet 200 yds. (= 180 m.) from the shore, in rocky crevices where some soil has collected, mostly on landward and more shaded side, flowers cream-white and fragrant, 26 May 1935, *Tedd 1571*" (K!). In this specimen the plants consist of 1–3 ascending stems (6–15 cm. high and c. 3 mm. thick), long-petioled leaves with relatively large leaflets (13–15–17 (–19) × (8–)10 (–12) mm. and 3–5 flowered umbels on 20–60 mm. long peduncles and 7–12 (–15) mm. long glabrous pedicels. The corolla is usually 17–20 mm. long and the ovary is 10–11 ovuled.

Janka's specimen from Athos Penins. (a. 1871), labelled "*Trifolium cryptoscias* Griseb.!" (E!), is rather intermediate between *Tedd 1571* and typical specimens of *T. uniflorum*. The original description of *T. cryptoscias* Griseb. mentions the peduncles as being sometimes long and exserted, though Grisebach's specimen at Kew is of the usual short-peduncled type. It would be interesting to grow *Tedd's* and *Janka's* plants experimentally to see whether or not they are but habitat forms.

The Sicilian specimens (*T. uniflorum* L. var. *savianum* (Guss.) Arcangeli, Comp. Fl. It. 168:1882), as well as those from Marseilles and Cyrenaica, differ from the Eastern Mediterranean ones in having relatively short and thick pedicels.

3. Sect. *Amoria*

Type—*T. repens* L.

Annuals or perennials. Flowers umbellate, rarely spicate, numerous, usually 7–13 mm. long, pedicellate, subtended by ± lanceolate membranaceous bracts. Calyx-teeth unequal, upper two slightly longer than the lower three. Vexillum almost free (slightly connate at the base). Pods 2–4 seeded.

Key to the Oriental Species

1a. Perennials:

2a. Capitula umbellate:

3a. Stems creeping 67. *T. repens*

3b. Stems ascending, caespitose or subcaespitose:

4a. Stems ascending, lax, usually 20–30 cm. high. Leaflets usually 20–30 × 12–18 mm. 69. *T. hybridum* subsp. *hybridum*

4b. Stems caespitose or subcaespitose, usually 3–15 cm. high:

5a. Fruiting pedicel longer than the calyx-tube; rootstock much-branched and horizontal:

6a. Vexillum ± obovate; aerial stems 3–5 cm. high. Rhizome loose, plagiotropic 68. *T. orphandeum*

- 6b. Vexillum oblong, narrowed towards the tip, obtuse, aerial stems usually 8–15 cm. high. Rhizome usually compact

T. hybridum subsp. *anatolicum*

- 5b. Pedicel always longer than the calyx-tube; rootstock thick and vertical 64. *T. radicosum*

2b. Capitula spicate:

- 7a. Bracts broadly lanceolate, embracing the calyx-tube, c. 3×2 mm.; flowers usually 15–17 mm. long; leaflets oblong-lanceolate, 3–4 times as long as broad ($45\text{--}65 \times 11\text{--}16$ mm.)

65. *T. montanum* subsp. *humboldtianum*

- 7b. Bracts linear-lanceolate, slightly removed from the calyx-tube, 3–4 (–5) $\times$ c. 1 mm., $\pm$ folded; flowers usually 10–13 mm. long; leaflets ovate-cuneate, obovate or broadly elliptic, always less than 3 times as long as broad (usually $15\text{--}35 \times 10\text{--}19$ mm.) 66. *T. ambiguum*

1b. Annuals:

- 8a. Corolla shorter than or equal to the calyx; peduncles shorter than the subtending leaves; flowers small, 4–5 mm. long

75. *T. retusum*

- 8b. Corolla longer than the calyx; peduncle longer than the subtending leaves; flowers 7–10 (–13) mm. long:

- 9a. Capitula $\pm$ spicate; flowers almost sessile (even when mature), 10–13 mm. long, purple or rose. Carina-tip shortly beaked, pod deeply constricted between the seeds

70. *T. isthmocarpum*

- 9b. Capitula umbellate; flowers distinctly pedicellate, usually 7–10 mm. long, white, cream, pink or pale rose:

- 10a. Calyx-teeth $\pm$ equal to the tube, c. 2 mm. long, upper two slightly imbricate at the base and recurved when mature. Ovary 2-ovuled; flowers white, cream or pink

71. *T. nigrescens* subsp. *petrisavii*

- 10b. Calyx-teeth nearly 3 times as long as the tube, c. 4 mm. long, narrowly subulate, straight and with wide sinuses in between 72. *T. michelianum*

64. *T. radicosum* Boiss. & Hohen. in Boiss. Diagn. Ser. I (9), 27 (1849); Boissier, Fl. Or. ii, 146 (1872).

1a. Calyx pubescent var. *radicosum*

1b. Calyx glabrous var. *guestii*

var. *radicosum*. *Icon.*: Blakelock in Kew Bull. 1948, 420, f. 2A (1949).

Type—Iran: “In summo jugo Atscha Pasch montis Demawend Persiae borealis”, *Kotschy* 620 (holo. G! iso. K!).

N. IRAN. In excelsis alpium Totschal, c. 3500–3600 m., 8 July 1902, *Bornmüller* 6600. Prov. Mazanderan, dist. Kudjur: in monte Ulodj,

substr. calc. 3200–3400 m., 9 Aug. 1948, *K. H. & F. Rechinger* 6496.—Endemic.

Habitat: Calcareous substrata on mountains. Alt. 3200–3600 m. Flowering July–August.

var. *guestii* (Blakelock) Hossain, **comb. et stat. nov.**

Basionym: *T. guestii* Blakelock in Kew Bull. 1948, 420, f. 2 B, 421 (1949).

Holotype—N. Iraq: Arl Gird Dagħ, 3000 m., on grassy places by a lake, 22 July 1932, *Guest* 2854 (K!).

N. IRAQ. Arl Gird Dagħ, on a damp grassy slope, 3300 m., 22 July 1932, *Guest* 2894 (paratype)—Endemic.

Habitat: Grassy slopes on mountains. Alt. 3000–3300 m. Flowering July.

T. radicosum can be readily distinguished from *T. orphanideum* and *T. hybridum* subsp. *anatolicum* by its thick vertical root-stock, which in the latter two taxa are rhizomatous and much thinner. In addition, the stipules as well as the teeth on the leaf-margins of this species are blunt, unlike those in other species.

65. *T. montanum* L., Sp. Pl. ii, 770 (1753).

1a. Stems and leaves glabrous, peduncles glabrescent; leaflets subentire above, serrulate below; bracts embracing the calyx-tube and $\pm$ equal to it (c. $3 \times$ c. 2 mm.); flowers c. 15 mm. long: (Caucasus and N.E. Turkey) subsp. *humboldtianum*

1b. Stems, leaves and peduncles rather densely pubescent; leaflets usually sharply serrulate; bracts a little remote from and much shorter than the calyx-tube; flowers c. 10 mm. long: (Central, South and South-East Europe) subsp. *montanum*

subsp. *humboldtianum* (A. Br. & Aschers.) Hossain, **comb. et stat. nov.**
Icon.: Bobrov in Acta Inst. Bot. Acad. Sc. URSS. Ser. I (6), 218, f. 1 (1947)—as *T. bordzilowskyi*.

Syn.: *T. montanum* L. var. *grandiflorum* A. Br. in Index Sem. Hort. Berol. 17 (1867), *nomen*.

T. humboldtianum A. Br. & Aschers. in Index Sem. Hort. Berol. 24 (1868)—basionym.

T. montanum L. var. *humboldtianum* (A. Br. & Aschers.) Gib. & Belli in Atti. R. Accad. Sc. Tor. xxii, 451 (1887).

T. bordzilowskyi Grossh. in Journ. Soc. Bot. Russ. xiv, 311 (1929).

Type—Berlin (n.v.). The name was based on plants cultivated in the Berlin Botanic Garden from seeds collected at Tiflis by Dr. Noodt and sent in 1848.

TURKEY. Prov. Kars: Sarikamiş, 2100 m., alt., 7 Aug. 1957, *Davis & Hedge* (D.30797); 8 km. from Kars towards Susuz, 1800 m., 5 Aug. 1957, *Davis & Hedge* (D.30612).

Habitat: Mountain-slopes. Alt. 1800–2100 m. Flowering August.

Distribution: Caucasus.

66. *T. ambiguum* M.Bieb., Fl. Taur.-Cauc. ii, 208 (1808); Boissier, Fl. Or. ii, 147 (1872); Ledebour, Fl. Ross. i, 552 (1843).

- 1a. Aerial stems pubescent, usually 8–15 cm. tall; leaflets usually obovate-cuneate or broadly elliptic, 15–25 × 10–13 mm. Roots thick, rhizomatous or plagiotropic var. *ambiguum*
 1b. Aerial stems glabrescent, usually 30–40 cm. tall; leaflets usually ± ovate or broadly elliptic, 30–35 × 17–19 mm. Plants usually deep-rooted. var. *majus*

var. *ambiguum*. *Icon.*: Bobrov in Acta Inst. Bot. Acad. Sc. URSS. Ser. I (6), 220 (1947).

Type—"Habitat frequens Tauriae et Caucasi pratis . . ." *M. Bieberstein* (LE, n.v.).

TURKEY. Lazistan, Chokje, 2700 m., 1 Aug. 1934, *Balls* 1915. Prov. Çoruh: mountain above Artvin, 1900 m., 19 June 1957, *Davis & Hedge* (D.29721); Yalnızçam dağları near Kutul Yayla, 2100 m., 28 June 1957, *Davis & Hedge* (D.30250). Prov. Kars: Ardahan—Yalnızçam, 1900 m., 16 June 1957, *Davis & Hedge* (D.29600); Selim—Kars, 1900 m., 13 June 1957, *Davis & Hedge* (D.29550). Yağmurlu Dağ above Sarıkamış, 2200 m., 23 Aug., 1957, *Davis & Hedge* (D.32629). Prov. Erzurum: Horasan—Pasinler, 1700 m., 12 June 1957, *Davis & Hedge* (D.29417). Prov. Van, dist. Hoşap: Kehir Dağ, 2800 m., 30 July 1954, *Davis & Hedge* (D.2346); Van—Başkale, Halanduran Dağ, c. 25 km. from Başkale, 3000 m., 26 Aug., 1956, *McNeill* 654.

IRAN. N. Sabalan, 750 m., 8 July 1941, *Parsa* 645. Central Meshkambar, 1800 m., 15 June 1941, *Parsa* 101. Lorab, 1650 m., 14 June 1929, *Cowan & Darlington* 1604.

Habitat (var. *ambiguum*): Steep non-lime scree slopes, forests, eroded banks, stream sides, mountain-meadows, etc. Alt. 1900–2800 m. Flowering June–August.

Distribution: Romania, S. Russia, Transcaucasia.

var. *majus* Hossain, var. *nov.* A typo caulibus glabrescentibus multo altioribus, foliolis majoribus viridioribus differt.

TURKEY. Prov. Kars: Sarıkamış, 2100 m., slopes (lush), 7 July 1957, *Davis & Hedge* (D.30778—holo., E!); Sarıkamış, 2100 m., *Davis & Hedge* (D.30800). Prov. Bitlis: Kotum, 1900 m., 5 July 1954, *Davis & O. Polunin* (D.22440).

Habitat: Mountain-slopes, forest margins, fields, etc. Alt. 1900–2200 m. Flowering July–August.

67. *T. repens* L., Sp. Pl. ii, 767 (1753); Boissier, Fl. Or. ii, 145 (1872); Hayek, Prodr. Fl. Balc. i, 854 (1926); Post, Fl. Syr. Pal. Sin. ed. 2, i, 348 (1932). *Icon.*: Sowerby & Sm., Eng. Bot. xxv, t. 1769 (1807); Reichenbach, Ic. Fl. Germ. Helv. xxii, t. 115 (1903).

TURKEY. Gallipoli, Boghali, common, 29 Apr. 1923, *Ingoldby* 128. Prov. Bolu: c. 25 km. from Bolu towards Adapazari, c. 500 m., 21 July 1956, *McNeill* 251. Prov. Çoruh (Artvin): Şavval Tepe above Murgul, 2200 m., 13 Aug. 1957, *Davis & Hedge* (D.32363).

CYPRUS. Kryos Potamos, 1530 m., 29 June 1938, *Kennedy* 1289.

SYRIA. Banias, 830 m., 11 May 1911, *Meyers & Dinsmore* 1813.

LEBANON. Ex clivo occidentali Montis Libani, pr. Gezzin, c. 1000 m., May 1877, *Ball* 1774. Beirut, 22 May 1877, *Herb. Post.* Baalbek, leg.?

IRAQ. Erbil liwa: Shaqlawa, 900 m., 8 May 1947, *Gillett* 8033; N.E. slope of Arl Gird Dagħ, 2000 m., 3 Aug. 1947, *Gillett* 9541; *ibid.*, 2700 m., 24 July 1932, *Guest* 2960.

S.W. IRAN. a. 1890, *Sawyer* 13195.

Habitat: Common in meadows, pastures, roadsides, hill-slopes, etc.

Distribution: Whole of Europe, Siberia, C. Asia, Afghanistan, Baluchistan, Caucasus, N. Africa.

T. repens is naturalized in N. America, Atlantic Is., S. Africa, Australia and E. Asia. It is also extensively cultivated as an important fodder crop and pasture plant. It can be easily recognized by its creeping stems (rooting at the nodes) and by the tube of its calyx being more or less equal to or slightly longer than the teeth. (cf. *Erith*, A.G. (1924) "White Clover—A Monograph on *T. repens* L." for further information about the species.)

68. ***T. orphanideum* Boiss.**, *Diagn. Ser. II* (2), 17 (1856).

Syn.: *T. repens* L. var. *orphanideum* (Boiss.) Boiss., *Fl. Or. ii*, 145 (1872).

Type—Greece: "In monte Kyllene Peloponnesi supra Trikala", *Orphanides* (G, n.v.).

TURKEY. Prov. Bursa: Bursa, slopes between hotel and main ridge leading to summit of Uludağ, 1800–2180 m., 19 June 1956, *Moore* 7294.

Habitat: Mountain slopes.

Distribution: Greece (Mt. Killini, Mt. Parnassus, Euritanis).

69. ***T. hybridum* L.**, *Sp. Pl. ii*, 766 (1753); Boissier, *Fl. Or. ii*, 145 (1872); Hayek, *Prodr. Fl. Balc. i*, 853 (1926).

1a. Stems ascending, usually 20–30(–50) cm. long; leaflets usually 20–30 × 12–18 mm. subsp. *hybridum*

1b. Stems caespitose or subcaespitose; leaflets usually 7–10 (–15) × 6–8 (–10) mm. subsp. *anatolicum*

subsp. ***hybridum***. *Icon.*: Sturm, *Deutschl. Fl. IV. XV t.* 229 (1804); Reichenbach, *Ic. Fl. Germ. Helv. xxii*, t. 117 (1903); Gardner in *Journ. Dept. Agri. West. Austral. Ser. III, vi* (2), 169, f. 17 (1957).

Syn.: *T. elegans* Savi, *Fl. Pis. ii*, 161 (1798).

T. hybridum L. var. *elegans* (Savi) Boiss., *Fl. Or. ii*, 146 (1872).

TURKEY. Prov. Erzurum: 14 miles from Horasan towards Karaugan, 2000 m., 13 June 1957, *Davis & Hedge* (D.29518). Prov. Tunceli: Ovacik—Hozat, 2000 m., 22 July 1957, *Davis & Hedge* (D.31540). Prov. Van, dist. Şatak: Gorentaş, 2000 m., 23 July 1954, *Davis & O. Polunin* (D.23228). Prov. Bursa: Olympus (Ulu dağ), regio media, *Boissier* (G!; this sheet is a mixed gathering of subsp. *hybridum* and subsp. *anatolicum*).

Habitat: Water meadows, flush in oak scrub, etc. Alt. c. 2000 m. Flowering June–July.

Distribution: As a native, the subspecies occurs in the whole of Southern Europe (from Iberian Peninsula to the Balkans), extending eastwards to Caucasia and the neighbouring parts of Turkey. It is naturalized in almost

the whole of the temperate region where, however, it is also cultivated as an important fodder crop (Alsike clover).

subsp. *anatolicum* (Boiss.) Hossain, **stat. nov.**

Basionym: *T. anatolicum* Boiss., Diagn. Ser. I (2), 31 (1843).

T. hybridum L. var. *anatolicum* (Boiss.) Boiss., Fl. Or. ii, 146 (1872).

Lectotype: Turkey: Tmolii cacumini supra Philadelphiam (Alasehir), June 1842, Boissier (G!).

TURKEY. Ex Bithynae in Monte Olympo, 10 Oct. 1867, Ball.* Troas (Prov. Çanakkale): M. Ida, in sylvis pr. Kareikos, 3 July 1883, *Sintenis** 630. Prov. Izmir: Yaila di Bozdag, 20 July 1854, *Balansa** 170; *ibid.*, 1800 m., 15 Aug. 1950, *Davis* 18188. Prov. Muğla: Sandras Dağ, Köklüce, 22 July 1947, *Davis* 13626; *ibid.*, 2200 m. alt., 23 July 1947, *Davis* 13554; Girdev Dağ, 2400 m., 5 Aug. 1947, *Davis* 14020; *ibid.*, between Bel Yayla and Duger, 1800 m., 6 Aug. 1947, *Davis* 13798. Prov. Antalya, dist. Gebiz: Bozburun Dağ at Kuruca Ova, 1800 m., 7 July 1949, *Davis* 15689; Ak Dağ (S. of Geyik Dağ), 2300 m., 28 Aug. 1947, *Davis* 14361. Prov. Kayseri: Bakır Dağ nr. Akoluk Y. above Kiske, 2300 m., 29 June 1952, *Davis*, *Dodds* & *Çetlik* (D.19527).

Habitat (subsp. *anatolicum*): Meadows, burnsides, lake sides, etc., on mountains. Alt. 1800–2400 m. Flowering July–August.

Distribution: Greece (Mt. Oeta).

70. *T. isthmocarpum* Brot., Phyt. Lusit. i. 148, t. 61 (1816); Hayek, Prodr. Fl. Balc. i, 851 (1926).

Type—? Lisboa (LISU, n.v.).

TURKEY. Gallipoli, Helles, common especially near Helles, 23–24 Apr. 1923, *Ingoldby* 101.

Distribution: Portugal, S. Spain, Gibraltar, N. Morocco, N. Algeria; Thrace. There is a specimen of this species at Kew from near Paris and one from near Bristol. To these places as well as to the neighbourhood of Gallipoli the species must have been introduced from the Iberian Peninsula and N. Africa where it is now centred.

The stipules in *T. isthmocarpum* are extremely thin, membranaceous and more or less transparent, and, as in *T. nigrescens*, they are amplexicaul. In mature pods the constriction between the two seeds reaches almost to the dorsal suture.

71. *T. nigrescens* Viv., Fragm. Fl. Ital. i, 12, t. 13 (1808).

1a. Ovules usually 4, rarely 5–6 or by abortion 3. Pods shallowly constricted between the seeds: (Mediterranean coasts of Europe and N. Africa)

subsp. *nigrescens*

1b. Ovules 2, pods deeply constricted between the seeds: (Orient)

subsp. *petrisavii*

* Ball's and Sintenis's specimens are intermediates between subsp. *hybridum* and subsp. *anatolicum*, but *Balansa* 170 is a mixture of an intermediate and subsp. *anatolicum*.

subsp. **nigrescens**

Type—Italy: "Reperi in littore Romano, non longe ab Ostia, nunc Fiumicino", *Viviani* (?Genoa)

subsp. **petrisavii** (Clem.) Holmboe, *Studies Veg. Cyprus*, 106 (1914). *Icon.*: Reichenbach, *l.c.* Fl. Germ. Helv. xxii, t. 116 (1903).

Syn.: *T. prostratum* Biasol. sensu Griseb., *Spicil. Fl. Rum. Bith.* i, 29 (1843).

T. petrisavii Clem., *Sert. Orient.* 32 t. 7, f. 2 (1855)—basionym.

T. hygrophilum Boiss., *Diagn. Ser. II* (2), 18 (1856).

T. nigrescens Viv. var. *petrisavii* (Clem.) Gib. & Belli in *Atti. R. Accad. Sc. Tor.* xxii, 633 (1887).

1a. Stems fistulose, usually 30–35 cm. high and 3–5 mm. thick; leaflets usually 20–25 × 12–20 mm. var. *meneghinianum*

1b. Stems slender, usually 10–20 cm. high and 1–2 mm. thick; leaflets usually 8–15 × 8–13 mm. var. *petrisavii*

var. **petrisavii**

Type—Turkey: "Copiose provenit in collibus Constantinopolitanis ultra il Gran Campo et tota aestate floret," a. ? 1850, *Clementi* (? Turin).

TURKEY. Gelibolu, Helles, 23–24 Apr. 1923, *Ingoldby* 76. Istanbul, near Büyükdere, 24 May 1896, *Aznavour*. Smyrne (Izmir), sur les coteaux incultes, 9 May 1854, *Balansa* 164; *ibid.*, in pratis pr. Kokarialis & Giostepe, 3 May 1906, *Bornmüller* 9362. Prov. Konya: Akşehir, 1000 m., 22 June 1899, *Bornmüller* 3254. Antalya, 30 m., 22 Apr. 1936, *Tengwall* 465; *ibid.*, 1 May 1860, *Bourgeau* 100. Prov. Mersin, dist. Anamur: Anamur—Gilindire, 20 m., 14 Apr. 1956, *Davis & O. Polunin* (D.26005); foot of Kaldoken Dağ near Anamur, 100 m., 13 Apr. 1956, *Davis & O. Polunin* (D.25936). Prov. Adana: Ceyhan—Osmaniye, 500 m., 17 May 1957, *Davis & Hedge* (D.26708); Toprakkale, 300 m., 20 Apr. 1957, *Davis & Hedge* (D.26921). Prov. Hatay: Iskenderun, Mar. 1931, *Rogers* 3690. Prov. Diyarbakir: 8 km. from Diyarbakir towards Çınar, 650 m., 31 May 1957, *Davis & Hedge* (D.28773). Prov. Mardin: 24 km. from Diyarbakir towards Mardin, 1000 m. alt., 27 May 1957, *Davis & Hedge* (D.28851).

CYPRUS. Nicosia, *Rogers*. In campis pr. Kythraea, April 1880, *Sintenise & Rigo* 410. Kyrenia, sea level, 30 Apr. 1956, *Atherton* 1341. Syrianokhori, near Morphou, 13 Mar. 1941, *Davis* 2618. Drousha, 1 May 1941, *Davis* 3264. Platres, 1140 m., 3 June 1938, *Kennedy* 1288.

RHODES. Bords des fosses près Salakos, 2 June 1870, *Bourgeau*.

LEBANON. Ruines d'un puits près du port de Barghout, environs de Saida, 6 Apr. 1853, *Blanche* 1014. Beirut, 20 May 1871 *Herb. Post.*

PALESTINE. Acre, 15 Apr. 1926, *Jolles* 119. Magdala, a. 1863–64, *Lowne*. Moab: between Es-Salt and Wadi Rumeimin, 600 m., 1 May 1911, *Meyers & Dinsmore* M1722. Jaffa, 7 Apr. 1897, *Bornmüller* 457. Binyamina—Caesarea, 8 Apr. 1942, *Davis* 4430.

IRAQ. Mosul liwa, Ain Sifui, 390 m., 8 June 1932, *Selim Effendi* 2551. Dohuk, 8 June 1932, *Mekki Beg* 3290. Nimrud, 20 Apr. 1955, *Helbaek* 951. Habitat: Coastal sand dunes, river banks, roadsides, fallow fields, edges

of corn-fields, vineyards, dryish places in the marshes, humid pastures, dry mountain slopes, rocky limestone slopes, basalt hillsides and gullies, etc. Alt. 0–1140 m. Flowering March–June.

var. *meneghinianum* (Clem.) Hossain, **comb. et stat. nov.**

Basionym: *T. meneghinianum* Clem., Sert. Or. 31, t. vii, f. 1 (1855).

Type—Turkey: "In collibus Constantinopolitanis ultra il Gran Campo una vice aestate 1850", *Clementi* (iso. ? G, fide Boissier, Fl. Or. ii, 144: 1872).

TURKEY. Constantinople (Istanbul), in graminosis prope Zekeriekeny, May–June 1907, *Aznavour* 4863.

PALESTINE. Jordan: Ain Bellata, 2 m., 13 May 1911, *Meyers & Dinsmore* 5245.

Habitat: Damp places. Flowering May–June.

Distribution: N.W. Turkey, S. Turkey, Lebanon, Caucasus.

The two subspecies of *T. nigrescens* are recognized on the basis of the number of ovules in each ovary correlated with geographical distribution. Subspecies *petrisavii* occurs in the Mediterranean coastal regions of Turkey, Lebanon and Palestine, and further inland, in Iraq and Armenia. Throughout this region, not a single specimen was found with more than two ovules in the ovary. Similarly, with the exception of one specimen from St. Vallier (Alpes marit.) all the specimens from Greece to Spain were found to contain (3)–4–(5–6) ovules in each ovary. The rare 3–ovuled plants were from Greece. In both the subspecies the flower-colour varies from white to creamy-white to pink.

72. *T. michelianum* Savi, Fl. Pis. ii, 159 (1798); Hayek, Prodr. Fl. Balc. i, 851 (1926). *Icon.*: Micheli, Nov. Pl. Gen. t. 25, f. 2 (1729); Gardner in Journ. Dept. Agri. West Austral. Ser. III. vi (2), 168, f. 16 (1957)—*T. balansae* Boiss.

Syn.: *T. balansae* Boiss., Diagn. Ser. II (5), 81 (1856)!

T. michelianum Savi var. *balansae* (Boiss.) Azn. in Mag. Bot. Lap. xii, 161 (1913)!

Type—Italy: "Circa Bientinum". (?).

TURKEY. Prov. Çanakkale: Thymbra, in valle Kimar-Su, 4 May 1883, *Sintenis* 371. Prov. Izmir: Cordilio, près de Smyrne (Izmir), dans les champs en friche, 9 May 1854, *Balansa* 158 (iso. *T. balansae*).

Distribution: France, Sicily, Italy, Iberian Penins., Corsica, Sardinia, Sicily, Serbia, Macedonia, Thrace, Bosnia, Romania, Crete.

T. michelianum is closely related to *T. angulatum* W. & K. It can be distinguished from the latter by its 2-ovuled ovary (4-ovuled in *T. angulatum*) and by the much larger size of its flowers and pedicels.

73. *T. retusum* L., Demonstr. Pl. 21 (1753). *Icon.*: Waldst. & Kit. Pl. Rar. Hung. iii, t. 252 (1812).

Syn.: *T. parviflorum* Ehrh., Beitr. Nat. vii, 165 (1792); Boissier, Fl. Or. ii, 143 (1872); Hayek, Prodr. Fl. Balc. i, 852 (1926).

TURKEY. Phrygia, in reg. subalp. montis Sultan dağ prope Akşehir (Pro. Konya), 1600 m., 21 June 1899, *Bornmüller* 4348. Lydia, in reg. pinetorum montis Yamanlar dağ, dit. Smyrna (Izmir), 700-900 m., 22 May 1906, *Bornmüller* 9357. Kurdistan: Suverek, in lapidosis prope Kainar, 25 May 1888, *Sintenis* 694.

Habitat: Pinewoods in the subalpine zones of mountains; stony places etc. Alt. 700-1600 m. Flowering May-June.

Distribution: Spain, Pyrenees, C. France, Czechoslovakia, Hungary, Serbia, Greece, Bulgaria, Romania, Caucasus, Crimea.

The peduncles vary considerably in length but are always shorter than the subtending leaf.

4. **Sect. *Micrantheum*** (Presl) Gib. & Belli in Mem. Accad. Sc. Tor. Ser. II. xli, 197 (1891).

Basionym: *Micrantheum* Presl, Sym. Bot. i, 47 (1832).

Syn.: *Trifolium* L. Subsect. *Micrantheum* (Presl) Čelak. in Oest. Bot. Zeitschr. xxiv (2), 41 (1874).

Lectotype: *T. glomeratum* L.

Annuals. Capitula sessile, axillary. Flowers sessile. Calyx thick, tube 10-nerved, teeth reflexed or more or less recurved. Corolla more or less equal to the calyx, vexillum free from the other petals. Pods 2-seeded.

Key to the Species

- 1a. Corolla included within the calyx; calyx-tube sparingly pilose ± smooth, teeth recurved but not reflexed; plants caespitose; leaflets faintly nerved, denticulate 75. *T. suffocatum*
- 1b. Corolla exserted; calyx-tube glabrous, sulcate, teeth reflexed; stems well-developed, ± ascending; leaflets nervose, sharply serrulate 74. *T. glomeratum*

74. ***T. glomeratum*** L., Sp. Pl. ii, 770 (1753); Boissier, Fl. Or. ii, 142 (1872); Hayek, Prodr. Fl. Balc. i, 855 (1926); Post, Fl. Syr. Pal. Sin. ed. 2, i, 347 (1932). *Icon.*: Sowerby & Sm., Engl. Bot. xv, t. 1063 (1802); Fiori & Paol., Ic. Fl. Ital. ii, 238 (1899); Ross-Craig, Drawings Br. Pl. pt. vii, pl. 33 (1954).

TURKEY. Bithynia, Brussa (Bursa), in saxosis inferioris montis Olympi (Ulu dag), 200 m., 21 May 1899, *Bornmüller* 4349. Constantinople (Istanbul), *Aucher* 1228. Dardanelles prope Kurschunlu, 28 May 1883, *Sintenis* 855.

CYPRUS. Platres, 1200 m., 3 June 1938, *Kennedy* 1279; *ibid.*, 1125 m., 15 May 1938, *Kennedy* 1281.

IRAN. Lahijan, Guilan, June 1937, *Lindsay* 841.

Habitat: Rocky places, among bushes under Pine trees, fallow lands, dry banks, etc. Alt. 200-1200 m. Flowering May-June.

Distribution: S. England, Portugal, Spain, S. France, Corsica, Sicily, Italy, Dalmatia, Greece, Aegaeon Is.

In the Orient, the species has also been reported from the Turkish provinces of Izmir, Aydin and Rize and from Lebanon by Boissier.

75. *T. suffocatum* L., Mant. Pl. ii, 276 (1771); Boissier, Fl. Or. ii, 142 (1872); Hayek, Prodr. Fl. Balc. i, 855 (1926); Post, Fl. Syr. Pal. Sin. ed. 2, i, 347 (1932). *Icon.*: Sowerby & Sm., Engl. Bot. xv. t. 1049 (1802); Reichenbach, Ic. Fl. Germ. Helv. xxii, t. 110 (1903); Ross-Craig, Drawings Brit. Pl. pt. vii, pl. 34 (1954).

CYCLADES. In aridis insulae Cythni, 3 Apr. 1900, *Tuntas* 1531.

CYPRUS. Platanissa, Karpas, threshing floor outside village underneath *Melilotus* sp., 45 m., 7 Apr. 1950, *Chapman* 258.

Distribution: S. & E. England, France, Spain, Gibraltar, Sardinia, Sicily, Istria, Albania, Greece, Balearic Is., Italy, Yugoslavia, Bulgaria, Caucasus, N. Africa, Canaries, Madeira.

In the Orient, the species has also been reported from the coastal regions of S. Turkey by Boissier and from Palestine by Post.

Subgen. 8. *Chronosemium* (Ser.) Hossain, stat. nov.

Basionym: *Trifolium* L. Sect. *Chronosemium* Ser. in DC., Prodr. ii, 204 (1825).

Syn.: *Amarens* Presl, Symb. Bot. i, 46 (1832).

Lectotype: *T. badium* Schreb.

Annuals or perennials. Leaves pinnately or palmately trifoliate. Inflorescence capitate, mostly ovoid. Flowers shortly pedicelled, subtended at the base by a few short, red, glandular hairs representing the bracts, usually reflexed and squamously imbricate when mature. Calyx membranaceous, bilabiate, tube 5-nerved, upper two teeth $\pm$ equal to the tube, lower three usually twice as long, all with 1 or 2 terminal glandular or eglandular hairs. Corolla usually yellow, pink or violet, turning brown after maturation, persistent and scarious; vexillum obovate to oblong-obovate, sometimes longitudinally folded, sometimes abruptly narrowed at the throat and clawed below, with an orbicular or spoon-shaped lamina (except in *T. stipitatum* where the corolla is tubular below). Pods stipitate, reaching beyond the calyx, but remaining within the carina, 1-seeded.

Key to the Oriental Species

1a. Perennials. Terminal leaflet sessile:

- 2a. Calyx purple or pink, glabrous; capitula lax, usually 4–12 flowered; united (lower) part of the corolla longer than the calyx (tube + teeth); vexillum folded; stipe of the ovary c. 4 mm. long; flowers 8–12 mm. long, mauve 76. *T. stipitatum*

- 2b. Calyx greenish white, lower lobes ciliate or sparingly pilose; capitula dense and many flowered; united (lower) part of the corolla $\pm$ equal to the calyx-tube; vexillum longitudinally half-folded or $\pm$ oblong spoon-shaped when mature; stipe of the ovary inconspicuous; flowers 5–7 mm. long:

- 3a. Corolla chestnut- or chocolate-brown in mature flower

77. *T. badium* subsp. *rytidosemium*

- 3b. Corolla dark brown (almost black) in mature flower

78. *T. spadicum*

- 1b. Annuals. Terminal leaflet stalked or subsessile:
- 4a. Terminal leaflets subsessile (petiolule minute):
- 5a. Flowers 3-5 per inflorescence, 3(-4) mm. long (pedicel excluded); peduncles slender thread-like and weak. Vexillum longitudinally folded; petioles shorter than the stipules 90. *T. filiforme*
- 5b. Flowers more than 10 per inflorescence, (4-) 5-6 mm. long (pedicel excluded); peduncles relatively thick, stiff and straight:
- 6a. Stems $\pm$ rigid, erect or ascending; stipules oblong lanceolate; capitula ovoid, many-flowered, compact, 15-20 $\times$ 12-14 mm., reflexed flowers squamosely imbricate:
- 7a. Corolla dark-brown (almost black) in mature flower; petioles (except in the case of uppermost leaves) much longer than the stipules 78. *T. spadiceum*
- 7b. Corolla chestnut-brown in mature flower; petioles usually shorter than the stipules 86. *T. agrarium*
- 6b. Stems slender and weak, procumbent or decumbent; stipules $\pm$ ovate-acuminate; capitula $\pm$ hemispherical usually 12-20 flowered, rather lax, 7-8 mm. long and c. 10 mm. broad; reflexed flowers not squamosely imbricate:
- 8a. Stipules foliaceous and (except in the basal leaves) equal to or longer than the petioles; corolla (in vivo) golden yellow: (Italy, Balkan Penins. and around Istanbul) 85. *T. patens*
- 8b. Stipules membranaceous, always shorter than the petioles, corolla (in vivo) rose: (Palestine) 84. *T. erubescens*
- 4b. Terminal leaflets with a conspicuous petiolule:
- 9a. Flowers (6-) 7-9 mm. long (pedicel excluded):
- 10a. Lower (anterior) part of the calyx rather densely hairy:
- 11a. Lamina of mature vexillum orbicular, vexillum c. 6 mm. long; peduncles with spreading hairs. Inflorescence spicate, oblong to cylindrical; reflexed flowers squamosely imbricate 79. *T. billardieri*
- 11b. Lamina of mature vexillum obovate ($\pm$ oblong), vexillum c. 9 mm. long; peduncles adpressed pubescent 80. *T. stenophyllum*
- 10b. Lower (anterior) part of the calyx glabrescent or sparingly pilose with long soft hairs:
- 12a. Mature vexillum boat-shaped (oblong and longitudinally folded); stems and peduncles with spreading hairs. Flowers (in vivo) yellow, c. 9 mm. long 82. *T. boissieri*

12b. Vexillum abruptly constricted at the throat and clawed below, lamina orbicular or spoon-shaped; stems and peduncles with adpressed hairs:

13a. Corolla (in vivo) violet, c. 9 mm. long; claw of the vexillum c. 4 mm. long and c. 1.5 mm. broad, lamina c. 5 mm. $\times$ 5 mm. 81. *T. speciosum*

13b. Corolla (in vivo) yellow, c. 7 mm. long; claw of the vexillum c. 2 mm. long, lamina 4–5 mm. $\times$ 3–4 mm.

83. *T. mesogitanum*

9b. Flowers only 4–5 mm. long (pedicel excluded):

14a. Capitula many-flowered, ovoid and compact; reflexed flowers squamosely imbricate:

15a. Stems usually (20–) 25–35 cm. tall, diffuse and divaricately branched; corolla thin and papery 88. *T. procumbens*

15b. Stems usually 8–15 (–18) cm. tall, sparingly branched; corolla relatively thick 87. *T. glaucescens*

14b. Capitula 10–12 flowered, subglobose, rather lax; reflexed flowers not squamosely imbricate. Stem slender, dwarf (5–8(–10) cm. tall), erect, simple, rarely branched

89. *T. pumilum*

76. *T. stipitatum* Boiss. & Bal. in Boiss., Fl. Or. ii, 149 (1872).

Syn.: *T. sintenisii* Freyn in Oest. Bot. Zeitschr. xli, 404 (1891).

Type—Turkey: “Vallée sous-alpine de Djimil (Lazistan), vers 2300 metres d'altitude—prairies humides”, Aug. 1866, *Balansa* 1404 (holo. G! iso. K!).

TURKEY. Prov. Giresun: Balabandağlari, above Tamdere at Avsar, 2400 m., 7 Aug. 1952, *Davis, Dodds & Çetik* (D.20568). Prov. Trabzon: N. side of Soğanlı Dağ, above Çaykara, 2000–2200 m., 4 Aug. 1957, *Davis & Hedge* (D.32153). Prov. Gümüşane: Karagoell dagh, ad Kuduk goell, 31 July 1894, *Sintenis* 7157 (as *T. sintenisii* Freyn); N. of Bayburt, 2790 m. alt., 26 July 1934, *Balls* 1846.

Habitat: Alpine bogs, marshy meadows, moist acid turf, etc. Alt. 2000–2800 m. Flowering July–August.

Distribution: Endemic to N.E. Turkey and adjacent parts of Transcaucasia.

Freyn's discrimination of *T. sintenisii* by “foliolis cuneato-obcordatis (nec obovatis), capitulis majoribus, plurifloris, etc. . . .” is untenable. In the type of *T. stipitatum* the leaflets of the lower leaves are obcordate, though those of the upper leaves are rather retuse at the tips than emarginate. In the other specimens cited above, the leaflets are all, to a greater or lesser extent, obcordate. The flowers range from 8–12 mm. in length and their number varies from 4–12 per capitulum. The stems are usually upright or ascending and 5–16 cm. high.

T. stipitatum is distinct from all other species of the subgenus by its corolla being united and tubular below.

77. **T. badium** Schreb. in Sturm, Deutschl. Fl. I. Heft. xvi, t. 12 (1804).

1a. Leaflets 10–15 mm. $\times$ 6–8 mm.; plants dwarf, often caespitose, stems usually procumbent, 7–12 cm. tall. Flowers c. 5 mm. long, golden yellow when young, brown (not as dark as in *T. spadiceum*) when mature: (S.E. Turkey, Iraq)

subsp. *rytidosemium* var. *rivulare*

1b. Leaflets usually 20–25 (–30) mm. $\times$ 10–12 (–15) mm.; stems upright or ascending, usually 15–35 (–40) cm. tall. Flowers golden yellow or cream when young, chocolate or chestnut brown when mature:

2a. Stems c. 15 cm. tall, rarely 20 cm.; corolla golden yellow when young, chocolate brown when mature: (C. & S. Europe)

subsp. *badium*

2b. Stems usually 25–35 cm. tall; corolla creamy-white when young, light chestnut when mature: (N. & N.E. Turkey, Caucasus, N. Iran)

subsp. *rytidosemium* var. *rytidosemium*

subsp. ***rytidosemium*** (Boiss. & Hoh.) Hossain, **comb. et stat. nov.**

Basionym: *T. rytidosemium* Boiss. & Hoh. in Boiss., Diagn. Ser. I (9), 29 (1849)!

var. ***rytidosemium***

Syn.: *T. rytidosemium* Boiss. & Hoh. var. *longipes* Boiss. Fl. Or. ii, 149 (1872).

Holotype—Iran: In monte Totschal prope Teheran, a. 1843, *Kotschy* 704 (G!).

TURKEY. Prov. Trabzon: N. side of Soğanlı Dağ above Çaykara, 2200 m., 4 Aug. 1957, *Davis & Hedge* (D.32143). Prov. Rize, dist. İkizdere: Yetimhoca (Cimil), 2100 m., 27 Aug. 1952, *Davis, Dodds & Çetik* (D.20992); vallée sous-alpine de Djimil (Rize), vers 2300 m., Aug. 1866, *Balansa* 1405. Prov. Kars: Sarikamiş, 2100 m., Aug. 1957, *Davis & Hedge* (D.32639). Prov. Gümüşane: Haldizan, N. of Bayburt, 2700 m., 27 July 1934, *Balls* 1854; Hamsekeui, 1500 m., 11 July 1934, *Balls* 1649; Argyri dag, 14 July 1894, *Sinten* 6268; Karagoell dag, in valle Schadachlar, 3 Aug. 1894, *Sinten* 7159. Prov. Erzincan: Keşiş Dağ above Cimin, 2450 m., 28 July 1957, *Davis & Hedge* (D.31808). Prov. Giresun: Balabandağlari (Kilinç Tepe) above Tamdere, 2700 m., 7 Aug. 1952, *Davis, Dodds & Çetik* (D.20549).

N. IRAN. Judi Elbursensis occid. in alpinis pr. Asabdar, c. 2500 m., 26 June 1902, *Bornmüller* 6603. Prov. Mazanderan: in decliv. boreal. judi Kandavan, 2600–3000 m., 25 Aug. 1948, *K. H. & F. Rechner* 6770.

Habitat: Marshy meadows, pastures, stream-sides etc. in the valleys and declivities of the mountains. Alt. 1500–3000 m. Flowering June–August.

Distribution: Caucasus.

One of the peduncles in the type (*Kotschy* 704) is 18 cm. long, others vary from 7–11 cm. In other specimens, including those from near the type-locality (cf. *Bornmüller* 6603 and *Rechner* 6770), the length of the peduncles ranges from 5–10 cm. It seems, therefore, that the extraordinarily long peduncle of the type represents an individual variation rather than a characteristic of a population.

var. *rivulare* (Boiss. & Bal.) Hossain, **comb. et stat. nov.**

Basionym: *T. rivulare* Boiss. & Bal. in Boiss., *Diagn. Ser. II* (6), 49 (1859)!

Holotype—Turkey: in rivulos reg. alp. mont. Aslan-Dach Antitauri in Cappadocia, Aug. 1856, *Balansa* 148 (G!).

TURKEY. Cappadocia (Argaeus), 2000 m., 20 July 1898, *Siehe* 203. Prov. Hakkari: Cilo Dağ, 10 kw. W. of Cilo Tepe, 3150 m., 9 Aug. 1954, *Davis & O. Polunin* (D.24168). Prov. Bitlis: Süphan Dağ, 2800 m., 28 Aug. 1954, *Davis & O. Polunin* (D.24725). Prov. Van, dist. Şatak: Kavuşşahap Dağ, 2700 m., 24 July 1954, *Davis & O. Polunin* (D.23065).

IRAQ. Erbil liwa: N.E. slope of Arl Gird Dagħ, 2760 m., 5 Aug. 1947, *Gillett* 9581; *ibid.*, 2700 m., *Guest* 2962; *ibid.*, 1800 m., *Guest* 2851.

S. IRAN. Shahzade Kuh, 2900 m., 30 June 1941, *Parsa* 300.

Habitat: Damp pastures by stream, marshy places by lake, etc. Alt. 1800–3150 m. Flowering June–August.

78. *T. spadiceum* L., *Fl. Suec.* ed. 2, 261 (1755); Boissier, *Fl. Or.* ii, 150 (1872); Hayek, *Prodr. Fl. Balc.* i, 849 (1926). *Icon.*: Sturm, *Deutschl. Fl. IV*, xvi, t. 251 (1804).

Syn.: *T. litigiosum* Desv. in *Ann. Sc. Nat. Ser. I*, xiii, 329 (1828).

TURKEY. Prov. Gümüşane: Hamşekui, 1200 m., 11 July 1934, *Balls* 1646; Boejukdere supra Artabir, 21 July 1894, *Sintenis* 7158. Prov. Çoruh (Artvin): Ardanuc—Kordevan Dağ (Artvin—Ardahan), 1450 m., 27 June 1957, *Davis & Hedge* (D.30122). Prov. Kars: Yalnizçam, 1900 m., 16 June 1957, *Davis & Hedge* (D.29659); Hacıvan (Kars—Ardahan), 1900 m. alt., 30 June 1957, *Davis & Hedge* (D.30476). Anatolia, *Wiedemann* 34.

IRAN. Koschadara, *Szovitz* 487.

Habitat: Marshy mountain-meadows, etc. Alt. 1200–1900 m. Flowering June–July.

Distribution: The whole of Europe, Caucasus.

T. spadiceum is an annual in Europe, but the Oriental specimens cited above suggest, at least, a biennial habit; it therefore appears in both the annual and perennial sections of the key.

The species can be recognized by its characteristic dark brown capitula which are much darker than those in *T. badium* and usually smaller. Unlike most of those in *T. badium* var. *rivulare*, the stems in *T. spadiceum* are usually upright or ascending.

79. *T. billardieri* Sprengel, *Syst. Veg.* iii, 211 (1826) ("*Billardieri*").

Syn.: *T. comosum* Labill., *IC. Pl. Syr. Decas* v, 15, t. 10 (1812)!, non L. (1753).

T. speciosum Willd. sensu Ser. in DC., *Prodr.* ii, 205 (1825).

Type—Lebanon: Habitat juxta Baruthum Syriae, a. 1786–87, *Labillardière* (? FI, ? iso. K!).

LEBANON: Sables ferrugineux du cap de Beyrouth, 3 May 1853, *Blanche* 1006; *ibid.*, *Post* 18.

PALESTINE: Ramleh, 50 m., 30 Apr. 1911, *Dinsmore* 1559.

Habitat: Sandy places. Flowering April–May.

Distribution: Endemic to Lebanon and Palestine.

80. *T. stenophyllum* Boiss., Diagn. I (9), 30 (1849); Boissier, Fl. Or. ii, 151 (1872); Post, Fl. Syr. Pal. Sin. ed. 2, i, 349 (1932).

Type: In arenosis Palaestinae circa Gaza, May 1846, *Boissier* (holo. G! iso. K!).

PALESTINE: Harzlia nr. Tel-Aviv, sandy fields, 26 Apr. 1928, *Eig, Feinbrun & Zohary* 69; Jaffa, 7 Apr. 1897, *Bornmüller* 458. Ramleh, 50 m., 30 Mar. 1911, *Dinsmore* 1558. Even Yehuda, 13 Mar. 1942, *Davis* 4075. Jebel Montar, 100 m., 3 Apr. 1911, *Dinsmore* 3558.

Habitat: Sandy places. Alt. 0–100 m. Flowering March–May.

Distribution: Endemic to the coastal plains of Palestine and adjacent parts of N. Egypt.

81. *T. speciosum* Willd., Sp. Pl. ii, 1382 (1802); Boissier, Fl. Or. ii, 151 (1872); Hayek, Prodr. Fl. Balc. i, 850 (1926); Post, Fl. Syr. Pal. Sin. ed. 2, i, 350 (1932). *Icon.*: Sibth. & Sm., Fl. Graeca, viii, t. 754 (1833).

Syn.: *T. gussoni* Ten., Pl. Rar. Sicil. Pugill. i, 17 (1817).

Type—Crete: *Vieweg* (holo. Herb. Willd. 14240, Berlin, photo. E!).

TURKEY. Prov. Çanakkale: Renkoei (? nr. Erenköy), in valle Dumbrek, 30 Apr. 1883, *Sinten* 171. Prov. Izmir: Izmir, ad castellum, 2 May 1906, *Bornmüller* 9378; *ibid.*, sur les collines incultes, 20 Apr. 1854, *Balansa* 172; *ibid.*, *Ball*; *Fleischer*. Prov. Ankara: Hacikadun valley near Keciören, 900 m. alt., 11 June 1952, *Davis, Dodds & Çetik* (D.18810). Prov. Gaziantep: Karataş, 990 m., 3 May 1935, *Balls* 2216. Prov. Mardin: 24 km. from Diyarbakir towards Mardin, 1000 m., 27 May 1957, *Davis & Hedge* (D.28838). Pontus Galaticus, pr. Amasya, 500 m., 17 May 1890, *Bornmüller* 1833.

CYCLADES. Amorgos: Langadha, 150 m., 15 Apr. 1940, *Davis* 1526.

RHODES. In monte Prophet Elias pr. Salakos, c. 600 m., 10 May 1935, *K. H. & F. Reching* 7085.

SYRIA. Djebel Seman, 600 m., 20–30 May 1908, *Haradjian* 2119.

LEBANON. Ex jugo montis Libani Djebel Baruk dicto, supra Ain Zehalteh, 1600–2200 m., 25 May 1877, *Ball* 2104.

IRAQ. Gwaija dagh, Sulaimania, 5 May 1951, *Mooney* 4335. Erbil liwa: Jindian above Rowanduz, 600 m., 15 May 1947, *Gillett* 8295; Shaklava, 900 m., 9 May 1893, *Bornmüller* 1151.

N.W. IRAN. Khossamabad, 1230 m., 10 Apr. 1929, *Cowan & Darlington* 1018; *ibid.*, 16 Apr. 1936, *Trott* 410. Prov. Kermanshah, Gilan-e-Gharb, Viginan, 8 May 1948, *Behbudi* 68.

Habitat: Limestone hills, gulleys and screes in open oak scrubs, mountain steppes, waste lands, etc. Alt. 150–2200 m. Flowering April–May.

Distribution: Italy, Sicily, Greece, Aegean Is., Caucasus.

82. *T. boissieri* Guss., Fl. Sic. Syn. ii, 858 (1844) ("*Boisseri*"); Boissier, Fl. Or. ii, 152 (1872); Hayek, Prodr. Fl. Balc. i, 848 (1926); Post, Fl. Syr. Pal. Sin. ed. 2, i, 350 (1932).

Syn.: *T. speciosum* Willd. sensu Boiss., Diagn. Ser. I (2), 33 (1843).

Type—Greece: Rupibus Calidis Argolidis, April 1842, *Boissier* (as *T. speciosum* Willd., holo. Napoli; iso. K!).

TURKEY. Prov. Manisa: montis Sipyli (Manisa dag) in reg. infer., 200–300 m., 19–20 May 1906, *Bornmüller* 9382. Prov. Izmir: Smyrne (Izmir), 6 May 1854, *Balansa* 166. Adalia (Antalya), 1 May 1860, *Bourgeau* 97; in fauce Trimboukchan Pamphyliæ, May 1845, *Heldreich* (as *T. speciosum* Willd.). Prov. Mersin: bords herbeux du Guzel-Dere, au-dessus de Sedicheg, au NO. de Mersina, rég. chaude, 7 May 1855, *Balansa* 454; Corycos, 40 m., a. 1895, *Siehe* 88. Amanus, 9 May 1933, *Meinertzhagen*. Prov. Hatay: Antakya near St. Peter's Church, 300 m., *Davis & Hedge* (D.27244). Prov. Urfa: Nimrud Dag, 20 May 1888, *Sintenis* 879.

CYPRUS (N.). Yaila (Kyrenia range), 750 m., 28 Mar. 1941, *Davis* 2879; Kyrenia, Agridha, 300 m., 8 Mar. 1941, *Davis* 2490. Buffavento, near Chrysastamos, 600 m., 23 Mar. 1941, *Davis* 2818. Larnaca-tis-Lapithou, 3 Apr. 1941, *Davis* 2976.

RHODES. Pélouses du mont Smith près Rhodes, 4 May 1870, *Bourgeau*; in pinetis declivium borealium Phileremos ad Trianda, 8 May 1935, *K. H. & F. Rechinger* 7007.

PALESTINE. Galilæa, in rupest. ad fluv. Lithani (pr. Der Mimes), 21 Apr. 1897, *Bornmüller* 460. Mt. Tabor, Apr. 1846, *Boissier*; *ibid.*, *Lowne*.

IRAQ. Acra, c. 450–900 m., mid-Apr. 1932, *Qaimagam* 3082. Rowanduz gorge, c. 1000 m., 15 Apr. 1955, *Helbaek* 799.

Habitat: Grassy places on limestone and sandstone rocks, in open places as well as in thin pine forests, on hill-slopes etc. Alt. 40–1000 m. Flowering March–May.

Distribution: Greece, Aegean Is.

T. boissieri is closely related to *T. speciosum* but can be readily distinguished by its yellow flowers, longitudinally folded ($\pm$ boat-shaped) vexillum and by the spreading hairs on the stems. In *T. speciosum* the flowers are violet, the vexillum distinctly clawed with an orbicular lamina, and the stems adpressed pubescent.

83. *T. mesogitanum* Boiss., Diagn. Ser. I (2), 34 (1843); Boissier, Fl. Or. ii, 152 (1872); Hayek, Prodr. Fl. Balc. i, 848 (1926).

Syn.: *T. procumbens* L. var. *pauciflorum* Griseb., Spicil. Fl. Bith. Rum. i, 36 (1843).

Type—Turkey: "In reg. mont. super. Mesogis supra Tralles", June 1842, *Boissier* (holo. G! iso. K!).

TURKEY. Prov. Izmir: in monte Gume-dağ (Mesogis) supra Tire, 500–600 m., 14 June 1906, *Bornmüller* 9384.

Habitat: Mountain meadows, etc.

Distribution: Thrace.

T. mesogitanum Boiss. closely resembles *T. brutium* Ten. (Italy), but can be recognized by the comparatively large and rather oblong lamina of its vexillum, which in the latter species is rounded.

84. *T. erubescens* Fenzl, Pugill. Fl. Nov. Syr. 5 (1842); Boissier, Fl. Or. ii, 151 (1872); Post, Fl. Syr. Pal. Sin. ed. 2, i, 350 (1932). *Icon.*: Bouloumoy, Fl. Liban. Syr. 109 (1930).

Syn.: *T. speciosum* Willd. var. *erubescens* (Fenzl) Fenzl, Illustr. Pl. Syr. 14 (1843).

Type—"In Syria prope Suedie ad ostia Orontis", Kotschy 141 (? W).

LEBANON. Vallée de Malaoui près Tripoli, Aug. 1866, *Blanche*. Mt. Lebanon, in rupestribus Wadi Hammana, 1050–1100 m., 6 June 1910, *Bornmüller* 11673. Abieh, 29 Apr. 1866, *Herb. Post*.

PALESTINE. Wadi Fallah (Carmel), 25 Mar. 1942, *Davis* 4176. Galilaea, ad Safed, c. 900 m., 22 Apr. 1897, *Bornmüller* 459. Between Ajlun and Mar. Elias, 2 May 1945, *Davis* 9440. Ajlun, 760 m., 5 May 1911, *Meyers & Dinsmore* G.746. Jerusalem, 800 m., 28 Apr. 1905, *Dinsmore* 2746.

Habitat: Rocky places in the garigues, declivities, etc. on the hills and mountains. Alt. 700–1100 m. Flowering March-May.

The salient distinguishing features between *T. erubescens* and *T. speciosum* are tabulated below:

<i>T. erubescens</i>	<i>T. speciosum</i>
1. Leaves with subsessile terminal leaflet.	1. Leaves with distinctly stalked terminal leaflet.
2. Flowers c. 6 mm. long; calyx glabrous; vexillum hardly clawed, oblong-obovate, longitudinally folded.	2. Flowers c. 9 mm. long; calyx sparingly pilose; vexillum distinctly clawed, lamina orbicular, c. 5 × 5 mm., claw abruptly narrowed, c. 4 × 1.5 mm.

T. erubescens is close to *T. patens*, but differs by its smaller, whitish-green and membranaceous stipules which in the latter species are much larger, green and more or less foliaceous. In addition, the two species also differ in their geographical distribution.

85. *T. patens* Schreb. in Sturm, *Deutschl. Fl.* IV. xvi, t. 256 (1804); Boissier, *Fl. Or.* ii, 153 (1872); Hayek, *Prodr. Fl. Balc.* i, 849 (1926).

TURKEY. Eastern side of Bosphorus, 7 June 1877, *Ball* 2537.

Distribution: France, Corsica, Italy, Switzerland, Austria, Serbia, Romania, Bulgaria, Greece, Crete.

86. *T. agrarium* L., *Sp. Pl.* ii, 772 (1753); Schreber in Sturm, *Deutschl. Fl.* IV, xvi, t. 250 (1804); Seringe in DC., *Prodr.* ii, 205 (1825).

Syn.: *T. strepens* Crantz, *Stirp. Austr.* ed. 2. fasc. v, 411 (1769); Hayek, *Prodr. Fl. Balc.* i, 849 (1926).

T. aureum Poll., *Hist. Pl. Palat.* ii, 344 (1777); Boissier, *Fl. Or.* ii, 153 (1872).

TURKEY. Prov. Trabzon: N. slope of Soğanlı Dağ, above Çaykara, 1300 m., steep banks, fl. flava, 5 Aug. 1957, *Davis & Hedge* (D.32076).

Distribution: S. Scandinavia, France, Switzerland, Germany, Austria, N. Italy, N. Balkan Penins., S. Russia, Caucasus.

87. *T. glaucescens* Hausskn. in *Mitteil. Thur. Bot. Ver. N.F.* v Heft, 79 (1893).

1a. Leaflets of the upper leaves usually 13–17 × 6–8 mm.: capitula (peduncles included) shorter than the subtending leaves; stems often covered with ± spreading hairs var. *macrophyllum*

- 1b. Leaflets of the upper leaves usually $7-10 \times 4-5$ mm.; capitula (peduncles included) longer than the subtending leaves or $\pm$ equal; stems usually adpressed-pubescent var. *glaucescens*

var. *glaucescens*

Syn.: *T. agrarium* L. var. *subsessile* Boiss., Fl. Or. ii, 154 (1872).

T. campestre Schreb. var. *subsessile* (Boiss.) Hayek, Prodr. Fl. Balc. i, 848 (1926).

Type—Syria: "In hort. oliv. pr. Aleppo, alt. 1200 ped." 22 Mar. 1865, *Hausknecht* (iso. K!).

TURKEY: Prov. Urfa: c. 20 km. from the turning to Sürüç towards Urfa, 600 m., 14 May 1957, *Davis & Hedge* (D.27982). Prov. Mardin: 12 km. from Mardin towards Nusaybin, 750 m., 22 May 1957, *Davis & Hedge* (D.28485); 24 km. from Mardin towards Diyarbakir, 1000 m., 27 May 1957, *Davis & Hedge* (D.28856, forma atypica). Prov. Adana, dist. Osmaniye: Toprakkale 80 m., 20 Apr. 1957, *Davis & Hedge* (D.26910). Prov. Antalya: Manavgat—Kara point, 10 Apr. 1956, *Davis & O. Polunin* (D.25832); Adalia (Antalya), 28 Apr. 1860, *Bourgeau* 96.

CYPRUS. Dist. Famagusta: Gastria, 27 Feb. 1941, *Davis* 2429. Papusta (Agios), 1200 m., 9 Apr. 1941, *Davis* 3106. Agia Irini (Morphou), sandy flats, 3 Mar. 1941, *Davis* 2546.

PALESTINE. Prope Nazareth, ex collibus, May 1877, *Ball* 1297. Jaffa, 7 Apr. 1897, *Bornmüller* 466. Jerusalem, 800 m., 30 Mar. 1903, *Meyers* 580. Medeba, 770 m., 24 Apr. 1911, *Meyers & Dinsmore* M.1343. Prope Bireh, May 1877, *Ball* 1124.

Habitat: Fallow fields, disturbed calcareous steppes, limestone gully in oak-scrub, schistose hills, dry igneous slopes, sandy flats, etc. Alt. usually 0–800 m. Flowering Feb.–May.

var. *macrophyllum* Hossain, var. nov. A typo foliolis majoribus, capitulis brevipedunculatis, foliis brevioribus differt.

Caulis 10–15 cm. altus, simplex vel parce ramosus, saepe subpatule hirsutus. Foliola oblonga-obovate apice retusa, $13-17 \times 6-8$ mm.

Holotype: Palestine: Wadi Fallah (Carmel), pathside, flowers yellow, 25 Mar. 1942, *Davis* 4173 (E!).

LEBANON. Saida, *Blanche*.

PALESTINE. Mt. Carmel, 200 m., 7 Apr. 1911, *Meyers & Dinsmore* 6580. Mt. Tabor, a. 1863–64, *Lowne*. Ain et Tabigha, 200 m., 1 Apr. 1911, *Meyers & Dinsmore* 3343. Ramleh, 50 m., 24 Apr. 1912, *Meyers & Dinsmore* 8580^b. Gaza, 50 m., 31 Mar. 1911, *Dinsmore* 4580. Jordan, Ajlun, 2 May 1945, *Davis* 9433 (forma depauperata). Jerusalem, 800 m., March, *Meyers & Dinsmore* B.2580 (a little more branched than usual).

Habitat: Fields, roadsides, etc. Alt. up to 800 m. Flowering March–April.

T. glaucescens is very variable. The Cilician and Pamphylian specimens are atypical and rather intermediate between *T. glaucescens* and *T. pseudo-procumbens* Gmel. Similarly, the specimens from Cyprus are more dwarf in habit than most of the mainland material and have more slender stems. The length of the peduncles, like the size of the leaflets, shows considerable variation. Even within each of the two varieties recognized above (with the

relative lengths of the leaves and the capitula as a diagnostic character), it is far from constant. In var. *macrophyllum* the capitula are subsessile to distinctly pedunculate. But they usually do not extend beyond the subtending leaves. In var. *glauescens*, on the other hand, the peduncles are usually much longer. Although in some cases they are as short as in the other variety, the capitula are usually longer than their subtending leaves.

The species is closely related to *T. procumbens* and *T. pseudoprocumbens*, but differs from both by its relatively thick, stiff and opaque corolla which in the latter two species is thin, papery and usually semi-transparent.

88. *T. procumbens* L., Sp. Pl. ii, 772 (1753); Seringe in DC. Prodr. ii, 205 (1825); Boissier, Fl. Or. ii, 153 (1872) (as *T. agrarium*).

Syn.: *T. campestre* Schreb. in Sturm, Deutschl. Fl. IV, xvi, t. 253 (1804); Hayek, Prodr. Fl. Balc. i, 847 (1926); Post, Fl. Syr. Pal. Sin. ed. 2, i, 350 (1932).

TURKEY. Prov. Trabzon: Of, sea level, 5 Aug. 1957, *Davis & Hedge* (D.32017); Trabzon, 30 m., 6 July 1934, *Balls* 1595. Prov. Giresun: Tamdere—Yavuzkema, near Karınca, 1500 m., 13 Aug. 1952, *Davis, Dodds & Çetik* (D.20712).

N. PALESTINE. Ramleh, 50 m., 24 Apr. 1912, *Meyers & Dinsmore* B.6580. IRAN. Prov. Gorgan: Bandar Gaz, 26 May 1948, *Sharif* 110.

Habitat: Marshy field at river mouth, turf on moist banks, hay-fields, roadsides, etc. Alt. 0–1500 m. Flowering May–August.

Distribution (*T. procumbens* L. sensu lato): Almost the whole of Europe (excluding the northernmost parts), North Africa, Atlantic Is.

Plants of *T. procumbens* are very variable in habit, degree of branching of their stems, and in the length of their peduncles. Stems are usually much-branched and diffuse, ascending or procumbent. The peduncles are usually much longer than the subtending leaves, but in some cases they are as short as their petioles (cf. *Balls* 1595).

T. procumbens is closely related to *T. pseudoprocumbens* and *T. glaucescens*. The capitula in all three are compact and ovoid, and the flowers are reflexed and squamously imbricate when mature. Plants of *T. pseudoprocumbens* are sparingly branched and usually much shorter than those of *T. procumbens*. Although intermediates between the two are not infrequent, the extremes are quite distinct. The two occur more or less in the same distributional area.

T. glaucescens differs from the other two by its dwarf habit and thicker corolla. In addition, *T. procumbens* and *T. pseudoprocumbens* are mainly European in distribution while *T. glaucescens* is mainly Oriental.

89. *T. pumilum* Hossain sp. nov. Affinis *T. dubio* Sibth. sed caule pumilo tenuissimo, petiolis omnibus longioribus, capitula pauciora, vexillis subpatulis latoribus obovatis cuneatis differt.

Herba annua. Caulis pumilus, 5–9 cm. altus, tenuissimus, 0.5–0.75 mm. latus, erectus, simplex vel saepe basi ramosus, leviter et adpresse pubescens. Folia pinnatim trifoliata; petioli tenuissimi, 5–7 mm. longi, c. 0.2 mm. lati, glabri, omnes stipulis amplexicaulibus ovatis acutis ciliatis 2–3 mm. longis 1.5(–2) mm. latis longiores. Foliola glabra (marginibus denticulatis) obovata-cuneata retusa, 5–7(–9) mm. longa, 3–4(–6) mm. lata, lateralia

subsessilia terminalia distincte petiolulata. Capitula 1-3, vix plura, 12-15-flora, axillaria, 7-8 mm. in diam., globosa; pedunculi tenuissimi, 10-15(-20) mm. longi, c. 2 mm. lati, erecti, adpresse pubescentes foliis longiores. Flores flavi, brevissime pedicellati, subanthesim reflexi, 4-5 mm. longi. Calyx minimus, translucidus, glaber; dentes tres inferiores $\pm$ lineares, 0.65-1 mm. longi, pilo terminati, duobus superioribus triangularibus circiter duplo longiores, tubo 5-nervio aequales. Corolla in vivo flava subtilissima, in sicco fulva translucida scariosa. Vexillum subpatulum obovato-cuneatum, paulo retusum, 4(-5) mm. longum c. 3 mm. latum, inferne ad ungues petalorum ceterum et filamenta connata paulo adnatum; alae (unguibus c. 1 mm. longis inclusis) 3-3.5 mm. longae; carina 2-2.5 mm. longa. Ovarium glabrum, breviter stipitatum, oblongo-obovatum, 1-2 ovulatum, c. 1.5 mm. longum et c. 0.65 mm. latum; stylus c. 0.5 mm. longus. Legumen monospermum. Fl. April-July.

TURKEY. Prov. Kars: Hacuvan (Kars-Ardghan), 1900 m., on banks, 30 June 1957, *Davis & Hedge* (D.30470, holo. E!). Prov. Bitlis: Pelli, 2200 m., damp bank, 6 July 1954, *Davis & O. Polunin* (D.22397). Prov. Antalya: Kumköy between Antalya & Serik, 5 m., fixed dunes, in open *Pinus pinea*-*Myrtus* forest, 6 Apr. 1956, *Davis & O. Polunin* (D.25709).

CYCLADES. Nikosia Is. off Amorgos, 11 Apr. 1940, *Davis* 1392. Amorgos Is.: Langantha, 15 Apr. 1940, *Davis* 1527.

The nearest ally of *T. pumilum* seems to be *T. dubium* Sibth. The latter species, however, differs from it by its extremely short-petioled leaves (petioles usually 2-3 mm. long, shorter than the stipules, except in some basal leaves where they are more or less equal), numerous capitula, shorter and narrower flowers (c. 3.5 $\times$ c. 1 mm.), and by its vexillum being oblong and always conduplicate. In addition, *T. dubium* has usually a procumbent or decumbent habit, and its stem is usually thicker and taller than that of *T. pumilum*. Geographically, the two species are mutually exclusive. *T. dubium* is distributed almost throughout Europe and reaches as far south as Thessaly (fide Hayek) in the Balkan Peninsula, but is absent from the Orient. *T. pumilum*, on the other hand, is so far known only from Turkey and from the Cyclades.

Other species showing some affinity with *T. pumilum* are *T. glaucescens* and *T. procumbens*, which often grow in the same area. The new species, however, can be distinguished by its slender and dwarf habit, extremely thin translucent corolla, smaller and fewer flowered capitula, and by its mature and reflexed flowers being not compactly and squamosely imbricate.

The specimens (D.25709) from the fixed-dunes along the coastal regions of Antalya are 4-6 cm. high, simple (rarely with 1-2 basal branches), bear 1-2 subterminal capitula and have leaflets darker than those of the specimens from the mountains of Kars and Bitlis. D.25709 grows in habitats almost identical with those of *T. glaucescens* near Manavgat (cf. D.25832) about 50 km. away.

The specimens from the Cyclades have slightly thicker and paler yellow petals than those in the specimens from Turkey.

90. *T. filiforme* L., Sp. Pl. ii, 773 (1753); Boissier, Fl. Or. ii, 155 (1872); Hayek, Prodr. Fl. Balc. i, 847 (1926). *Icon.*: Sowerby & Sm., Engl. Bot.

xviii, t. 1257 (1804); Vicioso in Anal. Bot. Cav. Tom. IX. ii, 1952, 354 (1953).

Syn.: *T. micranthum* Viv., Fl. Libyc. Spec. 45, t. 19, f. 3 (1824).

N. IRAN. Ditionis Rescht, prope Kudum, 1 May 1902, Bornmüller 6607.

Distribution: S. Norway, Denmark, British Is., France, Iberian Penins., Italy, Balkan Penins., Turkey, Caucasus, N. Africa, Canary Is.

ADDENDUM

The above account has been almost entirely based on material examined. The following taxa have been omitted because they were not seen by the author: *Trifolium alsadami* Post, *T. amani* Post & Beauv., *T. bobrovii* Chalilov, *T. bonnevilliei* Mout., *T. dichroanthoides* K. H. Rech., *T. mazanderanicum* K. H. Rech., *T. parantzemae* Azn., *T. salmoneum* Mout., *T. talychense* Chalilov.

Some other taxa have been recorded from our area, notably *T. caucasicum* Tausch. (Grossheim, Fl. Kavkaza, ed. 2, v: 1952, not available to us at the time), *T. intermedium* Guss. and *T. lagrangei* (Rechinger, Fl. Aegaea: 1943), and *T. ligusticum* Balb. (Boissier, Fl. Or. ii: 1872).