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## MATERIALS FOR A FLORA OF TURKEY

### II: LINUM LINN.

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In a genus as difficult as *Linum* it is impossible at this stage to produce a stable classification; as more material becomes available, adjustments in rank will certainly have to be made. In this paper only new taxa are described, and notes given on others that particularly need them. When very rare species, hitherto only known from the type gathering, have been collected again, the additional records are given. In this connection, it is encouraging that in most cases the original differential characters have been found to hold good. Unless otherwise indicated, all specimens cited have been examined.\*

In *Linum* the basal portion of the plant often produces useful specific characters—some species appear to be constant suffrutescent chamaephytes, others are hemicryptophytic. Sepal shape has been used a great deal in the differentiation of species, and though a most valuable character it can vary within rather wide limits, even on the same plant; on the other hand, the strength of the sepal venation (especially in Sect. *Linum*), difficult to express in words, is often constant for the species. Capsule size and petal shape may also provide useful, but neglected, specific diagnostics.

\* Where type material has been cited, however, it has not been examined unless an exclamation mark is given. For example, "holo. G; iso. E! K!" means that the holotype at Geneva has not been seen, but that isotypes at Edinburgh and Kew have been examined. This method of citation will be adopted throughout the series.

## SECT. LINUM

(Syn.: Sect. *Eulinum* Griseb.)

*L. nervosum* Waldst. & Kit., Pl. Rar. Hung. ii, t.105 (1805).  
subsp. *glabratum* (DC.) P. H. Davis, stat. nov.

Syn.: *L. nervosum* var. *glabratum* DC., Prodr. i, 426 (1824).

*L. Aucheri* Planchon in Hook. Lond. J. Bot. vii, 173 (1847).

*L. nervosum* var. *Aucheri* (Planchon) Boiss., Fl. Or. i, 862 (1867).

Differs from the type in its lower stature (30–60 cm.), less numerous (15–25), less rigid leaves of thinner texture and less prominent nervature, less rigid and fewer-flowered panicle, and in having the stem very glabrous, even at the base. In subsp. *nervosum* the stems are usually 60–85 cm. tall and the number of green leaves below the inflorescence is 30–55.

TURKEY. Lazistan: Khabakor, *Balansa* 1392. Prov. Gümüşane; Centera (?) near Gümüşane, *Bourgeau* a. 1862, p.p. (with *L. aroanium*); Boejukdere above Arsabir, *Sintenis* 7098. Prov. Erzincan: Sipikordagh near Erzincan, *Sintenis* 1091; Sipikor at Pirinbaghre, *Sintenis* 3051. Prov. Bitlis: Kambos Dağ, 1900 m., rocky slope, 30 June 1954, *Davis & O. Polunin* (D. 23482). Armenia, *Zohrab*.

Subsp. *nervosum* is the only race present in Rumania and Hungary, whence the species was first described. All Turkish material belongs to subsp. *glabratum*, of which material has also been seen from N. Persia, the Crimea and Caucasia; the taxon is based on a Russian specimen (n.v.) collected by Goldbach near the Tanais (River Don). Some specimens from the Caucasus have the lower part of the stem hairy as in subsp. *nervosum*, but in other characters are typical of subsp. *glabratum*.

*L. Aucheri* Planchon (described from Mazanderan) was originally distinguished from *L. nervosum* by its short sepals. This character, however, breaks down when a range of material is examined; plants with sepals just as short as those of the N. Persian taxon occur in Hungary and Rumania. It is only when other characters are considered that the Orient material can be taxonomically separated from the European plant.

*L. aroanium* Boiss. & Orph. in Boiss., Diagn. Ser. II (1), 96 (1853).  
var. *aroanium*.

Syn.: *L. bithynicum* Azn. in Bull. Bot. Soc. France, xliv, 167 (1897).

*L. cassium* Rech. fil. in Arkiv Bot. Stockh., andra ser., i, 312 (1950).

TURKEY. Prov. Gümüşane: Centera (?) near Gümüşane, *Bourgeau* a. 1862, p.p. (with *L. nervosum* subsp. *glabratum*). Prov. Istanbul: Beuyuk Tschamlidja (Buyuk Çamlıca near Üsküdar), 17 May 1901, *Aznavour* (*L. bithynicum*); Istanbul: Boghourlu (?), *Post* 260 (Pl. Byz.). Prov. Antakya: 20 km. S. of Urdu (?), *Dinsmore* 12961. Prov. Isparta: Isparta hule, May 1949, *M. Heilbronn*.

I am unable to separate from *L. aroanium* Boiss. & Orph. (described from Greece) either *L. cassium* Rech. fil. (Mt. Cassius!) or *L. bithynicum* Azn. from hills near the Bosphorus. As interpreted here, *L. aroanium* (like *L. nervosum* Waldst. & Kit.) varies considerably in the shape of its sepals, though these are always acuminate and  $\pm$  glandular-margined. The species has a disjunct distribution from Greece, across Turkey to Mt.

Cassius and the Lebanon (Qurnat Aruba above Tripoli, 1400–1800 m., in *Abies cilicica* forest, Davis 6298).

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

A typo caulibus et foliis dense pubescentibus differt.

TURKEY (Paphlagonia). Prov. Kastamonu: Ilgaz Dağ, c. 1800 m., 22 July 1933, W. Kotte (holo. Ankara University!).

Hairy leaves and stems are a most unusual feature in Sect. *Linum*. The gathering differs further from var. *aroanum* in its more branched inflorescence and larger, less conferted lower leaves; these characters, however, might be a direct environmental response.

*L. aroanum* can be distinguished from *L. nervosum* by its 1-nerved leaves, shorter, flexuous stems and smaller petals.

The following is a key to those Turkish species in Sect. *Linum* with oblong-capitate stigmas and eglandular sepals shorter than the capsule\*:

1a. Fruiting pedicels nodding or strongly deflexed:

2a. Perennial; capsule c. 6 mm. long; leaves thick:

3a. Plant dwarf, 2–6 cm. tall; stem 1–3-flowered; suffrutescent

*L. carnosulum* Boiss. var. *empetrifolium* Boiss. & Ky. ex Boiss.

3b. Plant tall, 30–50 cm.; stems many-flowered; not shrubby at base.

*L. austriacum* L.

2b. Annual; capsule 9–10 mm. long; leaves thin

*L. Peyronii* Post

1b. Fruiting pedicels erect; plants suffruticose:

4a. Plants typically erect; capsule 7–9 mm. long:

5a. Outer sepals oblong, acute or even acuminate, 6–7 mm.; leaves oblong-linear, 2–5 mm. broad, obtuse or acute, obscurely 3 (–1)-nerved

*L. meletonis* Hand.-Mzt.

5b. Outer sepals oblong-elliptical, obtuse or subacute, 4–6 mm.; leaves linear, 1–2 mm. broad, very acute, 1-nerved

*L. obtusatum* (Boiss.) Stapf

4b. Plants typically prostrate; capsule 5–6 mm. long; leaves obtuse, conferted.

*L. pycnophyllum* subsp. *kurdicum* P. H. Davis

*L. meletonis* Hand.-Mzt. in Ann. Nat. Hofmus. Wien, xxvii, 62, t.2, f.3. (1913).

TURKEY (Kurdistan). Prov. Bitlis: Meleto Dağ im Sassun, 3000–3150 m., 11 Aug. 1910, Handel-Mazzetti 2757 (holo. W!); dist. Kotum, on Karz Dağ above Kamer, Davis & O. Polunin (D. 24584); dist. Reşadiye, on mt. 10 km. S.E. of Pelli, 2600 m., 8 July 1954, O. Polunin & Davis (D. 22514), and on Pelli Dağ, 3000 m., 7 July 1954, O. Polunin & Davis (D. 22509); dist. Tatvan, on Nemrut Dağ above Sogurt, 2100 m., 3 July 1954, O. Polunin & Davis (D. 23517). Prov. Hakkâri: Kara Dağ, 2800 m., 16 Aug. 1954, O. Polunin & Davis (D. 24449); *ibid.*, 3200 m., D. 24472; *ibid.*, 2700 m., D. 24374.

This species, apparently endemic to Turkish Kurdistan, was based on Handel-Mazzetti's type gathering from Meleto Dağ. Handel-Mazzetti, presumably because he wrongly described the stigma shape, related the

\* No specimen of *L. perenne* L. has yet been seen from Turkey, though it occurs in Persian Kurdistan (Kurdistan, *Olguin*!). It can be distinguished from *L. obtusatum* by not being shrubby at the base, the herbaceous stems being 30–60 cm. tall; there are no short sterile shoots, and the nervature of the blunter sepals is more pronounced. It should be looked for in Eastern Anatolia.

plant to the annual *L. humile* Miller (treated here as a variety of *L. usitatissimum* L.). As a matter of fact the stigmas are oblong-capitate in *L. meletonis*, not clavate-filiform as in *L. usitatissimum* s.l. There is no doubt that *L. meletonis* is most closely related to *L. obtusatum* (Boiss.) Stapf.

***L. obtusatum*** (Boiss.) Stapf in Denkschr. Akad. Wien, li (2), 23 (1886).

Syn.: *L. alpinum* Jacq. var. *obtusatum* Boiss., Fl. Or. i, 865 (1867).

**TURKEY.** In lapidosis montis Akdagh Lyciae in regione alpina, Bourgeau, p.p. (holo. G! iso. K!). Lycia, *Luschan* (n.v.). Prov. Maraş dist. Çardak: Berit Dağ, *Hausknecht*; dist. Göksün: Hobek Dağ, *Davis*, *Dodds & Çetik* (D. 20206), and on Binboğa Dağ above Yalak, *Davis*, *Dodds & Çetik* (D. 20134). Prov. Kayseri dist. Kışge: Bakır Dağ near Akoluk ya., *Davis*, *Dodds & Çetik* (D. 19343)—alpine form with abbreviated stems). Prov. Erzincan: Sipikör Dağ, *Sinten* 1091. Armenia, *Calvert & Zohrab* (K).

Rocky limestone slopes, between 2000 and 3000 m., in Irano-Turanian and transitional Mediterranean territories.

The type gathering of *L. obtusatum* is mixed, consisting (both at Geneva and Kew) of *L. austriacum* (in flower) and *L. obtusatum* (in flower and fruit). The Lycian type of *L. obtusatum* has somewhat broader leaves (2-3 mm. wide) than the more eastern material, but differs in no other respects.

*L. obtusatum*, *L. pycnophyllum* Boiss. & Heldr. and *L. glaucum* Boiss. & Noë (as var. *glaucescens* Boiss.) were all treated as varieties of *L. alpinum* Jacq. by Boissier in his Flora Orientalis. The first two are distinct species, and the third is treated here as a variety of *L. austriacum* L. *L. obtusatum* differs from *L. alpinum* (which does not occur in the Orient) in its suffruticose habit, numerous, short, sterile buds of densely imbricated leaves (destined to be next year's flowering stems), and petals that overlap nearly to the top as in *L. perenne* L. It is, in fact, more closely related to *L. meletonis* Hand.-Mzt.

***L. pycnophyllum*** Boiss. & Heldr. in Boiss., Diagn., Ser. II (1), 98 (1853).

Syn.: *L. alpinum* Jacq. var. *pycnophyllum* (Boiss. & Heldr.) Boiss., Fl. Or. i, 865 (1867).

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

A typo caulibus plerumque prostratis (haud procumbentibus) minus flexuosis, foliis paucioribus minus confertis recedit.

*Caules* prostrati, 6-12 cm. longi, e caudice lignoso enati, dense foliosi, 1-5-flori. *Folia* mediana oblongo-lineariter, obtusa, crassa, obscure uninervosa, glauca, 5-9 mm. × 1-1.5(-2) mm., inferiora minora et imbricata. *Pedicelli* in fructu erecti. *Sepala* 3-5 mm. longa, vix nervosa, exteriora oblonga saepe subacuta, interiora late elliptica obtusa. *Petala* caerulea, 11-15 mm. longa, marginibus incumbens. *Stigmata* oblongo-capitata. *Capsula* ovata, 5-6 mm. longa.

**TURKEY** (Kurdistan). Prov. Van. dist. Başkale: Ispiriz Dağ, 3400 m., rocky slope on N. ridge, stems prostrate, petals blue but paler towards base, leaves glaucescent, 30 July 1954, *Davis & O. Polunin* (D. 23691—holo. E! iso. K!); dist. Çatak: Kavussahap Dağ, 3400 m., summit ridge, stems procumbent, flowers blue, 23 July 1954, *Davis & O. Polunin* (D. 23104); dist. Gevaş, on Artos Dağ, 3500 m., exposed slopes, stems prostrate,



flowers blue, 15 July 1954, *Davis & O. Polunin* (D. 22869); *ibid.*, 3000–3300 m., growing through *Onobrychis cornuta*, etc., stems ascending or erect, flowers blue, 15 July 1954, *Davis & O. Polunin* (D. 22835—erect habitat form up to 30 cm. tall). Prov. Hakkâri: Cilo Dağ, 10 km. W. of Cilo Tepe, 3500 m., rocky limestone ridge, prostrate perennial, flowers blue, 9 Aug. 1954, *Davis & O. Polunin* (D. 24154).

Subsp. *pyncophyllum* is a rare alpine plant confined to Greece, so that the presence of a closely related Irano-Turanian race in S.E. Turkey, 1800 km. away, is rather surprising. Unfortunately the fruit of the Greek plant is unknown to me, but in all other characters the Kurdish plant so closely resembles the Greek that I have no hesitation in including it within that species; indeed, subspecific rank might not have been assigned to it if the geographical disjunction had not been so marked, since the morphological differences are slight.

*L. pyncophyllum* is closely related to the Sicilian *L. punctatum* Presl, a species with more pointed leaves and sepals and larger capsules than those of subsp. *kurdicum*.

***L. austriacum* L., Sp. Pl. ed. 2, i, 399 (1762).**

var. ***glaucescens* (Boiss.) P. H. Davis, comb. nov.**

Syn.: *L. alpinum* Jacq. var. *glaucescens* Boiss., Fl. Or. i, 865 (1867), excl. pl. Bourgeana et Haussknechtiana.

*L. glaucum* Boiss. & Noë in Boiss., Diagn. Ser. II (5), 66 (1856).

Differs from the typical form of the species in its broader, less numerous leaves (median leaves 15–20 mm.  $\times$  1.5–5 mm.), slightly larger calyx (5–6 mm.) and larger corolla (15–19 mm.).

TURKEY. Diyarbakir, Noë 196 (lecto. G!). Prov. Kastamonu: Tossia, Karvak-Tschesme, *Sinten* 3638. Prov. Kutahya: Uşak, *Krause* 3425. Armenia, *Calvert & Zohrab*. Prov. Konya: Sarayönü, *Birand*.

In his Flora Orientalis Boissier reduced *L. glaucum* Boiss. & Noë (from Diyarbakir) to a variety of *L. alpinum* (as var. *glaucescens* Boiss.). Except for the type gathering, however, the other two specimens cited under the varietal name by Boissier are *L. obtusatum* (Boiss.) Stapf. I have no doubt that the original *L. glaucum* is closely related to *L. austriacum*—even in the type the young fruiting pedicels are recurved as in that species. Until its nature is better understood, it seems best to treat it as a variety of *L. austriacum* (syn. *L. squamulosum* Rud.) which is a quite widespread, though local plant on the Anatolian plateau. A specimen from near Ankara (Wey nach Haymana, *Kotte* 1103!) is intermediate between the type and var. *glaucescens*, though nearer to the latter. Specimens of var. *glaucescens* have also been seen from Persia.

***L. usitatissimum* L., Sp. Pl. 277 (1753).**

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

Syn.: *L. Reuteri* Boiss., Fl. Or. Suppl. 139 (1888).

TURKEY. In Cilicia prope Mersina, *Cadet* (syntype, G!); in argillosis Syriae borealis prope Surug, *Haussknecht* (syntype, G!).

*L. Reuteri* approaches too closely the variable *L. usitatissimum* var. *humile* (*L. humile* Miller—sensu Boiss., Fl. Or.\*) to be maintained as a

\* Unfortunately Miller's "type" of *L. humile* in the British Museum appears to be a form of var. *usitatissimum* with ciliolate septa, and not the southern plant interpreted as var. *humile* by Boissier.

distinct species. Var. *usitatissimum* is apparently cultivated in N. Anatolia (fide Ciferri, La sistematica del Lino: Bologna, 1949), but var. *humile* is certainly the flax most commonly grown in the rest of Anatolia. Whether var. *Reuteri* is wild or cultivated we do not know, so that information on this point from the type localities would be welcome. There is a specimen of the same variety at Kew collected by G. A. Watson in "Mesopotamia."

#### SECT. DASYLINUM (PLANCHON) JUZ.

in Komarov, Fl. U.R.S.S. xiv, 140 (1940)

There is no doubt in my mind that subgenus *Syllinum* Griseb. ser. *Dasylinum* Planchon (in Hook. Lond. J. Bot. vi, 598: 1946) is best treated as a distinct section co-ordinate with Sect. *Linum* (Sect. *Eulinum* Griseb.) and Sect. *Syllinum* Griseb. In many ways it holds a position intermediate between them. The species within it form a very natural group with a distinctive facies and a unique correlation of characters. The possession of coherent petals has often led to the inclusion of *Dasylinum* within Sect. *Syllinum* (the course adopted by Hayek and by Hegi), but the alliance is unnatural and unjustified.

Section *Dasylinum* is a Eurasian section with its centre in Anatolia, where it is now represented by nine species. Among these the new annual *L. seljukorum* (described below) is particularly interesting, since it forms a link between Sect. *Dasylinum* and Sect. *Linum*, resembling the latter in its small, free, blue petals. The discovery of this species therefore lends some support to the classifications of Boissier and of Winkler (in Engler & Prantl, Nat. Pflanzenfam. 2 Aufl. 18a, 114: 1931); both authors included *Dasylinum* within Sect. *Linum*, although no species with free petals was known in *Dasylinum* at that time. *L. seljukorum* has an oblong-capitate stigma; this character is common in Sect. *Linum* (in which the stigma shapes provide useful "key" characters), but is rare in Sect. *Dasylinum*, although the stigma of *L. unguiculatum* P. H. Davis is nearly as short. In Sect. *Syllinum* I have not found any species with a truly oblong-capitate stigma, although the shortly oblong-clavate stigmas of *L. toxicum* Boiss. and *L. triflorum* P. H. Davis come pretty near it. *L. seljukorum* is also homostylic, a character absent or very rare in the rest of Sect. *Dasylinum* and in the heterostylic Sect. *Syllinum*; homostyly, however, is characteristic of some species in Sect. *Linum*. Despite these technical anomalies, there can be little doubt that *L. seljukorum* is best included in Sect. *Dasylinum* where its leaves, pedicels, sepals (though exceptionally short) and ovary are typical of the section; a monographer, however, might prefer to place it in a subsection of its own. The following is a description of Sect. *Dasylinum* as it is interpreted here to include *L. seljukorum*:—

Perennial or annual. Leaves alternate, without glandular stipules, usually manifestly hairy (sometimes glabrous), often margined by glands. Fruiting pedicels short, sturdy, hairy. Flowers heterostylic and large (rarely homostylic and small). Sepals hairy, usually margined by stalked glands, distinctly nerved but not keeled. Petals with coherent claws (free in *L. seljukorum*), lilac, pink or blue (rarely white with violet venation). Ovary and capsule hairy or glabrous. Stigmas linear-clavate, sometimes oblong-capitate or clavate. Lectotype: *L. viscosum* L.

The distribution of the Turkish species is given in maps 1 & 2.

*Linum hirsutum* L., Sp. Pl. ed. 2, 398 (1762).

This very polymorphic species can be divided into several infraspecific taxa, most of which have a geographical basis. A key to these (including the European subsp. *hirsutum* and subsp. *pannonicum*) is given here:

- 1a. Median leaves margined by stalked glands; leaves oblong:
  - 2a. Stems ascending or erect, 1–2 mm. wide; median leaves 10–25 mm. long; cyme lax, spreading, 7–many-flowered; flowers lilac or pink, rarely white . . . . . subsp. *anatolicum*
  - 3a. Leaves 2–5 mm. wide, not semiamplexicaul, 1–3-nerved; stems ascending (Central & West Anatolia) . . . . . var. *anatolicum*
  - 3b. Leaves 5–10 mm. wide, semiamplexicaul, 3–5-nerved; stems apparently erect (Bithynia) . . . . . var. *platyphyllum*
  - 2b. Stems prostrate, scarcely 1 mm. thick; median leaves 6–9 mm. long; cymes reduced to 1–3 flowers; petals white (Caria: alpine) . . . . . subsp. *oreocaricum*
- 1b. Median leaves not margined by glands; leaves oblong, linear or subspathulate:
  - 4a. Median leaves linear, 1–1.5 mm. broad, adpressed pilose; stems procumbent; cyme  $\pm$  dense, few-flowered (Pisidia) . . . . . subsp. *pisidicum*
  - 4b. Median leaves broader, oblong or subspathulate; stems ascending; cymes spreading, usually many-flowered:
    - 5a. Plants herbaceous, often lignified but not suffruticose at base, with few or no sterile shoots; median leaves rounded at base, oblong:
      - 6a. Stems ascending; branches of inflorescence widely spreading; leaves usually  $\pm$  acute (Central Anatolia) . . . . . subsp. *anatolicum* var. *eglandulosum*
    - 6b. Stems erect; branches of inflorescence ascending, rather closely flowered:
      - 7a. Leaves oblong, 3–8 mm. broad,  $\pm$  adpressed pilose, abruptly narrowed into a subobtusate or subacute tip; stems hirsute; sepals pubescent-hirsute (Central Europe, Balkans, S. Russia) . . . . . subsp. *hirsutum*
      - 7b. Leaves oblong-lanceolate or linear-oblong, 1.5–4 mm. broad, glabrous, gradually tapering into an acute tip; stems often glabrescent; sepals adpressed-pubescent (Rumania and Hungary) . . . . . subsp. *pannonicum*
    - 5b. Plant suffruticose, probably with numerous sterile shoots; median leaves attenuated at base, subspathulate or oblong (Bosphorus) . . . . . subsp. *byzantinum*

The Turkish infraspecific taxa are annotated below:

subsp. *anatolicum* (Boiss.) Hayek, Prodr. Fl. Balc. i, 564 (1925).

var. *anatolicum*.

Syn.: *L. anatolicum* Boiss., Diagn. Ser. I (1), 56 (1842).

*L. hirsutum* var. *glanduliferum* Boiss., Fl. Or. i, 859 (1867).

*Lectotype*: Anatolia: Laodicea, Boissier, a. 1842 (holo. G; iso. K!).

Widespread on the Inner Plateau, material having been seen from the vilayets of Ankara, Konya, Niğde, Kayseri and Denizli. A form collected

by Siehe at Utsch Kapu Dag near Niğde, with short (but not prostrate) stems and leaves, approaches subsp. *oreocaricum* in those characters. In its typical form var. *anatolicum* is probably endemic to Anatolia, although Aucher 830 from "Syria" may belong here; its inflorescence, however, is unusually condensed.



MAP 1. Turkish distribution of *Linum hirsutum* sens. lato.

- |   |                               |
|---|-------------------------------|
| ● subsp. <i>anatolicum</i> var. <i>anatolicum</i> .   | + subsp. <i>oreocaricum</i> . |
| ○ subsp. <i>anatolicum</i> var. <i>eglandulosum</i> . | △ subsp. <i>pisidicum</i> .   |
| ▼ subsp. <i>anatolicum</i> var. <i>platyphyllum</i> . | × subsp. <i>byzantinum</i> .  |

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

A var. *anatolico* margine foliorum haud glanduloso, indumento caulium plerumque brevius, glandulis marginalibus sepalorum exteriorum ad dimidium superius plerumque confinitis divergit.

TURKEY. Prov. Kayseri: Bakir Dağ above Kısge, 1500 m., open slopes by *Pinus nigra* subsp. *Pallasiana* forest, leaves glaucous, petals nearly white with lilac veins at base, 28 June 1952, Davis, Dodds & Çetik (D. 19317: holo. E! iso. K!); Kayseri—Bünyan, Davis 21839; Ali Dağ, Talas, 1500 m., Balls 1383; foot of Mt. Karamas (5 hours E. of Kayseri), Balansa 949; Kurukavak, 18 June 1942, Kasapligil. Prov. Kırşehir: near Mucur, Davis 21830. Prov. Ankara: Ankara—Haymana Dağ, 1100 m., 30 May 1945, Kasapligil. Prov. Çankiri: Kalecik—Çankiri, Davis 21455.

The leaves vary from hirsute to completely glabrous, the latter form being the only one seen at Mucur, but in Balls 1383 the glabrous form is mixed with the hairy-leaved type. Var. *eglandulosum* and var. *anatolicum* do not usually grow together, but both varieties are represented in Balansa 949. Var. *anatolicum* is the common form in the environs of Ankara.

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

A var. *anatolico* foliis latioribus semiamplexicaulibus subobtusis 3–5-nervosis recedit.

*Caules* ut videtur erecti, villosuli, 30–40 cm. alti, 2 mm. lati. *Folia* oblonga, superiora acuta, inferiora valde obtusa, 15–25 mm. longa, 5–10 mm. lata, semiamplexicaulia, 3–5 nervosa. *Cyma* late dichotoma, 10–12 mm. lata, multiflora. *Sepala* lanceolata, 11–12 mm. longa; exteriora in duas partes superiores glanduloso-marginata.

TURKEY. (Bithynia). Prov. Bursa: Bursa, in low rocky parts of Keschisch Dağ (Olympus), 200 m., Bornmüller a. 1889 n. 4216 (holo. K!); Bursa, Pichler 29; ibid., Aucher 830 (grazed); Bursa–Çekirge, Gassner 577 (*fruct.*); Ulu Dağ road, July 1942, M. Başarman.

In its apparently erect habit var. *platyphyllum* approaches the Balkan subsp. *hirsutum*, but in that race the leaves are eglandular, narrower and not semiamplexicaul. In Gassner's specimen the fruiting branches are elongated and rather ascending, but not closely flowered as in subsp. *hirsutum*.

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

Affine subsp. *anatolicum* sensu stricto sed caulibus prostratis tenuibus, foliis minoribus, cymis ad flores 1–3 reductis, petalis semper albis facile distinguendum.

*Planta* basi lignescens caules prostratos velutino-pubescentes 1–9 cm. longos 0.75–1 mm. latos emittens. *Folia* oblonga, 6–9 mm. longa, 1.5–2 mm. lata, ut calyces dense glanduloso-marginata, pilis brevibus crispis densissime vestita. *Cyma* 1–3-flora,  $\pm$  densa. *Sepala* 7–9 mm. longa, exteriora lanceolata subacuta in duas partes superiores dense glanduloso-marginata, basi trinervosa, interiora acuminata. *Petala* c. 25 mm. longa, alba, inferne violaceo-venosa.

TURKEY (Caria). Prov. Denizli: Baba Dağ above Kadiköy, 2300 m., on limestone scree with *Erodium leucanthum*, 19 June 1938, Davis 233 (holo. K! iso. E!).

This beautiful alpine plant may possibly have arisen from the more widespread subsp. *anatolicum* var. *anatolicum* of the steppe. The latter—in its pink-flowered form—is abundant on the chalk downs at the foot of the mountain on which subsp. *oreocaricum* grows. No form of *Linum hirsutum* was seen in the intervening zone.

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

Syn.: *L. hirsutum* L. var. *stenophyllum* Boiss., Fl. Or. i, 859 (1867), p.p.

*Caules* procumbentes, graciles, 7–15 cm. longi, minus quam 1 mm. lati, puberuli. *Folia* linearia, 8–15 mm.  $\times$  1–1.5 mm., acuta, adpresse pilosa, eglandulosa, infima parva atque spathulata. *Cyma* 3–9-flora, in statu florifero subconferta, 2–3 cm. lata. *Sepala* dense et adpresse pubescentia, exteriora lanceolata parce glanduloso-marginata, interiora ovato-acuminata glandulosa.

TURKEY (Pisidia). Prov. Isparta: in saxosis apricis ad lacum Eğirdir, Heldreich a. 1845 (BM); Prov. Burdur in Pisidia, Heldreich a. 1845 (holo. BM!).

Boissier confused the content—and description—of his var. *stenophyllum* by basing it on 4 syntypes, two of which (Balansa's specimens) are no more than narrow-leaved variants of subsp. *anatolicum*; of these, Balansa's Phrygian specimen is var. *anatolicum* and his Cappadocian one



var. *eglandulosum*. The two remaining syntypes were collected by Heldreich, and, as they are represented at the British Museum, are very distinct from any other form of *L. hirsutum* L. and match one another closely. On account of this initial confusion, I have preferred to drop Boissier's epithet and to call Heldreich's plant subsp. *pisidicum*, the description being based on the specimens at the British Museum.

Heldreich's gathering from Egirdir, as it is represented at Edinburgh, differs markedly from the British Museum sheet, having taller, ascending (though still very slender) stems, somewhat broader, glandular-margined leaves, and the indumentum of the calyx not adpressed. It is, in fact, intermediate between subsp. *pisidicum* and subsp. *anatolicum* sens. str., and one cannot help wondering if hybridisation has not occurred between them. The typical forms of the subspecies are very distinct from one another.

subsp. *byzantinum* Azn. in Bull. Soc. Bot. France, xlii, 140 (1899).

TURKEY. Prov. Istanbul: lieux incultes et secs des collines, près de Beuyuk-Halkale (Europe), *Aznavour* (holo.—n.v.).

Until the type can be seen, or the plant collected again, the systematic position of this plant remains in doubt. The description suggests that its affinities may be with *L. olympicum* Boiss. or the Balkan *L. spathulatum* Hal.

Of the European forms of *L. hirsutum*, subsp. *hirsutum* is widespread in Central and S.E. Europe and in Southern Russia (as far east as the Caucasus); in Hungary and Rumania it is often replaced by subsp. *pannonicum*.\* No specimens of subsp. *hirsutum* have been seen from Turkey, but forms approaching subsp. *anatolicum* in habit (though still with the eglandular leaves of subsp. *hirsutum*) occur in Thrace and Macedonia where the species obviously needs further study. *L. lanuginosum* Juz. (n.v.), recently described from Crimea and Transcaucasia, should surely be included in *L. hirsutum* agg.

*L. olympicum* Boiss., Diagn. Ser. I (1), 56 (1842).

Syn.: *L. hirsutum* L. var. *alpinum* Boiss., Fl. Or. i, 859 (1867).

*L. Kotschyanum* Hayek in Ann. Nat. Hofmus. Wien, xxviii, 160 (1940).

TURKEY. Prov. Bursa: in excelsis Olympi Bithyni, *Aucher* 838 (G; K!); *ibid.* (Ulu Dağ), *Clementi*, *Boissier*, *Pichler*, *Davis* 14830, *A. Heilbronn* & *M. Başarman*. Cilician Taurus: in rupestribus calcareis alpinis *Gysl* Deppe, 2400 m., *Kotschy* 190 (type of *L. hirsutum* var. *alpinum* & *L. Kotschyanum*—G; K!); Cilicia, *Siehe* a. 1896 n. 548; Taurus, *Kotschy* 95.

On Ulu Dağ (Bithynian Olympus) *L. olympicum* varies widely both in sepal size and shape (ovate-lanceolate to lanceolate-acuminate), leaf indumentum (subsericeous to glabrescent) and even in inflorescence shape.

\* *Linum hirsutum* L. subsp. *pannonicum* (A. Kerner) P. H. Davis, comb. et stat. nov.

Syn.: *L. pannonicum* A. Kerner in Öst. Bot. Zeitschr. xviii, 229 (1868).

*L. hirsutum* var. *glabrescens* Roch., Plant. Rar. Banat. 27 (1828), nom. nud.

*L. hirsutum* L. var. *nudifolium* Wierzb. in Flora, xxiii (1), 368 (1840), nom. nud.

Hegi calls this plant *L. hirsutum* var. *subglabrum* Ledeb. (Fl. Ross. i, 424: 1842), but according to Juzepchuk (in Komarov, Fl. U.R.S.S. xiv, 140) this is a synonym of *L. hypericifolium* Salisb.

the 1990s, the number of people in the world who are under 15 years of age is expected to increase by 1.5 billion (United Nations 1994).

There is a growing awareness of the need to address the needs of children in the world, and the United Nations has developed a series of goals for the 21st century. The first goal is to 'eradicate poverty and hunger' (United Nations 1994). The second goal is to 'achieve universal primary education' (United Nations 1994). The third goal is to 'promote gender equality and empower women' (United Nations 1994). The fourth goal is to 'reduce child mortality' (United Nations 1994). The fifth goal is to 'improve maternal health' (United Nations 1994). The sixth goal is to 'combat HIV/AIDS, malaria and other diseases' (United Nations 1994). The seventh goal is to 'ensure environmental sustainability' (United Nations 1994). The eighth goal is to 'develop a global partnership for development' (United Nations 1994).

The United Nations has also developed a series of indicators to measure progress towards these goals. The first indicator is the 'Human Development Index' (HDI), which is a composite index of life expectancy, education and income. The second indicator is the 'Gender Equality Index' (GEI), which measures the extent to which women and men have equal access to education, employment and political participation. The third indicator is the 'Child Mortality Rate' (CMR), which is the number of children under the age of five who die each year.

The United Nations has also developed a series of strategies to achieve these goals. The first strategy is to 'improve access to basic services' (United Nations 1994). The second strategy is to 'promote economic growth and employment' (United Nations 1994). The third strategy is to 'strengthen governance and institutions' (United Nations 1994). The fourth strategy is to 'promote social justice and equity' (United Nations 1994). The fifth strategy is to 'promote environmental sustainability' (United Nations 1994).

The United Nations has also developed a series of programmes to achieve these goals. The first programme is the 'World Bank' (World Bank 1994). The second programme is the 'International Monetary Fund' (IMF) (IMF 1994). The third programme is the 'World Trade Organization' (WTO) (WTO 1994). The fourth programme is the 'United Nations Development Programme' (UNDP) (UNDP 1994). The fifth programme is the 'United Nations Children's Fund' (UNICEF) (UNICEF 1994).

The United Nations has also developed a series of initiatives to achieve these goals. The first initiative is the 'Millennium Goals' (Millennium Goals 1994). The second initiative is the 'World Summit on the Information Society' (WSIS) (WSIS 1994). The third initiative is the 'World Summit on Sustainable Development' (WSSD) (WSSD 1994). The fourth initiative is the 'World Summit on Children' (WSC) (WSC 1994). The fifth initiative is the 'World Summit on the Environment' (WSE) (WSE 1994).

The United Nations has also developed a series of partnerships to achieve these goals. The first partnership is the 'Partnership for Development' (Partnership for Development 1994). The second partnership is the 'Partnership for the Environment' (Partnership for the Environment 1994). The third partnership is the 'Partnership for the Environment' (Partnership for the Environment 1994). The fourth partnership is the 'Partnership for the Environment' (Partnership for the Environment 1994). The fifth partnership is the 'Partnership for the Environment' (Partnership for the Environment 1994).

The United Nations has also developed a series of mechanisms to achieve these goals. The first mechanism is the 'United Nations Security Council' (UNSC) (UNSC 1994). The second mechanism is the 'United Nations Economic and Social Council' (ECOSOC) (ECOSOC 1994). The third mechanism is the 'United Nations General Assembly' (UNGA) (UNGA 1994). The fourth mechanism is the 'United Nations Secretariat' (UN Secretariat 1994). The fifth mechanism is the 'United Nations Office of the High Commissioner for Human Rights' (OHCHR) (OHCHR 1994).

The United Nations has also developed a series of instruments to achieve these goals. The first instrument is the 'United Nations Declaration on the Rights of the Child' (UNCRC) (UNCRC 1994). The second instrument is the 'United Nations Convention on the Rights of the Child' (UNCRC) (UNCRC 1994). The third instrument is the 'United Nations Convention on the Rights of the Child' (UNCRC) (UNCRC 1994). The fourth instrument is the 'United Nations Convention on the Rights of the Child' (UNCRC) (UNCRC 1994). The fifth instrument is the 'United Nations Convention on the Rights of the Child' (UNCRC) (UNCRC 1994).

The United Nations has also developed a series of bodies to achieve these goals. The first body is the 'United Nations Children's Fund' (UNICEF) (UNICEF 1994). The second body is the 'United Nations Development Programme' (UNDP) (UNDP 1994). The third body is the 'United Nations Population Fund' (UNFPA) (UNFPA 1994). The fourth body is the 'United Nations World Food Programme' (WFP) (WFP 1994). The fifth body is the 'United Nations World Health Organization' (WHO) (WHO 1994).

The United Nations has also developed a series of centres to achieve these goals. The first centre is the 'United Nations Children's Fund' (UNICEF) (UNICEF 1994). The second centre is the 'United Nations Development Programme' (UNDP) (UNDP 1994). The third centre is the 'United Nations Population Fund' (UNFPA) (UNFPA 1994). The fourth centre is the 'United Nations World Food Programme' (WFP) (WFP 1994). The fifth centre is the 'United Nations World Health Organization' (WHO) (WHO 1994).

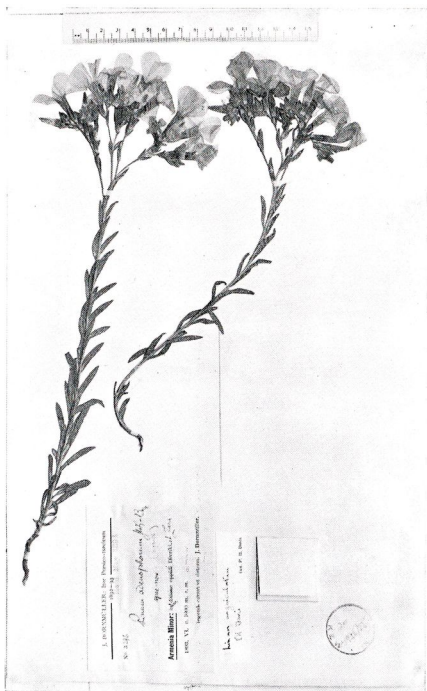


PLATE 6A *Linum unguiculatum* P. H. Davis. (Bornmüller 3296.)

The only difference that I can find between Bithynian and Cilician specimens is that the leaves are somewhat longer and narrower in Cilician than Bithynian material: in the Bithynian plants the median leaves measure 9–13 mm.  $\times$  1.75–3.75 mm., and in Cilician material 11–22 mm.  $\times$  1.5–3.5 mm.; in Cilician specimens the flowering shoots are also longer and the sterile shoots shorter—but these differences may be environmental. Until the Cilician plant is better known it would seem unwise to separate it at varietal or subspecific level from *L. olympicum* sen. str., so that I have here reduced *L. hirsutum* L. var. *alpinum* Boiss. and *L. Kotschyianum* Hayek (originally published to include Pichler's and Frivaldsky's specimens from Bithynian Olympus, as well as the Cilician material on which the name is presumably based) to synonyms of *L. olympicum*.

*L. olympicum* differs from *L. hirsutum* L. (setting aside subsp. *byzantinum* Azn. which may be wrongly placed) in its manifestly shrubby base and numerous short sterile shoots at flowering time. It is certainly very closely related to *L. spathulatum* Hal. from Albania and Greece which differs in having very obtuse, spathulate leaves whose indumentum (when present) is spreading, not adpressed. The Lycian *L. Luschanii* Stapf, based on one meagre specimen (Lycia: in jugo supra Karakioi, *Luschan*; WU!) is also extremely close to *L. olympicum*, apparently differing in its erect base and very glabrous leaves—except for the few long marginal cilia that are absent in *L. olympicum*; the leaves of the sterile shoots are narrower than in the latter species. It needs collecting again.

***L. unguiculatum* P. H. Davis, sp. nov.**

Plate 6A

Syn.: *L. adenophorum* Hausskn. & Bornm. in Mitth. Thur. Bot. Ver. N.F. vi, 65 (1894), *nom. nud.*

Affine *L. hirsutum* L. subsp. *anatolico* (Boiss.) Hayek sed foliis magis attenuatis, sepalis exterioribus fere ad basin dense glanduloso-ciliatis, indumento brevior, stigmatibus abbreviatis, praesertim petalis longe unguiculatis recedit.

*Planta* perennis, basi lignescens. *Caules* erecti (vel ascendentes?), 23–50 cm. alti, 1.5–2.5 mm. lati, teretes, piloso-pubescentes, fere solidi, dense foliati, superne in cymam subaxillam (floribus haud distantibus) divaricato-ramosam 15–30-floram 5–10 cm. latam abeuntes. *Folia* oblongo-linear, glandulis breviter stipitatis dense marginata, breviter pilosa, virescentia, mediana 3-nervosa superne sensim angustata acuta, infima lineari-spathulata, superiora oblonga uninervosa. *Sepala* villosulo-pilosa, inferne elevatim 3-nervosa, 8–9 mm. longa; exteriora anguste oblongo-ovata glandulis breviter stipitatis dense marginata; interiora oblongo-elliptica (margine membranaceo lato incluso), acuminata, superne glanduloso-marginata. *Petala* in sicco lilacina, 28–36 mm. longa; lamina orbiculata in unguem 1.5-plo longiorem abrupte angustata; unguis supra basin cohaerentes. *Filamenta* inaequalia, 7–9 mm. longa. *Antherae* 1.75 mm. longae. *Staminodia* 1 mm. longa. *Styli* ad medium coaliti. *Stigmata* oblongo-capitata, basi abrupte angustata. *Capsula* ignota.—Fl. Jun.

TURKEY. Prov. Sivas: inter Divriki et Zara, c. 1000 m., Jun. 1893, Bornmüller 3296 (Iter Turcico-Persicum, 1892–93—holo. K!). Erzerum, Zohrab, 655. Asia Minor (Armenia?), Zohrab. Mountains of Kurdistan, Layard.

Though undoubtedly very close to the polymorphic *L. hirsutum* L. (especially the glandular-leaved subsp. *anatolicum* sen. str.), *L. unguiculatum* has a remarkably long claw to its petals—a feature which is not found in any allied species. It differs further from its relative in having more attenuated leaves, a shorter indumentum, outer sepals that are glandular-margined right down to the base, and oblong-capitate (not linear-clavate) stigmas. It is also closely related to *L. densiflorum* P. H. Davis from which it can be distinguished by its spreading inflorescence, pubescent (not villose) stems, leaves proportionally narrower, long-clawed petals and shorter stigmas. The limited material does not enable one to be sure that the species is heterostylic like its allies.

In his *Symbolae* (Fedde, Repert. Beih. lxxxix (3), 131: 1938) Bornmüller assigned his specimen to *L. hirsutum* L. var. *stenophyllum* Boiss.

*L. unguiculatum* may be confined to the steppes of N.E. Turkey, since in Turkish Kurdistan (which Layard's label refers to) *L. densiflorum* was the only species of Sect. *Dasylinum* that I saw in the field; it may be that Layard's specimen came from the vicinity of Erzerum which he probably passed through on his journey to Kurdistan.

***Linum densiflorum* P. H. Davis, sp. nov.**

Plate 6B

Affine *L. hirsuto* L. subsp. *anatolico* (Boiss.) Hayek et *L. unguiculato* P. H. Davis; a priori caulibus villosulis erectis, foliis magis acutis, cyma valde congesta, petalis pulchre roseis recedit; ab altero foliis latioribus, caulibus et calycibus villosulis, cyma confertiflora, petalis brevius unguiculatis differt.

*Planta* perennis, basi indurata sed vix suffrutescens. *Caules* plures, herbacei, erecti, vel nunc in locis apertis ascendentes, 8–32 cm. alti, 1–2 mm. lati, eburnei, villosuli (inferne glabrescentes), simplices, dense foliati, vix solidi, cyma densa (1–)3–11-confertiflora 1–3 cm. lata terminati. *Folia* caulium floriferorum anguste oblonga, 10–24 mm. × 3–5 mm., membranacea, acuta (superiora apicem versus serius angustata), sessilia, virescentia, pilosa, ad marginem glandulis stipitatis flavidis ciliata, internodiis 2–3(–4)-plo longiora; folia infima oblongo-spathulata, conferta, diminuta, subemarcida. *Rosulae steriles* parvae a foliis spathulatis glaucis villosulis compositae (vel nunc absentes). *Pedicelli* breves, villosuli. *Flores* heterostyli. *Sepala* 7–9 mm., glandulifera, dorso villosula, acuta; exteriora oblongo-lanceolata, subacuminata, in dimidio inferiore manifeste trinervia, glandulis stipitatis etiam ad basin dense marginata; interiora superne magis acuminata glanduloso-marginata, inferne membranaceo-marginata vix glandulifera. *Petala* intense rosea vel lilacino-rosea, circa 25 mm. longa, obovata, obtusa, in unguem 5 mm. longum flavescentem sensim attenuata; ungues cohaerentes. *Antherae* 1.5–2.75 mm. longae, oblongae. *Staminodia* subulata 1 mm. longa. *Styli* in floribus brevistylis 4 mm. longi ad medium coaliti stigmatibus clavatis; styli in floribus longistylis 9 mm. longi ad duas partes coaliti, stigmatibus lineari-clavatis. *Ovarium* pilosulum. *Capsula* fere matura 6 mm. longa, subspherica, superne pilosula, rostro 1 mm. longo mucronata. Fl. Jun.–Jul.

TURKEY (Kurdistan). Prov. Bitlis, dist. Reşadiye: mountain 10 km. S.E. of Pelli, 2150 m., rocky slope, erect many-stemmed perennial, inflorescence always condensed, flowers bright pink with yellow centre, 8 July 1954, Davis & O. Polunin (D. 22553—holo, E! iso. K!). Prov. Van,





PLATE 6B *Linum densiflorum* P. H. Davis. (D. 22553.)

*Linum*  
*seljukorum* P.H. Davis

Det. P. H. Davis



PLATE 7 *Linum seljukorum* P. H. Davis. (D. 14777.)

dist. Van: Varak (Erek) Dağ (above Van), Maunnsell a. 1889-90 (BM); dist. Gevaş: Artos Dağ, 2550 m., on rocky slopes with *Salvia Sintenisii*, perennial, stems many, ascending, flowers lilac-pink, 14 July 1954, Davis & O. Polunin (D. 22721).

This very beautiful species is closely related both to *L. hirsutum* L. subsp. *anatolicum* (Boiss.) Hayek and to *L. unguiculatum* P. H. Davis described above. It differs from the first in its erect villosulous stems, more pointed leaves, invariably dense inflorescence and bright pink flowers; from *L. unguiculatum* (which I know only from dried material) it is distinguished by its proportionally broader, less pointed leaves, villosulous stems and calyces, dense cyme, and much shorter-clawed petals. All three species belong to the Irano-Turanian element, and so far as I know their areas do not overlap (cf. maps 1 & 2).



MAP 2. *Linum* Sect. *Dasylinum* in Turkey, excluding *L. hirsutum*.

- |                            |                              |
|----------------------------|------------------------------|
| ● <i>L. olympicum</i> .    | × <i>L. hypericifolium</i> . |
| ○ <i>L. unguiculatum</i> . | S <i>L. seljukorum</i> .     |
| + <i>L. densiflorum</i> .  | △ <i>L. anisocalyx</i> .     |
| L <i>L. Luschantii</i> .   | ▽ <i>L. pubescens</i> .      |

*L. densiflorum* also shows affinities with the Pontic and Caucasian *L. hypericifolium* Salisb. but is readily distinguished by its narrower (though still hollow) villosulous stems, and narrower leaves that are 3-nerved (instead of 5-7-nerved) and densely ciliate with stalked glands. The heterostyly of this species is associated with stigma dimorphism, the stigmas of the short-styled plants being shorter than those of the long-styled ones.

#### *Linum seljukorum* P. H. Davis, sp. nov.

Plate 7

Species distinctissima, annua, nana, basi ramosa, foliis parvis obtusis (basalibus crassis glaucis, caulinis glanduloso-marginatis) provisa, verosimiliter affinis *L. hirsuto* L. (praesertim subsp. *anatolico* (Boiss.) Hayek) et *L. pubescenti* Banks & Sol. sed ab ambobus floribus multo minoribus homostylis, petalis exacte liberis caeruleis, sepalis ovato-oblongis obtusis capsulam aequantibus, stigmatibus abbreviatis inter alia longe distat.

*Planta* annua, basi ramosa, 6–20 cm. alta. *Radix* verticalis, superne 2–3 mm. lata. *Caules* ascendenti-erecti cymoso-ramosi, vix 1 mm. lati, ut pedicelli molliter hirsuti (inferne glabrescentes), a medio vel infra in cymas unilaterales laxas abeuntes. *Folia inferiora* obovato-spathulata, obtusa, crassa, glauca, eglandulosa, enervosa, in planta juniore rosulata, in planta florifera subemarcida. *Folia caulium floriferorum* (infimis glabris exclusis) hirsuta, oblonga vel superiora ovato-oblonga, obtusa, sessilia, glandulis stipitatis marginata, 4–10 mm.  $\times$  1–3 mm., inferne ad basin obscure uninervosa. *Pedicelli* breves, 1–3 mm. longi, erecti. *Flores* parvi, ut videtur homostyli. *Sepala* villosula, vix 5 mm. longa, obtusa; exteriora ovato-oblonga, glandulis breviter stipitatis marginata, inferne 3-nervosa; interiora angustiora, in dimidio superiore angustata, glanduloso-marginata, inferne indistincte membranaceo-marginata eglandulosa. *Petala* caerulea, libera, 8 mm. longa, obovata, apice obtusa undulata, inferne in unguem obtusum 2 mm. longum sensim angustata. *Filamenta* lineari-lanceolata, 3–5 mm. longa, basi in tubum 1 mm. longum coalita. *Antherae* vix 1 mm. longae, late oblongae. *Staminodia* subulata, minima. *Ovarium* dense pilosum. *Styli* 2 mm. longi, fere ad medium coaliti. *Stigmata* oblongo-capitata. *Capsula* 4 mm. longa, ovoideo-spherica, brevissime rostrata, superne pilosa, sepala aequans. *Semina* 2.5 mm. longa, compressa, brunnea, nitida. Floret Aug.-Sept.

TURKEY (Lycaonia). Prov. Konya: Konya—Kaşinhan, 1000 m., in dry mud at edge of saline marsh, young leaves very glaucous and fleshy, flowers blue, 7 Sept. 1947, Davis 14777 (holo. E! iso. K!).

Although an annual, this very distinctive, small flowered species is probably more closely related to the perennial *L. hirsutum* L. (especially the Irano-Turanian subsp. *anatolicum* (Boiss.) Hayek) than to the annual *L. pubescens* which has very different sepals to those of *L. seljukorum*. The new species is probably the only homostylic member of Sect. *Dasylinum*, and the only one in which the petals are quite free. In addition to its annual habit and the floral differences cited in the diagnosis, *L. seljukorum* differs from *L. hirsutum* subsp. *anatolicum* in its smaller, obtuse stem-leaves (the lowest ones being very fleshy and glaucous), and in the form of its ascending inflorescence. Its sectional position is discussed on p. 140.

When *L. seljukorum* was discovered in flower and fruit in early September, numerous young plants (showing only fat rosettes of glaucous eglandular leaves) were growing among the flowering plants. These (infected by *Melampsora lini*) presumably represented a later germination than those which had produced the flowering plants. The locality where the species grows near Konya—on dried-up, probably slightly saline mud-flats—is evidently subjected to periodic flooding during winter or spring.

The species is named after the Seljuk Sultans of Rum, who made Konya the capital of their kingdom.

***L. pubescens*** Banks & Sol. in Russell, Nat. Hist. Aleppo, ed. 2, ii, 268 (1794).

This species was originally described from material collected by Russell near Aleppo (holo. BM!). Boissier in his *Flora Orientalis* (i, 860:1867) noted that the Greek plant differed somewhat from the Eastern material but did not distinguish the former by a taxonomic name. Careful examina-

tion shows that the several minor *differentiae* are closely correlated, and there is every justification for recognising the Greek plant as a distinct subspecies; a diagnosis, with the characters of subsp. *pubescens* in parenthesis, is given below.

subsp. *Sibthorpiatum* (Margot & Reuter) P. H. Davis, *stat. nov.*

Syn.: *L. Sibthorpiatum* Margot & Reuter in Mem. Soc. Phys. Genève, viii, 283, t. 3 (1839).

*L. pubescens* var. *Sibthorpiatum* (Margot & Reuter) Planchon in Hook., Lond. J. Bot. vii, 520 (1848).

?*L. piligerum* Presl, Fl. Sic. 171: 1826. (Sicily?).

?*L. decoloratum* Griseb., Spicil. Fl. Rum. i, 117: 1843. (Macedonia).

*L. pubescens* var. *Thomannianum* Guyot in Rev. Fac. Sci. Univ. Istanbul, N.S. ii (3-4), 5 (1937).

A typo ramis inflorescentiae ascendentibus (haud late divaricatis), sepalis villosulis 8-10 mm. longis superne lanceolato-linearibus (haud 9-12 mm. longis linearibus parcius piliferis), bracteis eglandulosis vel sparsim (haud manifeste) glanduloso-marginatis, corolla minore 16-20 mm. longa (haud 20-27 mm. longa) divergit. Planta saepe minor, pauciflora.

GREECE. Zante, in cespitosis ad radices montis Scopo et alibi, *Margot* (holo. G?; n.v.). Corcyra (Corfu), *J. Ball* a. 1877; Corfu, *Edmonds* 317. Attica: pr. Ecaly, *Guiol* a. 1931; Ekale, *Atchley* a. 1936; Mt. Parnes, *Guiol* a. 1930; Mt. Pentelikon (nr. Ekale), *Atchley* 620. Foothill of Oeta, *D. Lowe* 24. Mt. Peloponnesi, (herb. Benth.). In fruticetis montis Torniki (?) Argolidis, *Heldreich* 1844. Argos-Nemea (Herb. Stuart Mill). Prope Patras, *Heldreich* 1861. Navarino, *Forbes* a. 1841. Pindus Tymphaeus: Wutades, *Sintenis* 523. Laconia: ad coenobium Palaia Panghia pr. Astros et pr. Maselina, *Orphanides* 829. Crete: Canea, *Sieber*.

Subsp. *pubescens* occurs in S. Turkey (from the Amanus eastwards), N.W. Syria, Lebanon, Palestine (including Jordan), N. Iraq and Cyprus, and is chiefly a plant of degraded Mediterranean communities, especially *batha*. There is apparently no record of the species from Western Anatolia, so that the two subspecies are geographically isolated. Subsp. *pubescens* is the plant figured as *L. pubescens* var. *Sibthorpiatum* in the Botanical Magazine (t. 5112:1859), the epithet evidently being adopted by Hooker through a misinterpretation of the latter taxon's differential characters.

In its ascending inflorescence and reduction in glandulosity, *L. pubescens* subsp. *Sibthorpiatum* parallels the European *L. hirsutum* L. sens. str.; the latter differs in the same characters from its Turkish counterpart, subsp. *anatolicum* (Boiss.) P. H. Davis.

*Linum anisocalyx* P. H. Davis, *sp. nov.*

Valde affine *L. pubescenti* Banks & Sol. sed sepalis valde inaequalibus, exterioribus duobus elliptico-lanceolatis latioribus, interioribus tribus duplo minoribus rhomboideo-lanceolatis praesertim recedit.

*Herba* annua, 25-40 cm. alta, gracilis. *Caules* floriferi 1-5 erecti, solidi, 1-2 mm. lati, molliter hirsuti, superne in cymam laxam 5-10 cm. latam e ramulis 2-4 unilateralibus laxifloris compositam abeuntes. *Folia* caulina hirsuta, eglandulosa, textura tenuia; inferiora spatulato-oblonga, sub-obtusa, subemarcida, 15-25 mm.  $\times$  3.5-5 mm.; mediana et superiora



oblonga vel breviter lanceolato-oblonga, acuta, basi rotundata sessilia, 3-5-nervosa, internodiis duplo longiora; folia inflorescentiae simillima, sensim diminuta. *Pedicelli* breves, pubescentes. *Flores* heterostyli. *Sepala* valde inaequalia; exteriora duo e basi elliptico-lanceolata plana, 11-12 mm.  $\times$  3-3.5 mm., herbacea, hirsuta, longe ciliata, eglandulosa, basi prominente trinervosa; interiora tria, exterioribus occlusa, duplo minora, 6-8 mm. longa, involuta, rhomboideo-lanceolata, obscure 3-5-nervosa, acutissima, superne glandulis stipitatis marginata, infra medium in marginem hyalinum saepe asymmetricum abrupte ampliata. *Petala* 25-28 mm. longa, in sicco roseo-lilacina, limbo late obovato 10-11 mm. lato in unguem aequilongum sensim attenuato; unguis cohaerentes. *Filamenta* inaequalia (longiora 12-14 mm. longa) basi in coronam 2 mm. altam coalita. *Antherae* late oblongae 1 mm. longae. *Styli* in floribus brevistylis 4 mm. longi ad medium coaliti, in floribus longistylis 11-12 mm. longi ad  $\frac{1}{2}$  coaliti. *Stigmata* lineari-clavata. *Ovarium* glabrum. *Capsula* fere matura sphaerica, 4-5 mm., breviter mucronata, glabra, sepalis occultata. *Semina* matura ignota. Fl. Mai.-Jun.

TURKEY (Cilicia). Prov. Içel: plaine de Mersina, May 1855, Balansa 721 (holo. K! iso. BM!); Mersina, Siehe a. 1896 n. 199; Mersin-Kuzucubayir, 18 June 1950, A. Attila.

It is not without some hesitation that I have described *L. anisocalyx* as a new species. Its affinity with *L. pubescens* Banks & Sol. is so close that the type gathering was referred to that species by Boissier. Yet the structure of the calyx is very different in the two plants. In *L. pubescens* the sepals are all subequal and linear except for the enlarged obovate-rhomboid base; but in *L. anisocalyx* the sepals are very strikingly dimorphic—the two outer elliptical-lanceolate and broader than in *L. pubescens*, the three inner only half as long, rhomboid-lanceolate and almost hidden by the outer pair. Such extreme sepal dimorphism is unique in Oriental species of *Linum*. Furthermore, this cannot be considered an abnormality or a sporadic variant, since it is represented by three different gatherings, all from the vicinity of Mersin in the Cilician plain. I have seen no specimens of *L. pubescens* from that area although the figure of subsp. *pubescens* (Bot. Mag. t. 5112: 1859) claims to be based on seed obtained from the Mersin plain by Reuter.

In addition to the floral differences described above, *L. anisocalyx* appears to be a more slender (and usually taller) plant than *L. pubescens*, with more laxly flowered, unilateral cymes.

## SECT. SYLLINUM GRISEB.

Spicil. i, 118 (1843)

The unsatisfactory state of the classification of the very natural Sect. *Syllinum* in Europe has its repercussions in Anatolia, especially in the N.W. where specific problems cannot be settled until this critical group is better understood in S.E. Europe and the Crimea. The variability of (and between) populations is evidently related to the heterostylic nature of the whole section. The chaotic taxonomic state of the section in the Balkans (where Sect. *Linum* is little better) cannot all be attributed to slovenly systematics. Hybridisation may well have obscured specific

patterns in that area.\* On the other hand, there is no doubt that the species are rather plastic in response to differences in environment, the presence or absence of basal rosettes and sterile shoots being one of the useful diagnostic characters that are not as constant as one might wish. It is a group that would well repay collateral cultivation.

**L. arboreum** L., Sp. Pl. 279 (1753).

TURKEY. Prov. Muğla distr. Marmaris (Caria): Marmaris-Emecik (towards Datça), 350 m., in maquis (*Quercus coccifera*, *Genista*, *Arbutus Andrachne*), erect 1 m. shrub, flowers bright yellow, 25 March 1956, Davis & O. Polunin (D.25372).

New for Anatolia. The species has previously been recorded only from Crete and the Dodecanese.

**L. mucronatum** Bertol., Misc. Bot. (1), 18 (1842).

This very polymorphic species raises problems of taxonomy and nomenclature that require discussion. When Boissier (1867) published *L. orientale* (Boiss.) Boiss. (based on *L. flavum* L. var. *orientale* Boiss.), he cited *L. mucronatum* Bertol. as a synonym, thus invalidating the use of his binomial, *L. orientale*, at specific rank under Art. 73 (1) of the International Code. (This does not, of course, prevent the epithet *orientale* from being taken up at infraspecific rank.) *L. mucronatum* Bertol., it is true, is antedated by the earlier *L. mucronatum* Gilibert (Exercit. Phyt. ii, 288: 1792), but as Gilibert did not consistently employ binomial nomenclature in his Exercitia Phytologica and earlier works, his biverbal names must be rejected under Art. 79 (4) of the Code.† *L. mucronatum* Bertol. is therefore the correct name for the species.

At this point, however, we are faced with a taxonomic difficulty. *L. mucronatum* Bertol. is based on Chesney's gathering from the Euphrates, of which isotypes are preserved at Kew and the British Museum. The specimens are poor and their interpretation is open to question. Handel-Mazzetti (Ann. Nat. Hofmus. Wien, xxvii, 62: 1913) has suggested (apparently without having seen the specimens) that Chesney's plant is *L. sulphureum* Boiss. & Hausskn. ex Boiss. This I do not believe, since although it has small lower leaves it does not have the strongly suffruticose habit and rigid flowering stems characteristic of that taxon. In habit Chesney's plant can be matched with certain specimens from N. Iraq, but the keeled calyx and differently shaped petal are not characteristic of the common yellow *Linum* of Iraq (*L. mucronatum* subsp. *assyriacum*, described below). Therefore, although I take up the name *L. mucronatum* Bertol. for the major part of Boissier's *L. orientale*, its status at subspecific level, when that species is divided on a morpho-geographical basis, is less satisfactory; it happens to be intermediate between two well-marked geographical subspecies. To conform with the rules of nomenclature, it seems necessary to recognise a subsp. *mucronatum* to include the type

\* In addition to the account of the Balkan species given by Hayek (Prodr. Pen. Balc. i, 559-563: 1925), the revisions of J. Podpěra (Ver. Zool.-Bot. Ges. Wien, lii, 635: 1902) and S. Jávorka (Mag. Bot. Lap. ix, 147: 1910) will be found very useful, although the authors are in disagreement about the status of their units.

† I am indebted to Mr. J. E. Dandy (British Museum) for nomenclatural information on this matter.

and other specimens intermediate between the Iraq and Turko-Palestine races (subsp. *assyriacum* and subsp. *orientale*), though in habit and leaf shape they may differ considerably from Chesney's type. In this connection it is worth noting that at the British Museum there is a sheet collected by Sintenis from Rum Kala'a on the Euphrates that consists of one specimen very like Chesney's plant and another that is typical of subsp. *orientale*. Whether subsp. *mucronatum* represents a true geographical race or is the product of hybridisation is a question that needs to be answered in the field, but it certainly occurs between the main distributional areas of the other two subspecies.

*L. Balansae* Boiss. cannot be kept specifically distinct from *L. mucronatum* Bertol. With the wealth of material now available, it seems that *L. mucronatum* falls into at least two major geographical races: subsp. *assyriacum*, centred in N. Iraq and having a small petal limb and long claw, and subsp. *orientale* with a large petal limb and short claw, centred in Turkey, W. Syria, and Palestine. Within the latter subspecies two colour varieties can be recognised: var. *Balansae*, characterised by the purple claw of the petal, which forms pure populations in Turkey, or in the eastern part of its range grows mixed with the uniformly yellow-petalled form; the latter, var. *orientale*, is the only colour variant present in W. Syria, Palestine and Lebanon.

In addition to the above taxa, I have recognised subsp. *gypsicola* from the gypsum hills near Çankiri (Paphlagonia) at the northern extremity of the species' Turkish range. This is, however, paralleled in habit (though not in calyx) by a form recently collected by Dr. Duncan Poore in Jordan (Wadi Dana, Poore, 180A)—a marginal region where the species shows marked local variation that needs further study. In particular a Jordanian specimen from north of Naqb Ishtar (Poore 170A) is very distinctive, having sturdy, ascending stems, short oblong leaves that are acute but not acuminate, and ovate acute sepals; it may require subspecific rank. More material, collected to show population variability, is required from Jordan.

The distribution of the subspecies and varieties is given in maps 3 and 4.

It should be added here that in his *Flora Orientalis* Boissier cites under *L. orientale* (Boiss.) Boiss. not only specimens of subsp. *mucronatum* and subsp. *orientale* (var. *orientale* and var. *Balansae*) but also *L. scabrinerve* P. H. Davis to which Wiedemann's specimens from Ankara and Kastamonu belong. When Boissier described *L. Balansae* he cited as one of his syntypes a plant that is actually *L. sulphureum* Boiss. & Hausskn. ex Boiss. (Aintab-Nisib, *Haussknecht!*). The difference between the latter species and *L. mucronatum* is discussed under *L. sulphureum*. The following is a key to the infraspecific taxa of *L. mucronatum*, followed by an annotation of specimens seen.

- 1a. Petal limb broadly obovate, 10–15 mm. wide, tapering into a short claw scarcely  $\frac{1}{2}$  as long as limb; sepals keeled:
- 2a. Sepals ovate, shortly acuminate, 5–7 mm. long; leaves linear, 1.5–2 mm. broad, very glaucous; cyme few-flowered and  $\pm$  contracted; petals 18–20 mm. long . . . subsp. *gypsicola*
- 2b. Sepals lanceolate or linear-lanceolate, longly acuminate, 7–13(–15) mm. long; leaves oblong or linear-oblong, 2–7 mm. broad; cyme

usually many-flowered and widely spreading; petals 21–28 mm. long. Stems ascending or procumbent:

- 3a. Petals purple towards the base subsp. *orientale* var. *Balansae*  
 3b. Petals yellow throughout subsp. *orientale* var. *orientale*  
 1b. Petal limb obovate-orbicular, 7–8 mm. wide, contracted into an exerted claw 1–1.5 × limb (petals 17–22 mm. long); sepals scarcely keeled, lanceolate, 6–11 mm. long. Leaves very glaucous, oblong. Stems often prostrate and ± rigid subsp. *assyriacum*  
 1c. Petals and sepals intermediate between subsp. *orientale* and subsp. *assyriacum*. Leaves linear-oblong, 1.5–6 mm. wide. Cyme few flowered, ± contracted subsp. *mucronatum*

subsp. **mucronatum**

*Caules* e basi breviter suffrutescentes, 10–15 cm. longi, subflexuosi. *Folia* lineari-oblonga, 10–13 mm. × 1.5–3.0 mm., uninervosa, acuta, mucronata, infima spathulata 3 mm. longa conferta. *Cyma* 3–5-flora, contracta. *Sepala* lanceolata, carinata, 6–7 mm. longa. *Petala* flava, 21 mm. longa, limbo anguste obovato c. 7 mm. lato in unguem paulo breviorum sensim attenuata. (Description of type; other specimens may have leaves up to 6 mm. broad and be of more sturdy habit).

SYRIA. Ex oris Euphratis, *Chesney* 186 (holo. Bologna; K! BM!). Aleppo, *Russell*. Mesopotamia, in desert by Chabur river, *Haussknecht* 148.

TURKEY. Prov. Gaziantep: Rum Kala'a, on slopes towards the Euphrates, *Sinten* a. 1889, p.p. Diyarbakir, *Noë* 844 (leaves 2–6 mm. wide). Prov. Bitlis: Baykan–Bitlis, 1400 m., arid slopes, stems procumbent-ascending, fl. small (flava), usually without a purple centre, *Davis* 22167 (leaves 3–6 mm. wide).

N. IRAQ. Dohuk, *Lazar* 3348; *ibid.*, *Mekki Bey* 3255.

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

Syn.: *L. flavum* L. var. *orientale* Boiss., *Diagn. Ser. II* (1), 99 (1853).

*L. orientale* (Boiss.) Boiss., *Fl. Or. i*, 855 (1867), p.p.

*Caules* e basi saepe lignescente ascendentes vel nunc erecti, 7–30 cm. longi. *Folia* oblonga (nunc interdum lineari-oblonga), 12–30 mm. × 2–7 mm., uninervosa (rare ad 5-nervosa), breviter acuminata, glaucescentia, inferiora spathulata. *Cyma* plerumque late patens, multiflora. *Sepala* lanceolata vel lineari-lanceolata, carinata, 8–13(–15) mm. longa. *Petala* flava, 21–28 mm. longa, limbo late obovato 10–15 mm. lato in unguem breviorum sensim angustata.

var. **orientale**—Ic. *Fl. Israelis*, tt. 51–100 (t. 80) (1952).

Petala ex toto flava.

PALESTINE. Hierosolyma (Jerusalem), *Boissier* (lecto. G!; K!); *ibid.*, *Roth*, *Bornmüller* a. 1897, *Ball*, *Durham*. Jerusalem, Mt. Scopus, *Zohary & Jaffe*. Palestine, *Pinard*. Jordan: Jerash–Mafraq, *Poore* 110 A.

SYRIA. Aleppo, *Kotschy* 98; *ibid.*, *Haussknecht* a. 1865. In deserto fl. Chabur, *Haussknecht* a. 1868. Hama–Aleppo, plain, *R. Wyndham*, a. 1945. Damascus, *Gaillardot*. Jebel el Rejmeni (Syr. Desert), *Post*. Bir Slem,

\* Since receiving proofs of this paper, I have come across the description of *Linum orientale* subsp. *armenum* Bordz. in *Acta Hort. Bot. Jurjev.* xiii, 20 (1912) from Turkish Armenia. This may fall within the range of subsp. *orientale* (var. *orientale*?), but no type material has been examined. If they should prove synonymous, the name subsp. *armenum* will have to be adopted in place of subsp. *orientale*.

N. of Palmyra, *Davis* 5765. Jebel Shubeit (Syr. Desert), *Post. Busrah, Dinsmore*, 11027. Musul-Nisibin (Iraq?), *Loftus*.

LEBANON (dist. Akar). Amouah—Qurnat Aruba, *Davis* 6292.

TURKEY. Prov. Maraş dist. Göksün: Binboğa Dağ above Yalak, 1500 m., *Davis* 19949. Prov. Sivas: Gürün, *Davis* 21951, p.p. Prov. Van dist. Gevaş: Artos Dağ, 2800 m., *Davis* 22778. Prov. Bitlis: Nemrut Dağ, 1800 m., *Davis* 23576, p.p.; *ibid.*, *Davis* 23534 (tall form with elongated leaves and sepals). Prov. Erzincan/Gümüşane: Kop Dağ, 25 July 1947, *A. Heilbronn*.

IRAQ (Kurdistan). Khamsad pass, 800 m., *A. Low* 263.

RUSSIAN AZERBAIJAN. Norashenski region, N. Ahura, 1250–1300 m., 18 May 1947, *Grosshiem et al.* (BM).

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

Syn.: *L. Balansae* Boiss., *Fl. Or. i*, 855 (1867), excl. pl. *Haussknechtiana* (*L. sulphureum* Boiss.).

A typo petalis flavis versus basin purpureis divergit.



MAP 3. *Linum scabrinerve* and *L. mucronatum* in Turkey.

- ▽ *L. scabrinerve*.
- + *L. mucronatum* subsp. *mucronatum*.
- ..... subsp. *orientale* var. *orientale*.
- ..... var. *Balansae*.
- × ..... subsp. *gypsicola*

TURKEY. Prov. Trabzon: Stavri, 1500 m., *Balls* 531. Mersin, *Siehe* 332. Thyana-Pursuk (?), *Siehe* a, 1898 n. 96. Prov. Ankara: Beynam S. of Ankara, *Kasaplıgil* 291; Ankara-Hacikadun, 17 July 1945, *M. Başarman*. Malatya, Pinarbaşı, *Gleisberg* 184. Prov. Niğde: Taşpınar-Hasan Dağ, *Davis* 18853. Prov. Kayseri: in collibus supra Talasse Cappadociae (7 km. S.E. of Kayseri, 1300 m.), *Balansa* 590 (lecto. G! iso. K!); Ürgüp, 1200 m., *Davis* 19111. Prov. Sivas: Gürün, 1100 m., *Davis* 21591, p.p. Prov. Sivas/Malatya: Gürün-Darende, 1500 m., *Davis* 21863 (approaching subsp. *assyriacum* in habit). Prov. Gümüşane: Mt. Tazka near Gümüşane, *Bourgeau* 58 & 187. Prov. Erzincan: Eğin, June 1953, *Attila*; Süşehri-



Refahiye, 1600 m., *Balls* 1492. Prov. Elazığ: Maden-Hazar Göl, 1200 m., *Davis* 22048; Euphrates-Elazığ, 1200 m., *Davis* 22017; Harput, *Noë* 845. Prov. Van, dist. Başkale: İspiriz Dağ, 3200 m., *Davis* 23779 (dwarf alpine form). Armenia Minor: Delidagh, *Bornmüller* a. 1893 n. 3301.

IRAQ. Jebel Sinjar, Kursi, limestone mt. with relics of *Quercus Aegilops* forest, *Gillet* 10951.

Widespread in Turkey, but centred in the central and eastern parts of the plateau, where it is more common than var. *orientale* s.l., but the fading of their flowers or the fact that they are in fruit makes it impossible to decide to which variety they belong. On the plateau of Turkey the subspecies is scarcely lignified at the base, the plants often being hemicryptophytic. Further south, in Palestine, Syria and Lebanon, the taxon must be classed as a weakly suffrutescent chamaephyte, like the following subspecies from Iraq.

Other herbarium specimens can be assigned to subsp. *orientale* s.l., but the fading of their flowers or the fact that they are in fruit makes it impossible to decide to which variety they belong. On the plateau of Turkey the subspecies is scarcely lignified at the base, the plants often being hemicryptophytic. Further south, in Palestine, Syria and Lebanon, the taxon must be classed as a weakly suffrutescent chamaephyte, like the following subspecies from Iraq.

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

Ab omnibus aliis formis speciei ob petala longe unguiculata insuper differt.

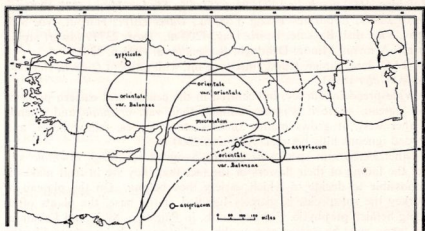
*Planta* valde glauca, basi indurata. *Caules* prostrati vel procumbentes, rigidi, 10–30 cm. longi. *Folia* oblonga, 10–25 mm.  $\times$  2–6 mm., uninervosa, breviter acuminata, inferiora oblongo-spathulata minora subconferta. *Turiones* steriles paucae vel nullae. *Cyma* patens, (3–)5–15(–18)-flora, 4–10(–14) cm. lata. *Sepala* lanceolata, vix carinata, 6–11 mm. longa, margine membranaceo glandulifero provisa. *Petala* pallide flava (nunc pallidissima), (17–)20–22 mm. longa, longe unguiculata; limbus obovato-orbicularis, 7–8 mm. latus, in unguem aequalem vel sesquolongiorem oculus angustatus. *Capsula* spherica, 5 mm. longa (mucrone 1 mm. incluso). Fl. Apr.

IRAQ (Kurdistan). Near Kirkuk, on road to Baba Gurgur oil wells, 100 m., 4 April 1931, *Guest* 1349 (holo. K!). Tuz, *Rogers* 0155. Desert of Sinjar, 2 April 1849, *Loftus*. Naft Khana, 150 m., *Guest* 1857. Kani Dolman hills near Kirkuk, 400 m., *Guest* 4341. Kifri, *Graham* a. 1920 (form with red-throated corolla). Mosul Liwa; Ain Sifui, *Salim* 2564. Shargol, *Reed*. Summit of pass to Jaidar, 5 May 1851, *Loftus*. Altun Kufri–Kirkuk road, *Guest* 631. Qaiyarah, Mosul, *Bayliss* 126. Jebel Darwawishkah, nr. Khanikin, 250 m., *Guest* 1757.

PALESTINE (Jordan): Between H.4 and H.5, *Field & Lazar* 143.

PERSIA. Sine loco (Kurdistan), *Olguin* (form with branched stems).

Subsp. *assyriacum* is confined to more desert habitats than subsp. *orientale*. In its typical form the taxon is so distinct that one might be tempted to assign specific rank to it, but the occurrence of specimens (here classified as subsp. *mucronatum*) linking it to subsp. *orientale* suggest that discretion may be the better part of taxonomic valour. However, the possibility that we have here two species hybridising deserves consideration. The chemistry of the flower pigment in subsp. *assyriacum* is apparently different to that of other forms of the species, the petals (a very pale yellow when fresh) drying a different colour—a deep, slightly greenish, brassy yellow. Field notes describe subsp. *assyriacum* as being a useful fodder plant in Iraq.



MAP 4. The subspecies of *Linum mucronatum* in the Orient.

This is probably the plant from Kurdistan identified as *L. sulphureum* by Nábělek; his *L. sulphureum* var. *sulphureopurpureum* (Fac. Sc. Univ. Masaryk, No. 35, 57: 1923) may also belong to subsp. *assyriacum*. It is possible that the subspecies may extend across the little-known Syrian Desert to its outlying station in Jordan.

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

Affine subsp. *orientali* var. *orientali* sed sepalis brevibus, foliis linearibus, cymis contractis, petalis brevioribus differt.

*Caules* e basi breviter suffrutescente procumbentes vel ascendentes, 5–10 cm. longi, rigidi. *Folia* linearia, valde glauca, 10–22 mm.  $\times$  1.5–2 mm., uninervosa, mucronata, inferiora lineari-spathulata. *Turiones* steriles paucae. *Cyma* contracta, 3–12-flora, 1–4 cm. lata. *Sepala* ovata, breviter acuminata, 6–7 mm. longa, carinata, margine membranaceo breviter glandulifero provisa. *Petala* ex toto flava, 18–20 mm. longa, limbo late obovato saltem 10 mm. lato sensim et breviter unguiculato. *Capsula* fere matura 4–5 mm. longa (mucrone 1 mm. incluso). Fl. Mai.–Jun.

TURKEY. Prov. Çankiri: on marly gypsum hills S. of Çankiri, with species of *Artemisia* and *Achillea*, stems spreading-ascending, flowers bright yellow (flava), leaves glaucous, 9 June 1954, Davis 21730 (holo. E! iso. K! BM!).

In habit and leaf shape this subspecies approaches the Pisidian *L. papilliferum* Huber-Morath & Reese, which is, however, distinguished from all forms of *L. mucronatum* by its characteristic indumentum.

*L. pamphylicum* (Boiss.) Podp., described as a variety of *L. orientale* by Boissier, is surely a distinct species; it resembles *L. elegans* Spruner in having a rosette of spatulate leaves at the base of the flowering stems, but differs in its woodier habit, longer sepals and subtrinnerved leaves. Apart from its diagnostic basal rosettes, *L. pamphylicum* can be distinguished from *L. mucronatum* subsp. *orientale* by the scabridulous ridges on its stems and in its non-acuminate leaves.

*L. sulphureum* Boiss. & Hausskn. ex Boiss., Fl. Or. i, 857 (1867).

*L. sulphureum* is so close to *L. mucronatum* Bertol. (with which it has often been confused) that I feel diffident about maintaining it at specific rank and subordinating subspecies to it. As the species is circumscribed here, it is a much woodier plant than *L. mucronatum* s.l., being decidedly shrubby at the base. Though this character may prove to be directly adaptive, I doubt it; it certainly gives the plant a very distinctive facies. The stems are stiff, straight and few-flowered, the leaves rarely more than 3 mm. wide and not acuminate as is usually the case in *L. mucronatum*. The lower stem leaves are more numerous than in *L. mucronatum*, and always persistent and imbricated. Balls describes the flowers of subsp. *sulphureum* as apricot yellow, and Guest those of subsp. *pubifolium* as orange. I have never seen these colours in *L. mucronatum*, in which the flowers are a clear rich sulphur (*flava*)—though often very pale in subsp. *assyriacum*.

*Key to the subspecies*

1. Leaves all glabrous:
  2. Median stem leaves 2–3 mm. broad; sterile shoots numerous, with densely imbricated leaves forming a column; flowering stems spreading-ascending, 3–9-flowered . . . . . subsp. *sulphureum*
  2. Median stem leaves 1–1.5 mm. broad, glaucous, sterile rosettes few; flowering stems erect, 1–5-flowered . . . . . subsp. *syriacum*
1. Lower leaves crisply pubescent (both of flowering stems and sterile shoots); flowering stems erect, 1–5-flowered . . . . . subsp. *pubifolium*

subsp. *sulphureum*

Syn.: *L. rigidissimum* Post in J. Linn. Soc. xxiv, 424 (1886), n.v.

TURKEY. Gaziantep, *Balls* 794; *ibid.*, *Balls* 2199. Aintab (Gaziantep), *Post* a. 1884. Aintab–Nisib, *Haussknecht* (as *L. Balansae*). In declivibus Syriae borealis supra Balkis, *Haussknecht* (holo. G!). Mesopotamia, *Sinten* 269.

subsp. *syriacum* (Boiss. & Gaill. ex Boiss.) P. H. Davis, **comb. et stat. nov.**

Syn.: *L. syriacum* Boiss. & Gaill. ex Boiss., Fl. Or. i, 856 (1867).

*L. flavum* L. var. *syriacum* (Boiss.) Post, Fl. Syria, Palest. & Sinai, i, 183 (1896).

*L. mucronatum* Bertol. var. *syriacum* (Boiss.) Bornmüller in Beih. Bot. Centralbl. xxxi (2), 196 (1914).

SYRIA. Antilebanon, 1400 m., 4 May 1933, *Meinertzhagen* (BM).

Syntypes: In rupestribus calcareis Antilibani inter Damascus et Berythum ad Ouadi el Karn et Ouadi el Harir, *Gaillardot* (G; K!); in monte Schergi, 1500 m., *Kotschy* 2 (G).

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

A typo foliis inferioribus crispule pubescentibus imprimis recedit.

*Suffrutex*. *Caules* erecti, 6–12(–17) cm. alti, 1–3(–5)-flori. *Folia* oblonga vel lineari-oblonga, 7–13 mm. × 1.5–3.5 mm., acutissima; inferiora (ut ea turionum steriliū brevium) congesta, spathulata, mucronata, breviter et crispule pubescentia, 3–5 mm. longa, glaucescentia. *Sepala* lanceolata, vix carinata, margine angusto membranaceo glandulifero provisa, 7–10

mm. longa, subcuspidata. *Corolla* aurantiaca, 20–22 mm. longa, limbo obovato in unguem subaequalem sensim attenuato. *Capsula* fere 5 mm. longa (mucrone 1 mm. incluso). Fl. Apr.

IRAQ. (Kurdistan). Near Zawita, 750 m., on red loam banks, beautiful orange flowers, 23 Apr. 1932, *Guest* 2175 (holo. K!); Zawita, on rocky plateau, 1200 m., 28 July 1933, *Guest* 4578 (*fruct.*).

*L. scabrinerve* P. H. Davis, *sp. nov.*

Plate 8A

Syn.: *L. mucronatum* Bertol. var. *latifolium* Freyn in *Öst. Bot. Zeit.*, xl, 211 (1890), *nom. nud.*

Affine *L. flavo* L. sed caule costis elevatis scabris alato-angulato, foliis medianis oblongo-lanceolatis (infra medium latioribus) subtus nervis scabris 3–5(–7) provisus recedit.

*Planta* perennis, haud suffruticosa sed caudicibus subterraneis induratis provisa. *Caules* herbacei, erecti, 20–30 cm. alti, 2–2.5 mm. lati, costis elevatis pallidis scabris pluribus alato-angulati, superne in inflorescentiam ramosi. *Folia* caulina glauca vel virescentia, plana, basi glandulis nigris stipulata, textura tenuia; inferiora obovata, obtusa, 5–25 mm. longa, sessilia vel in petiolum brevem attenuata, haud rosulata; mediana oblongo-lanceolata, acuta, 2.4–5 cm.  $\times$  4–14 mm., subtus saltem ad nervos 3–5(–7) et ad marginem scabra, internodiis duplo longiora; superiora (et bracteae) simillima sed diminuta, paucius nervosa. *Rosulae* steriles nullae. *Inflorescentia* cymoso-corymbosa, 12–32-flora, 5–13 cm. lata, e ramis ascendentibus (ultimis  $\pm$  dense trifloris) composita. *Flores* heterostyli. *Sepala* 7.5–14 mm. longa, margine membranaceo-glandulifera, dorso subcarinata (carina saepe scabra), exteriora lanceolata, interiora anguste ovata subacuminata latius marginata. *Corolla* flava, immaculata, 20–25 mm. longa; petala cuneato-obovata lamina in unguem indistinctum duplo breviorum abeunte; unguis cohaerentes. *Antherae* 1.5 mm. longae. *Stigmata* lineariclavata vel clavata. *Capsula* 4 mm. longa rostro 0.75 mm. longo incluso. *Semina* ignota. Fl. Jun.

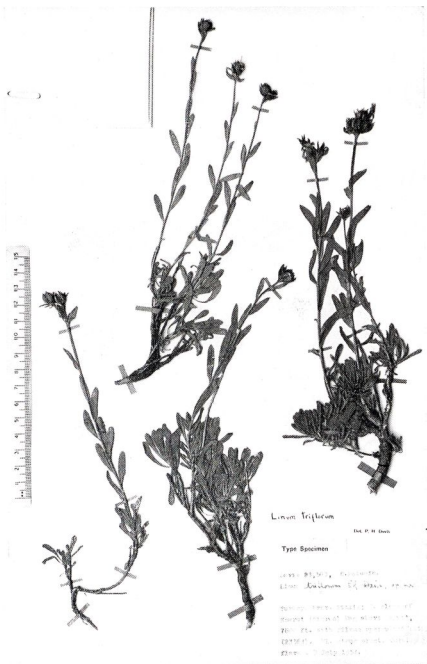
TURKEY. Prov. Ankara: Ciluktal near Ankara, 10 June 1932, *Kotte* 283 (holo. K!); Çankaya, 1000 m., *Lindsay* 67; *ibid.*, *Krause* 4369; Dikmen Dağ, *Kotte* 1211; *ibid.*, *Krause* 3540; Cubukdere, *Krause* 4619; Kure Dağ, *Müller*; Kadiköy, *Wiedemann*; Ankara, in Kawkli-dere, 900 m., *Bornmüller* a. 1929 n. 13921; Beypazar-Balumköy, *Gassner* 536. Prov. Samsun: Amasya—Samsun, in Hadsihilar Dağ, *Bornmüller* a. 1889 n. 60; c. 30 km. W. of Samsun, *Manissadjian* 224b. Prov. Kastamonu: Kastamonu, *Manissadjian* 146; *ibid.*, *Wiedemann*; 5 km. W. of Kastamonu 7 June 1954, *Davis* 21644; Prov. Kırşehir: Muçur—Sife Göl, 17 June 1954, *Davis* 21812.

*Habitat*: calcareous steppe, 700–1000 m., on hills of limestone and marl, and in fallow fields.

*L. scabrinerve* is probably most closely related to *L. flavum* L. from Central Europe, the North Balkans and the Crimea. It differs from the Linnaean species in having scabrid, almost winged angles to the stem, leaves that are broadest below the middle and have several scabrid nerves on the lower surface in addition to the scabrid margin.

This species has been much confused in herbaria. Specimens of it were found labelled as *L. flavum* L., *L. Balansae* Boiss., *L. mucronatum* Bertol. var. *latifolium* Freyn, *L. orientale* Boiss., *L. nodiflorum* L. (a frequent





*Linum triflorum*

Det. P. H. Davis

Type Specimen

June 21, 1917, P. H. Davis  
 from *Andros* Is. *Andros*, sp. nov.

Stems erect, branched, 1-2 dm. tall.  
 Leaves opposite, lanceolate, 1-2 mm. long.  
 Flowers small, 1-2 mm. across, 1-2 mm. long.  
 Petals 4, white, 1-2 mm. long.  
 Stamens 4, 1-2 mm. long.  
 Ovary 1-2 mm. long.

PLATE 8B *Linum triflorum* P. H. Davis. (D. 23563.)



repository for yellow-flowered flaxes, though the only annual in its section) and even *L. nervosum* W. & K.! Indeed, much of the confusion that centres round *L. mucronatum* Bertol. is due to *L. scabrinerve* not having been recognised before; when Boissier published his *L. orientale* (now *L. mucronatum* Bertol.) he included among the cited specimens two gatherings of Wiedemann's that must now be referred to *L. scabrinerve*.

On account of this frequent confusion with the widespread Anatolian *L. mucronatum* (especially subsp. *orientale*), it will be as well to point out how the new species differs from it since their areas show some overlap. *L. scabrinerve* is distinguished by its erect, scabrid-ridged stems, broader, oblong-lanceolate, acute (not acuminate) leaves with about 5 scabrid nerves below, inflorescence less divaricate and with the ultimate peduncles terminated by 3-flowered cymules, and shorter-clawed petals. An affinity with the Cilician *L. ciliatum* Hayek is also evident, from which the new species differs in its hemicryptophytic habit, leaves scabrid-nerved, of thinner texture and not ciliate, taller stems with more pronounced scabrid ridges, and sepals with a narrower, more shortly ciliate, membranous margin.

*L. scabrinerve* belongs to the Irano-Turanian element in the Turkish flora. After *L. mucronatum* (subsp. *orientale*), it may be the most widespread, perennial Turkish species in Sect. *Syllinum*.

***Linum triflorum* P. H. Davis, sp. nov.**

Plate 8b

Affine *L. toxico* Boiss. sed caulibus erectis elatioribus minus rigidis saepe trifloris, foliis majoribus viridibus, sepalis longioribus, capsula majore differt.

*Suffrutex*, basi lignosa procumbens e ramis vetustis saepe tortuosis ad 15 cm. longis et 2–7 mm. latis superne subsquamosis composita, rosulas steriles et caules floriferos emittens. *Caules* floriferi erecti, simplices, subangulati, laeves, 6–17 cm. alti, 1–1.5 mm. lati, substricti, basi saepe rosulis sterilibus praediti. *Folia rosularum sterilium* laxa, oblongo-spathulata, obtusa, mucronata, 1.5–3.5 cm.  $\times$  3–5(9) mm., glabra, viridia, in petiolum brevem sensim attenuata. *Folia caulina* glanduloso-stipulata, oblonga, 1.5–3 cm. longa, obtusa, mucronata (vel superiora  $\pm$  acuta), sessilia, viridia, firma, uninervia, inferiora saepe spathulato-oblonga obtusa subpetiolata 1.5–3 cm. longa, interdum rosulam laxam persistentem formantia. *Cyma* terminalis dense 1–5-flora, saepe triflora. *Pedicelli* breves, glabri. *Flores* heterostyli. *Sepala* 7–9(–10) mm. longa, ovato-oblonga, acuta, margine membranaceo breviter glandulifero provisa, nigro-viridia, haud carinata, interiora latius membranaceo-marginata. *Petala* flava, immaculata, 15–20 mm. longa, late obovata, obtusa, in unguem circa 5 mm. longum sensim attenuata; ungues cohaerentes. *Stigmata* breviter oblongo-clavata. *Antherae* oblongae. 2.5 mm. longae. *Staminodia* minutissima, linguiformia. *Capsula* magna, ovoideo-spherica, 8–9 mm. longa rostro 1 mm. longo inclusio. *Semina* fere matura 5 mm. longa. Fl. Jun.–Jul.

TURKEY, Prov. Bitlis (Kurdistan). Dist. Reşadiye: mountain 10 km. S.E. of Pelli, 2500 m. (range here 2150–2900 m.), rocky slopes, flowers yellow (flava), 8 July 1954, Davis & O. Polunin (D. 22536). Dist. Bitlis: Kamboş Dağı above Hürmüz, 2100 m., rocky limestone slope, base woody, procumbent, tortuous, branched, numerous sterile shoots, flower stems erect, flowers yellow (flava), 30 June 1954, Davis & O. Polunin

(D. 23454); *ibid.*, 2150 m., *Davis & O. Polunin* (D. 23467). Dist. Tatvan: N. slope of Nemrut (Nimrud) Dağ above Sogurt, 2350 m., flower stems erect, corolla yellow, 3 July 1954, *Davis & O. Polunin* (D. 23563—holo. E! iso. K!). Dist. Kotum: Karz Dağ above Kotum, 2200 m. rocky and earthy slopes, erect, leaves green, flowers yellow, 28 June 1954, *Davis & O. Polunin* (D. 22283).

*L. triflorum* is a well distinguished species in a very critical section. Its nearest ally is *L. toxicum* Boiss. (endemic to Mt. Hermon in Syria over 800 km. away) which it resembles in its woody base, short stigmas and numerous sterile rosettes of oblong-spathulate leaves. The new species differs from the latter in its erect, taller, less rigid stems, usually 3-flowered cymes, larger green leaves, longer sepals and manifestly larger capsule.

Apparently widely distributed in the mountains S.W. of Lake Van, *L. triflorum* usually grows at higher altitudes than *L. mucronatum* Bertol. subsp. *orientale* (Boiss.) Davis which is a common plant in the same region. It is not known if *L. triflorum* is poisonous to goats like *L. toxicum*.

***L. caricense*** Boiss., Diagn. Ser. I (5), 86 (1884).

TURKEY. Prov. Kutahya distr. Gediz (Phrygia): Şaphane Dağ, 2000–2100 m., on calcareous ridge, *Davis* 18491. Prov. Konya (Phrygia): top of Kizil Dağ in Sultan Dağ massif, 2040 m., *Huber-Morath* 10569. Prov. Burdur (Pisidia): 4 km. from Burdur, on marl hills, *Huber-Morath* 5429 (as *L. lignosum* Stapf).

The little-known *L. caricense* appears to be a rather variable species, the flowers being borne in few-flowered cymes or singly, and the sepals varying considerably in the length of their ciliation. In *Huber-Morath* 10569 the leaves and sepals are tipped by a curious, wart-like, brown secretion, giving the gathering a distinctive appearance. However, this feature occurs inconsistently in *Davis* 18491, and may well result from damage (by frost or wind) to the mucronate leaf and sepal apices. This throws some doubt on the apical glandular warts described as diagnostic for *L. verruciferum* Azn.—a species related to *L. aretioides* Boiss. and known to me only from the original description.

The closely related *L. lignosum* Stapf, whose type I have examined, remains a little-known plant whose specific status requires confirmation. The type is distinguished from *L. caricense* by its thicker rootstock, green, entirely linear leaves (instead of glaucous, the lower ones linear-spathulate or spathulate), and solitary subsessile flowers. It may be that some of these differences are a direct result of grazing or exposure.

***L. Boissieri*** Asch. & Sint. ex Boiss., Fl. Or. Suppl. 137 (1888).

TURKEY. Prov. Muğla distr. Köyceğiz (Caria): Sandras Dağ, 2200 m., on serpentine scree, rare, *Davis* 13555.

*Linum Boissieri* does not seem to have been collected since its original discovery on the top of Trojan Ida (*Sintenis* 742!). It is certainly very closely related to the Greek *L. elegans* Spruner sens. str. (syn. var. *iberidifolium* (Aucher ex Planchon) Hayek), but I think is best maintained as a separate species. The Turkish plant differs from the latter in its more dwarf stature, slender root, smaller leaves, sepals and corolla, and very short, always 1-flowered stems.

*L. thracicum* Degen in Öst. Bot. Zeitschr. xliii, 55 (1893).

Prov. Bursa: Soukpınar (Ulu Dağ), 4 July 1944, *M. Heilbronn* (K).

The species is apparently new for Turkey. The inflorescence is more elongated and the leaves narrower than in the typical form from N. Greece.

Material is required of any perennial yellow-flowered species of *Linum* from the region of Bursa and Istanbul, since their identity and status remain uncertain. Both *L. elegans* Spruner var. *elatus* Hal. and *L. tauricum* Willd. have been recorded by Aznavour from the Bosphorus.

#### AN UNDESCRIBED SPECIES OF LINUM?

Attention is drawn to a "curious *Linum* with opposite leaves and purple flowers" referred to by Spratt & Forbes (Travels in Lycia, Milyas and the Cibyras, ii, 145: 1847). This was found in May by E. Forbes—quite a competent taxonomist—near Oenoanda, a classical Lycian site at Incealiler between Fethiye and Elmali. As the only Oriental *Linum* known to have opposite leaves is the white-flowered *L. catharticum*, the identity of Forbes' plants invites investigation. I have not been able to trace Forbes' specimen (many of which are preserved at Kew), and the plant should certainly be looked for again. Can it possibly be *Moenchia caerulea* Boiss. in the Caryophyllaceae?