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A REVISION OF *PAPAVER* SECT. *MECONIDIUM*

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The biennial *Papaver* L. sect. *Meconidium* Spach (Papaveraceae) is considered to contain four species: *P. libanoticum* Boiss. with subspp *libanoticum* and *polychaetum* (Schott & Kotschy ex Boiss.) Kadereit comb. et stat. nov., *P. armeniacum* (L.)DC. with subspp *armeniacum*, *microstigmum* (Boiss.) Kadereit comb. et stat. nov. and *pilgerianum* (Fedde) Kadereit comb. et stat. nov., *P. curviscapum* Nab., and *P. persicum* Lindl. with subspp *persicum*, *tauricolum* (Boiss.) Kadereit comb. et stat. nov. and *microcarpum* (Boiss.) Kadereit comb. et stat. nov. A key to species and subspecies is given, capsules and leaves of all taxa are illustrated, and distribution maps are provided.

INTRODUCTION

Among the 11 sections recognized in the genus *Papaver* L. by Kadereit (1988), sect. *Meconidium* Spach, which is to be revised here, is exceptional for its strictly rosette-forming and biennial habit. In contrast, annuality, on the basis of the above treatment, occurs in six sections, and perenniality in four. A recent study of chloroplast DNA variation in *Papaver* and allied genera (Kadereit & Sytsma, 1992), however, reduced, either by exclusion or by fusion, the number of sections in the genus to five, or possibly seven (the geographically aberrant annual sects *Horrida* Elkan and *Californicum* Kadereit were not included in that study), of which only one (or three respectively) would be annual, one biennial and the remainder perennial.

The species of sect. *Meconidium* occupy a more or less continuous geographical range in the mountains of SW Asia from C Anatolia in the W to the Lebanon in the SW, the Caucasus Mts in the N, the Elburz Mts in the NE and the Zagros Mts in the SE.

Although the section has not been subject to any monographic treatment after Viguier (1814), Spach (1839), Elkan (1839), Kuntze (1887) and Fedde (1909), its geographical distribution secured complete coverage by Boissier (1867), and, in modern times, almost complete coverage (except for the Lebanese material) by Cullen (1965, 1966, 1980). The account of the section by Novak (1982), who recognized 11 species without introducing new names or combinations, is disregarded here as the author did not base his work either on the examination of herbarium material or on adequate living collections or on field experience.

While Boissier (1867) recognized seven species with an additional three varieties in sect. *Meconidium*, Fedde (1909) rather inflated, as he always did, the group by recognizing 14 species with an additional 10 varieties. Cullen (1965, 1966, 1980), when this

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author's three accounts are combined, recognized nine species with one additional variety.

In the present treatment four species are being recognized, two of which have three subspecies each, and one two subspecies. Thus altogether nine taxa are accepted, including five new combinations.

The herbarium material of sect. *Meconidium* is rather deficient in two respects. As collectors naturally have collected mainly flowering (or fruiting) material, next to no information is available on rosette leaves, since these die off once the flowering shoots are formed. Accordingly, all measurements and descriptions of leaves given below refer to cauline rather than rosette leaves. Second, the petals in this section appear to be even more caducous than in other groups of *Papaver*, so that representative petal measurements or observations of colour could not be made. While the petals may not be important for the classification of the group, it is believed that the rosette leaves might provide valuable characters.

Papaver L. sect. **Meconidium** Spach, Hist. Nat. Veg. Phan. 7: 21 (1839).
Type: *P. armeniacum* (L.) DC., Syst. Nat. 2: 83 (1821).
Syn.: *Miltantha* Bernh., Linnaea 8: 463 (1833, without rank).
P. sect. *Pyramistigmata* Elkan, Tent. Monogr. Papaver: 21 (1839.)
P. sect. *Miltantha* (Bernh.) Pfeiff., Nomencl. Bot 2: 582 (1873).

For a discussion of sectional nomenclature, see Kiger (1973, 1985).

Biennial herbs with rosette of leaves in first, and flowering stem in second year. Plants with distinct tap root. Rosette largely withered in second year. Plants mostly unbranched below, mostly erect, sometimes ascending. Plants with indumentum of weak to very stiff setae on some or all green parts, mostly distinctly glaucous. Leaves 1–4-pinnatipartite, lower leaves petiolate, upper leaves sessile. Flowers in mostly many-flowered inflorescences. Petals four, pale orange to pale red, white to yellowish at base, very quickly caducous. Stamens many, filaments filiform, white to yellowish, rarely dark (probably red). Capsules narrowly to broadly ellipsoid to ovoid or sometimes almost globose, glabrous or with more or less dense indumentum of more or less appressed setae. Stigmatic disc mostly pyramidical and often umbonate, sometimes almost flat or almost cylindrical. Capsules opening with distinct valves. Seeds reniform.

KEY TO THE SPECIES

1a. Filaments dark (probably red), pedicels mostly curved (capsules buried in holes and cracks of steep cliffs). Plants from mountains S of Lake Van **4. P. curviscapum**
1b. Filaments pale yellowish to white, pedicels not curved ____ 2

2a. Capsule stalks as long as to much longer than axis, capsules narrowly obovoid to ellipsoid, 2.5 to 4.5 x as long as broad. Plants from Lebanon or Taurus Mts **2. P. libanoticum**
2b. Capsule stalks rarely as long as to longer than axis (*P. armeniacum* subsp. *microstigmum*, Elburz Mts), capsules narrowly to broadly obovoid to ellipsoid to

almost globose. If plants from Taurus Mts, capsules < 2 x as long as broad (*P. persicum* subsp. *tauricolum*) _____ 3

3a. Capsules mostly less < 2 x as long as broad, setose, 8–18mm long (subsp. *persicum*), setose or glabrous, 5–11 mm long (subsp. *tauricolum*, Taurus Mts.), or glabrous, 5–10mm long (subsp. *microcarpum*, mountains S of Lake Van) **3. P. persicum**

3b. Capsules rarely < 2 x as long as broad (occasionally in subsp. *armeniacum*) and rarely setose (occasionally in subsp. *armeniacum*), up to 5 x as long as broad and up to 21mm long, plants sometimes with lax, few-flowered inflorescences (subsp. *microstigmum*, Elburz Mts), or with very stiff setae at least on leaves (subsp. *pilgerianum*, Zagros Mts) _____ **1. P. armeniacum**

In conjunction with geographical origin, identification of the altogether nine taxa should present no unsurmountable problems. *Papaver armeniacum* subsp. *microstigmum* (Elburz Mts) and subsp. *pilgerianum* (Zagros Mts), as well as *P. libanoticum* subsp. *libanoticum* (Lebanon) are identifiable by origin alone, as they represent the only taxa of the section in their respective areas. In the Taurus Mts *P. persicum* subsp. *tauricolum* and *P. libanoticum* subsp. *polychaetum* are normally distinguishable by the relatively longer pedicels and capsule stalks and longer capsules (2.5–4.5 x as long as broad vs. 2 x as long as broad) of the former. In this area, there is a certain overlap with *P. armeniacum* subsp. *armeniacum*, which has relatively shorter pedicels and capsule stalks than subsp. *polychaetum*, and mostly longer capsules (up to 5 x as long as broad) than subsp. *tauricolum*. *Papaver curviscapum* and *P. persicum* subsp. *microcarpum*, although sympatric in distribution with *P. armeniacum* subsp. *armeniacum* and *P. persicum* subsp. *persicum*, are identifiable by filament colouration in the case of *P. curviscapum*, and by the almost globose and always glabrous capsules (together with glabrous sepals) in the case of subsp. *microcarpum*. *Papaver armeniacum* subsp. *armeniacum* and *P. persicum* subsp. *persicum* normally can be distinguished by the setose capsules of the latter, which normally also are relatively shorter (2 x as long as broad vs. 2 to 5 x as long as broad) than the mostly glabrous capsules of subsp. *armeniacum*. Specimens of subsp. *armeniacum* with sparsely setose capsules and such of subsp. *persicum* with glabrous capsules might present problems.

1. P. armeniacum (L.) DC., Syst.Nat. 2: 83 (1821).

Type: papaver orientale, hypecoi folio, fructo minimo. Orient. Tournefort (BM!).

Syn.: *Argemone armeniaca* L., Sp. Pl.: 509 (1753)

Plants 7–85cm high, erect or rarely decumbent, branched from base or only above. Axes glabrous or with more or less sparse indumentum of patent setae or with few very stiff setae. Leaves up to 19 x 4cm, 1–3-pinnatipartite, lobes patent to antrorse. Leaves sparsely to densely setose or with long and very stiff setae. Pedicels glabrous or with sparse indumentum of weakly appressed setae. Buds 7–13 x 4.5–8mm, broadly ovoid to almost globose, glabrous to sparsely or densely patent setose. Filaments pale. Capsules 6–21 x 3–8mm, narrowly to broadly ovoid to almost globose, glabrous,

sometimes conspicuously wrinkled. Stigmatic disc with 3–5 rays, weakly to strongly emarginate between rays, light or dark.

KEY TO SUBSPECIES

1a. Leaves with indumentum of very stiff setae. Plants from Zagros Mts **iii. subsp. pilgerianum**

1b. Leaves not with indumentum of very stiff setae ____ 2

2a. Inflorescence lax, few-flowered, pedicels often as long as or longer than axis. Plants from Elburz Mts ____ **ii. subsp. microstigmum**

2b. Inflorescence mostly dense, many-flowered, pedicels mostly distinctly shorter than axis. Plants not from Elburz Mts ____ **i. subsp. armeniacum**

i. subsp. **armeniacum. Figs. 1, 3, 5.**

Syn.: *P. fugax* Poir., in Lam., Encycl. Meth. 5: 118 (1804). Type: in h.R. paris. 1789 (P-LA!).

P. fugax Poir. var. *platydiscus* Cullen, Notes Roy. Bot. Gard. Edinburgh 25: 42 (1963). Type: Vil. Tunceli, Munzur Dag, above Ovacik, 2600 m, screes. Biennial, flowers orange. *Davis* 31408 (K!).

P. caucasicum Marsch.-Bieb., Fl. Taur. Cauc. 2: 5 (1808). Type: circa fontes torrentis Chodjal alpium Caucasi orientalis etiam nascitur, teste Steveno in mem. soc. nat. cur. mosq. 3, p. 264 (LE).

P. floribundum Desf., Choix Pl.: 62, Pl. 46 (1808). Type: Choix Pl., Pl. 46.

P. hyoscyamifolium Boiss., Fl. Or. 1: 110 (1867). Type: Hab. in cretaceis calidis alt. 1500'–2000' prope Biredjik, et ad Aspadrul prope Aintab Syriae (G!).

P. triniifolium Boiss., Fl. Orient. 1: 110 (1867). Type: Hab. in regione alpina inferiori montis Masmeneudagh Cappadociae (Bal. exs. 1855 sub P. caucasico var. tenuifolio) (G!).

P. triniifolium Boiss. var. *roopianum* Bordz., Act. Hort. Bot. Univ. Imp. Juriew. 11: 34 (1910). Type: Herb. Fl. Cauc. No. 361 (LE). Seen from LE: Roop 12.7.1910, Armenia Rossica, Prope Pagum Bardus (in districtu Olty) a dextr. litus fluminis Bardus-ozaj (LE, photo E!).

P. roopianum (Bordz.) Sosn., Moniteur de Jardin Botanique de Tiflis 27: 3 (1913).

P. bartaschianum Fedde, in Engler, Pflanzenr. 4, 104: 347 (1909). Type: Sintenis, It. orient. 1889 n. 1096 sub.nom. P. caucasicum var., Erzinghan, Sipikor-Dagh (K!).

P. urbanianum Fedde, in Engler, Pflanzenr. 4, 104: 351 (1909). Type: Kleinasien: Kappadokien, in regione subalpinis montis Masmeneu-Dagh. 1600–2000m. Siehe sub P. Urbani.

P. cylindricum Cullen, Notes Roy. Bot. Gard. Edinburgh 25: 42 (1963). Type: *Davis* 24614, Vil. Bitlis, Tatvan to Ahlat, near Sogurt, 2000m (E!).

Plants 30–60cm high, erect. Leaves with more or less dense indumentum of not very stiff setae. Inflorescence mostly dense, many-flowered. Pedicels distinctly shorter than axis, glabrous. Stigmatic disc light or dark.

Rocky (calcareous, silicaceous, igneous rocks, sandstone, schist, shale), gravelly or sandy places, fallow pastures, meadows. 500–3500m. Flowering May to September.

The distribution of subsp. *armeniacum* is shown in Fig. 5.

Akeroyd 194, 6 viii 1974, mountain pass on Artvin-Ardahan road, c. 2300m (E); *Balls* 1499, 24 vi 1934, Refahiye (BM, E); *Balls* 2320, 20 v 1935, Erkenek-Malatya, 4,500ft. (BM, E); *Baytop* 12816, 30 v 1968, Divripi (Sivas)(E); *Baytop* 18269, 26 vii 1970, Göynük, near Tuglan (Bongöl), 1900m (E); *Bourgeau* 10, 28 v 1862, prope Gumusch-Khane (W); *Christian* s.n., 1917, Bozanti supra Adana, c. 760m (W);

Davis 20041, 15 vii 1952, Maras, Goksun: Binboga dag, NE side of Isik dag, 1900m (BM, W); *Davis* 22501, 7 vii 1954, Prov. Bitlis: Pelli Dag above Pelli, 10,000ft. (E); *Davis* 22845, 15 vii 1954, Prov. Van dist. Gevas: Artes Dag, 11,000ft. (BM, E); *Davis* 23131, 23 vii 1954, Van dist. Satak: Kavussahap Dag, 3100m (BM, E); *Davis* 23623, 31 vii 1954, Van, Baskale: Ispiriz Dag, 2600m (BM, E); *Davis* 23686, 31 vii 1954, Van, Baskale: Ispiriz Dag, 3400m (E); *Davis* 23841, 3 viii 1954, Hakkari: zab gorge 30 miles S of Baskale (BM, E, W); *Davis* 23957, 7 viii 1954, Hakkari: Cilo Dag in Diz Deresi, at Sua, 1980m (BM, E); *Davis* 24138, 9 ix 1954, Hakkari: Cilo Dag, 10km W of Cilo Tepe, 10,300ft. (BM, E); *Davis* 24365, 15 viii 1954, Hakkari, Kara Dag, 9000ft (BM, E); *Davis* 27527, 4 v 1957, Maras: E side of Armut dag between Maras & Göksun, 1200m (E); *Davis* 28873, 2 vi 1957, Elazig: Maden, 1000m (BM, W); *Davis* 29500, 13 vi 1957, Erzerum: Horasan-Karaurgan, 17 miles from Horasan, 2000m (E); *Davis* 30262, 28 vi 1957, Coruh (Artvin): Kordevan dag (Yalnizcan-Daglari) near Kütül yayla, 2000m (E); *Davis* 30616, 5 vii 1957, Kars: Kars–Susuz, 8km from Kars (BM, E); *Davis* 30955, 11 vii 1957, Erzerum: between Tercan & Selepur, 1400m (BM, E); *Davis* 32590A, 20 viii 1957, Prov. Kars: Ardahan–Hacuvan, 1800m (BM, E); *Davis* 33864, 2 vii 1959, Caucasus. Georgia, Tbilisi: Kodjori highway, 500m (E); *Davis* 43902, 31 v 1966, Agri: 3km E of Dogubayazit, 1750m limestone cliffs (E); *Davis* 44004, 1 vi 1966, Agri: Taslicay to Diyadin, 47km from Agri, 1850m (E); *Davis* 44994, 16 vi 1966, Hakkari: 8km from Semdinli to Yuksekova, 1900m (E); *Davis* 44259, 5 vi 1966, Van: 7km from Van to Ercek, 1850m (E); *Davis* 44536, 10 vi 1966, 3–4km NE of Baskale, 2300m (E); *Davis* 44563, 9 vi 1966, Van: 2km E of Hosap, 2100m (E); *Davis* 44817, Hakkari: Zap gorge, 12km from Hakkari to Cukurca, 1200m (E); *Davis* 44909, 14 vi 1966, Hakkari: Nehil Cayi, 62km from Hakkari to Yuksekova, 1750m (E); *Davis* 45646, 26 vi 1966, Hakkari: Sat Dagi, between Yüksekova and Varegöz, 2150m (E); *Davis* 45458, Hakkari: Zap gorge beneath (2–3km from) Hakkari, 1400m (E); *Davis* 45991, 3 vii 1966, Van: 36km from Baskale to Hosap, N side of Guzel Dere pass, 2750m (E); *Davis* 46150, 10 vii 1966, Mus: SW slopes of Bingöl Dag. 8km from Caylar to Karliova, 1850m (E); *Davis* 46740, 17 vii 1966, Kars: Akcay (E of Kagizman), 1400m (E); *Davis* 46937, 20 vii 1966, Kars, Aralik, Agri Dagi below Serdar Bulak, 1600m (E); *Davis* 47111, 24 vii 1966, Agri: E side of Tahir pass, 19km from Eleskirt to Horasan. 2400m (E); *Davis* 47163, 24 vii 1966, Agri: E side of Tahir Dag pass, 19km from Eleskirt to Horasan, 2400m (E); *Davis* 47261, 23 vii 1966, Agri: Sulucem (Musun), S end of Balik G., 2300m (E); *Duncan & Tait* 120, 30 viii 1967, Hakkari: Sat Dag (above Yüksekova), 2700m (E);

Haley 209, 1 ix 1956, Iraqi Kurdistan, Sakvan (BM); *Handel-Mazzetti* 2299, 16 vii 1910, inter Malatja et Kjachta, Gök Tepe (W); *Haussknecht* s.n., vii 1867, Kurdistan, M. Schahu, 8000'

(BM); *Huet du Pavillon* s.n., vi 1853, montium Tech-Dagh supra Erzeroum, 6–6500 p.s.m. (BM);
Iranshar (Herb.Min.Ir.Agric.) 34166 E, 6 vi 1971, Azerbadjan: Marand, 1400m (E); *Jacobs* 6937, 17 vi 1963, Kordestan, Sanandaj, 1800m (E); *Lamond* 3715, 6 vi 1971, Prov. Azerbaijan: Marand c.3km towards Tabriz, c.1400m (E); *Lamond* 3974, 10 vi 1971, Prov. Azerbaidjan: frontier of Turkey beyond Qotur, 2000–2100m (E); *Mirdamadi* 75, Azerbaidjan: Meshkambar prope Tabriz (W);
Rechinger 10265, 15–18 vi 1956, Sulaimaniya: Montes Avroman ad confines Persiae, Tawilla (W); *Rechinger* 10416, 10553, 19–20 vi 1957, Sulaimaniya: In ditione pagi Penjwin (W); *Rechinger* 14993, 4–5 vi 1957, Agri: inter Agri (Karaköse) et Horasan, 45km W Agri (W); *Rechinger* 15143, 7 ix 1956, Erzincin (Armenia), 27km WNW Erzincan versus Refahiye, c.1600m (W); *Rechinger* 15197, 7 ix 1956, Erzincan (Armenia), 52km WNW Erzincan versus Refahiye, c.2000m (W); *Rechinger* 32844, 3 viii 1965, Agri: in jugo inter Agri (Karaköse) et Horasan, 2000–2500m (W); *Rechinger* 32907, 4 viii 1965, Erzurum: Kop Dagh inter Askale et Bayburt, 2000–2450m (W); *Rechinger* 37689, 18 viii 1967, Erzurum: Kop Dagh inter Askale et Bayburt, 2300–2500m (W); *Rechinger* 40624, 30 v 1971, Azerbaijan orient.: in jugo Goja Bel 30km SW Ahar, 1800m (W); *Rechinger* 41161, 6 vi 1971, Azerbaijan orient.: Supra Marand, 1400m (W); *Rechinger* 41305, 6 vi 1971, Azerbaijan orient.: in Jugo inter Marand et Sufian, 1600–1750m (W); *Rechinger* 41653, 10 vi 1971, Azerbaijan occid.: Qotur W Khvoy, 1800–2000m (W); *Rechinger* 41917, 13 vi 1971, Azerbaijan occidd.: in jugo Qushchi inter Shapur et Rezaiyeh, 1600–1850m (W); *Rechinger* 42272, 22 vi 1971, Azerbaijan orient.: in saxosis faucium fluvii Qezel Owzan (Kizil Uzun) 13–19km SE Mianeh, 1200m (W); *Rechinger* 42376, 30 vi 1971, Khamseh: 52km SW Zanjan versus Bijar, 1700m (W); *Rechinger* 42933, 6 vii 1971, Kurdistan: in quercetis 90–110km W Sanandaj versus Marivan, 1650–1800m (W); *Rechinger* 43915, 29 vii 1971, Azerbaijan orient.: In monte Mishab Dagh prope Yam, 1800–2400m (W); *Rechinger* 48483, 28 vi 1974, Kurdistan: In jugo prope Salavatabad E Sanandaj, 2300m (W); *Rechinger* 48519, 29 vi 1974, Kurdistan: Kowleh 65km N Sanandaj versus Divandarreh, 1950m (W); *Rechinger* 48595, 29 vi 1974, Kurdistan: Ad versuras 33km NW Divandarreh versus Saqqez, 2100m (W); *Rechinger* 48951, 4 vii 1974, Azerbaijan occid.: Chalil Kuh: In faucibus NW Selvana, 1750–2000m (W); *Rechinger* 49061, 8 vii 1974, Azerbaijan occid.: In declivibus saxosis vallis 36km S Mahabad, 1750m (W); *Rechinger* 48799, 48800, 2 vii 1974, Azerbaijan occidentalis: in monte Chalil Kuh prope Razhan, 2600–3200m (W); *Rechinger* 49536, 17 vii 1974, Azerbaijan occidentalis: In valle fluvii Qotur W Khvoy, 1600–1900m (W); *Rechinger* 49625, 18 vii 1974, Azerbaijan occid., prope Habashi Bala N Qotur, 1950m (W); *Rechinger* 49664, 18 vii 1974, Azerbaijan occid.: Kuh Kani Ziarat N Habashi Bala prope Qotur, 3000m (W); *Rechinger* 49844, 21 vii 1974, Azerbaijan occidentalis: In declivibus borealibus jugi Qushchi inter Shapur et Rezaiyeh, 1700m (W); *Rechinger* 49927, 24 vii 1974, Bitlis: Van E Tatvan, 1700m (W); Rechinger 53860, 30 vi 1975, Van: inter Bashkale et Hoshap, 2200m (W); *Rechinger* 57102, 20 vi 1977, Azerbaijan Orient.: Montes Sahand: Ad pagum Kandavan (W); *Rechinger* 57454, 3 viii 1977, Kars: in valle fluvii Aras (Araxes) 30km ad occidentem pagi Kagizman versus Kara Kurt, 1350m (E, W); *Rechinger* 57514, 4 vii 1977, Erzincan: fluvii Karasu 49 km ab Erzincan orientem versus, 1300m (W);
Siehe 140, ii 1906, Marmutli Dag, Cappadocia, 1800m (BM, E, W); *Siehe* 168, vi 1911, Ak Dagh bei Sivas (BM, E); *Sintenis* 894, 24 vi 1889, Armenia turcica, Kainardagh inter Egin et Arabkir (W); *Sintenis* 3070, 7 viii 1890, Armenia turcica, Sipikordagh (BM, E, W); *Sintenis* 5988, 3 vii 1894, Szanschak Gümüschkhane, Kirkpauli (E); *Sintenis* 7061, 29 vii 1894, Armenia turcica, Artabir (BM, W); *Stileman* 60, 8 viii 1966, Bitlis: Süphan Dag, 9000ft (E); *Terme* (Herb. Min. Ir. Agric.) 34133 E, 27 vii 1971, Azerbaidjan: between Tabriz and Marand, 18km S Marand (1500m) (E); *Terme* (Herb. Min. Ir. Agric.) 34134 E, Azerbaidjan: Yam, Kuh-e-Mishoudagh, 1800–2400m (E); *Terme* (Herb. Min. Ir. Agric.) 34144 E, 5 vii 1971, Kordestan: between Sanadaj and Marivan, 1700m, (E); *Tobey* 2105, 20 vi 1967, Erzerum: Aras river gorge, 1700m (E); *Trelawny* 1451, 6 vi 1970, Hakkari: below Oramar village, 1520–1830m (E);

Vasak s.n., 6 vii 1975, Caucasus: distr. Razdan, in vicinitate pagi Verin Akhta, 1800–2000m (W); *Vasak* s.n., 11 vii 1975, Caucasus: distr. Ararat, montes Gegamski khrebet, Aruni Dzor, 1500–1900m (W); *Walton* 84, 28 vii 1967, Azerbaijan: 47°50' E, 38°24' N, 2400m (E).

Of all taxa of sect. *Meconidium*, *P. armeniacum* subsp. *armeniacum* is by far the most variable, as is also shown by its extensive synonymy. Variability can be found both in leaf and in capsule characters.

The degree of leaf division and the breadth of leaf lobes was taken by Cullen (1963, 1965, 1966, 1980) to distinguish finely and much divided (2–4-pinnatisect, lobes < 3mm) material (*P. armeniacum*, *P. triniifolium* + *P. triniifolium* var. *roopianum* = *P. roopianum* incl. *P. urbanianum*, which was distinguished from *P. triniifolium* by Fedde (1909) for its possession of smooth rather than torulose capsules) from coarsely and less divided (1–2-pinnatisect, lobes < 5mm) material (*P. cylindricum*, *P. fugax* incl. *P. caucasicum* and *P. floribundum*). Although the extremes of this character are conspicuously different, I cannot draw a clear line between different leaf forms. As both forms occupy more or less the same range, no characters can be found to correlate with leaf characters, and collections exist which exhibit a considerable infrapopulational range of lobe breadth (e.g., *Davis* 23841, see above), I prefer to regard all the above names as synonyms of *P. armeniacum*.

Papaver hyoscyamifolium, distinguished from *P. caucasicum* by Boissier (1867) for its smaller, rigid and 1-pinnatisect leaves (and shorter capsule stalks) also clearly belongs here.

As regards capsule characters, torulose capsules are quite common in this taxon, and have given rise to the description of several taxa already discussed above. Specimens with a sparsely setose capsule indumentum were described as *P. bartaschianum* by Fedde (1909), but represent mere infrapopulational variants. As will be discussed below, this character is variable also in *P. persicum*. Capsule proportions and the shape of the stigmatic disc were used by Cullen (1963) to describe *P. fugax* var. *platydiscus* with a rather flat disc, and *P. cylindricum* with very narrow capsules with an almost cylindrical disc. Again, I see no clear distinction between these and material with a pyramidical disc, and thus can see no justification to recognize such variants taxonomically, conspicuous as they may be.

i. subsp. **microstigmum** (Boiss.) Kadereit, **comb. et stat. nov. Figs. 1, 3, 5.**
Type: Kotschy, Plantae Persiae borealis. No. 647. Habitat in schistosis ad pagum Derbent prope Teheran (BM!, W!); Aucher-Eloy-Herbier d'Orient No. 4050. Djulfekkuh (K!).

Syn.: *P. caucasicum* Marsch.-Bieb. var. *microstigmum* Boiss., Fl.Orient. 1: 110 (1867).

Plants 7–40cm high, erect, rarely decumbent. Leaves with more or less dense indumentum of not very stiff setae. Inflorescence lax, few-flowered. Pedicels longer to only slightly shorter than axis, sometimes with sparse indumentum of weakly appressed setae. Stigmatic disc strongly emarginate between rays, dark.

Dry stony places. 2000–3500m. Flowering June to August (to September).

The distribution of subsp. *microstigmum* is shown in Fig. 5.

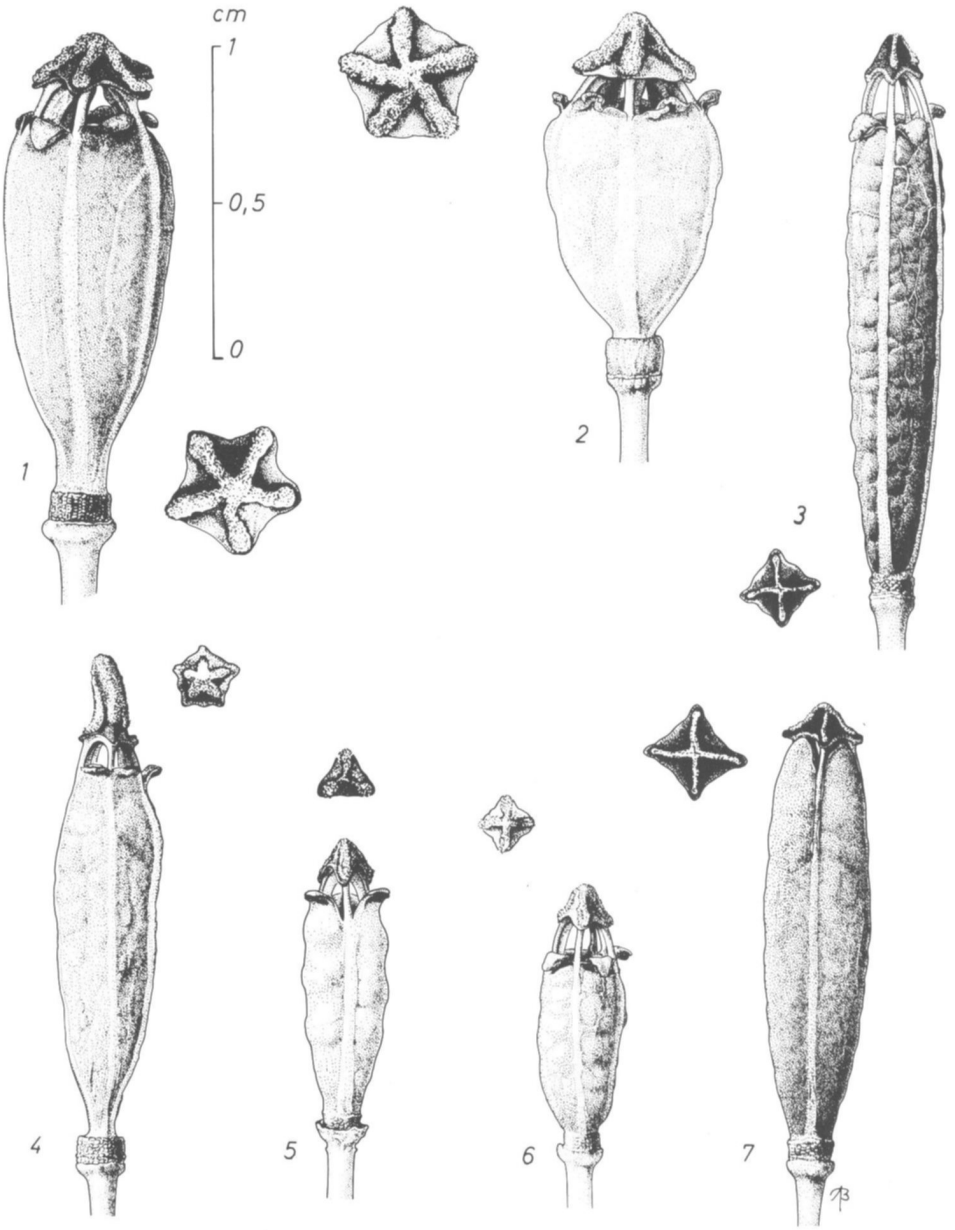

FIG. 1. Capsules of 1, 2, 4, 5, *P. armeniacum* subsp. *armeniacum*; 3, subsp. *microstigmum*; 6, subsp. *pilgerianum*; 7, *P. libanoticum* subsp. *libanoticum*.

Behboudi & Aellen 1524, 28 vii 1948, Prov. Damghan-Semnan: Zentral-Elburs: Oberlauf Tscheschme-i Ali, sö Kuh-i Nizwa, n Djaschm (Tschafte), 2200–2600m (W); *Behboudi & Aellen* 1529, 23 vii 1948, Prov. Mazanderan: Zentral-Elburs: Einzugsgebiet oberer Tedschen-Fluss; Felsenheide oberhalb Kom-rud bala, 60km ö Firuzkuh, c.2500m (W); *Behboudi & Aellen* 5861, 29 vii 48, Elburz, Madank Cashu (??)(W); *Bornmüller* 841, 23 vi 1893, Kurdistania Assyriaca, Riwandous (ad fines Pers.) in m. Sakri-Sakran regione alpina, 2000m.s.m.; *Bornmüller* 6096, 12 vi 1902, prope Scheheristanek, c.2200m.s.m. (BM, E, W); *Gauba* 70, 14 vi 1937, Prov. Mazanderan: Montes Elburs centr., in declivibus boreal. jugi Kandavan, c.2400m (W); *Gauba & Sabeti* 76, dito, c.2800m (W);
Koelz 16415, 18 vii 1940, Kuhikakashan, Mazenderan, 10000ft. (W); *Koelz* 16479, 19 vii 1940, Shahkuh, Mazenderan (W); *Kotschy* s.n., in alpinis Tatschal, Elburz ad Derbent (BM); *K.H. & F.Rechinger* 5486, 17 vi 1948, Prov. Sharud-Bustam. in jugo Khosh-Jaila, c.70km ab oppido Shahrud orientem versus, c.2000–2200m (E, W); *K.H. & F.Rechinger* 6029, 20–26 vii 1948, Prov. Shahrud-Bustam: mont. Shavar supra Nekarman (Nigarman), 3500m (W); *K.H. & F.Rechinger* 6122, 26–27 vii 1948, Gorgan (Asterabad): In decl. bor. mont. Shahvar prope Hadjilang c.2400–2600m (E,W); *K.H.Rechinger* 6495, 9 viii 1948, Mazanderan: Distr. Kudjur, In monte Ulodj, substr. calc., 3200–3400m (E, W); *Terme* (Herb. Min. Ir. Agric.) 34164 E, 13 x 1971, Tehran: Karadj valley, Kandavan (2500–2700m) (E); *Terme* (Herb. Min. Ir. Agric.) 34165E, 4 viii 72, Tehran: Elburz, Elika, Varvasht, 3500–4100m (E); *Wendelbo & Assadi* 13271, 2 vii 1974, Mazandaran: Lar valley, 2450–2550m (W).

Subspecies *microstigmum*, similar to subsp. *pilgerianum*, but very different from subsp. *armeniacum*, is quite uniform in appearance. It is well characterized by its lax, few-flowered inflorescence with relatively long pedicels, its always narrow capsules with a dark stigmatic disc rather strongly emarginate between the rays, and its normally sparse indumentum. Although quite distinct from subsp. *armeniacum*, their technical distinction presents difficulties, mainly due to the high variability of the latter. The best character for distinction is the difference in inflorescence, with subsp. *armeniacum* being many-flowered and having relatively short pedicels and a correspondingly rather dense inflorescence. This character, however, is impossible to quantify for the purpose of key construction. As regards capsule characters, i.e., disc colour, degree of emargination and capsule proportions, these fail to distinguish the two taxa clearly. Accordingly, the geographical origin of the material is the safest way to distinguish the two. Their geographical separation is here taken to justify subspecific status. I have seen one specimen from the Elburz Mts (*Furse & Synge* 620, 23 vi 1960, Elburz Mts, S side, W. of Firuzkuh; 7000ft, E) which clearly belongs to subsp. *armeniacum*.

iii. subsp. pilgerianum (Fedde) Kadereit, **comb. et stat. nov. Figs. 1, 3, 5.**
Type: *Haussknecht*, inter Tschinar & Maregun, Luristan, Juli 1868 (E!, K!, W!).
Syn.: *P. armeniacum* (L.) DC. var. *pilgerianum* Fedde, in Engler, Pflanzenr. 4, 104: 352 (1909).

Plants 50–85cm high, erect. Leaves with indumentum of very stiff setae. Pedicels distinctly shorter than axis, glabrous. Stigmatic disc weakly emarginate between rays, light.

Rocky, probably always calcareous places. 2200–2700m. Flowering June to July.

The distribution of subsp. *pilgerianum* is shown in Fig. 5.

Archibald 2883, 24 vii 1966, Fars, NW of Ardekan, towards Tal-i-Khusrovi, 2530m (E); *Behboudi* 1299E (Herb. Min. Ir. Agric.), 23 vii 1949, Chiraz, Tole Khosrow Kakan Kuhe

Kalivar (W); *Iranshahr & Moussavi* 34145E (Herb. Min. Ir. Agric.), 4 vi 1973, Esfahan: Bakhtiari, Falard, 2000m (E); *Pabot* 2409, 14 vii 1959, 80km NW Ardekan (Fars), 2200m (E); *K.H. Rechinger* 47179, 3 vi 1974, Bakhtiari (Tang-e-Sayad protected region): In monte Pir Kuh, 32km E Shahr Kord, 2400–2700m (W); *K.H. Rechinger* 47295, 5 vi 1974, Qashqai: In jugo 20km a Kohruyeh meridiem versus, inter Shahreza et Semirom, 2600m (W); *K.H. Rechinger* 47547, 7 vi 1974, Qashqai: Kuh-e Surmandeh (Kuh-e Alijuq) N Semirom, in declivibus boreo-orientalibus, 2700–3900m (W); *K.H. Rechinger* 47614, 10 vi 74, Esfahan: In Montibus prope Damaneh 35km SE Daran, 115km NW Esfahan (W).

Subspecies *pilgerianum* is a rather distinct taxon by its indumentum of very stiff setae and its always basally unbranched habit. This was also recognized by Rechinger, who on some of his collections marked this as a new species, '*P. glochidotrichum* Rech.f. ined.'. There exists, however, material intermediate between subsp. *pilgerianum* and subsp. *armeniacum*. This is *Moussavi* 34146E (Herb. Min. Ir. Agric.), 18 viii 1973, Boroudjerd, Kuh-e-Garrow, 2000–2900m (E) from the N Zagros Mts with stiff setae only on the tips of the leaf lobes. In the N Zagros Mts also material indistinguishable from subsp. *armeniacum* exists (*Rechinger* 47972, 12–14 vi 1974, Luristan: In convallibus borealibus montium Khali Kuh 50–60km ab Aligudarz meridiem versus, 2300–2800m). It is debatable whether specific rank should be given to subsp. *pilgerianum*. I here take its geographically largely separate distribution as reason to treat the taxon at subspecific rank.

It seems that some of the type material (*Kotschy* 723, 1842, in monte Kuh Daena Persiae australis K!) of *P. caucasicum* var. *stenocarpum* Boiss., Fl.Or. 1: 110 (1867) belongs to subsp. *pilgerianum*.

2. Papaver libanoticum Boiss., Ann. Sc. Nat. 16: 373 (1841).
Type: Aucher Èloy–Herbier d'Orient no. 362, 'in Cacumen Libani' (G!).

Plants 6–35cm high, erect, unbranched to profusely branched from the base. Axes with more or less dense indumentum of patent setae. Leaves up to 8 x 2cm, 1–2-pinnatipartite; lobes more or less linear, almost patent to distinctly antrorse; leaves setose, glaucous or not. Pedicels as long as to much longer than axis, glabrous or with sparse to more or less dense indumentum of appressed setae. Buds 7–12 x 4–8mm, obovoid to ellipsoid to ovoid, glabrous or with dense cover of patent setae. Filaments pale. Capsules 11–26 x 4–6mm, narrowly obovoid to ellipsoid, glabrous. Stigmatic disc with 4–6 rays, strongly emarginate between rays, dark.

KEY TO SUBSPECIES

1a. Buds glabrous to very sparsely setose or, when densely setose, plants distinctly glaucous and with glabrous pedicels. Plants from the Lebanon i. subsp. **libanoticum**
1b. Buds densely covered with patent setae, plants not glaucous, pedicels with sparse to dense indumentum of appressed setae. Plants from Turkey (Taurus & Mts to NE) _____ i. subsp. **polychaetum**

i. subsp. **libanoticum. Figs 1, 3, 5.**
Plants 6–30cm high, glaucous or not. Buds glabrous to densely setose. Pedicels glabrous or with sparse indumentum of appressed setae. Plants from the Lebanon.

Rocky places. 2500–3000m. Flowering June to September.

The distribution of subsp. *libanoticum* is shown in Fig. 5.

Aucher s.n., vi 1832, Gebel el chek point culminant (W); *Boissier* s.n., 1846, Mackmel (G); *Bornmüller* 36, 25–26 vi 1897, Antilibani in regione alpina jugi Hermonis, 2600m.s.m. (W); *Davis* 10180, 15 viii 45, Merj Sh'in (above Hermel) to Qornet Aachara 8000–8500ft (E); *Kotschy* 191, 27 vi 1855, In territorio montis 'Hermon', 9400 ped. (W, BM); *Kotschy* 1287, 30 vii 1855, versus cacumen montis Makmel, alt. 7000 ped. (In Libano ad Bscherre et circa Cedretum) (W); *Post* 860, 8 ix 1898, Dhor el Khodhib & s.n., 25 viii 1898, Top of Makmel (BM); *Post* s.n., 12 vii 1890, Top of Hermon (BM).

ii. subsp. polychaetum (Schott & Kotschy ex Boiss.) Kadereit, **comb. et stat. nov. Figs 2, 4, 5.**

Type: *Kotschy* 126b, Iter Cilicium in Tauri alpes 'Bulgar Dagh'. In monte Gisyl Deppe, inter fragmina dioritica arena commixta alt. 8000 ped. Die 15 Jul. 1853 (G!,W!).

Syn.: *P. polychaetum* Schott & Kotschy ex Boiss., Fl. Or. 1: 111 (1867).

Plants 14–35cm high, not glaucous. Buds with patent setae. Pedicels with sparse to dense indumentum of appressed setae. Plants from Turkey.

Rocky, gravelly or sandy places. 2000–2500m. Flowering June to July.

The distribution of subsp. *polychaetum* is shown in Fig. 5.

Balansa, s.n. viii 1855, Boulgarmaden (BM); *Davis* 19403, 30 vi 1952, Prov. Adana distr. Feke: Bakir Dag nr. top of Sencan Dere, 2000m (BM); *Kotschy* 139a, 30 vii 1853, alpina Karli Boghas (W); *Kotschy* 618, Taurus 1836, In alpe Bulgar-Dagh; *Kotschy* s.n., Aestate 1836, In monte Tauro (W); *Siehe* 499, vi 1910, Gerölle im Dumbelekpasse kurz vor Perinde, 2100m; *Siehe* 571, 1895, Cilicien (BM); Spitzenberger 111, 20 vii 1970, Mersin: Bolkar Daglari N Arslanköy, c.2500m (W); *Zederbauer* s.n., 24 vi 1902, Erdschias-dagh. Oberhalb Tschomakly, c.2200m (W).

Papaver libanoticum is easily recognizable mainly by the structure of its inflorescence. Due to the presence of only a short axis, the pedicels arise from near the base of the plants and are as long as to much longer than this axis.

As regards Lebanese plants, a certain differentiation can be observed. While much of the material from the Lebanon Mts is rather small (6–12cm) and not glaucous, has glabrous to sparsely setose buds and pedicels with a sparse indumentum of appressed setae, the Antilebanon plants (Mt Hermon) are taller (9–30cm) and strongly glaucous, have buds with a rather dense indumentum of patent setae and glabrous pedicels. This distinction is blurred by Boissier's own collections from Mt Mackmel (Lebanon), one of which cannot be distinguished from the Hermon plants. Unless a mistake of labelling has occurred here, this specimen forbids the distinction of two taxa in the Lebanon.

In the Lebanon, in addition to the localities listed above, the species has been recorded at Jabal Sannine, 'Ayyoun Ourgouch and Qornet Saouda by Mouterde (1970). Zohary (1973) lists *P. libanoticum* as partly typical of snow-soaked sinks and dolines of the alpine zone. In this alpine zone, it co-occurs with species like *Heracleum humile* Sm., *Cicer incisum* (Willd.) K. Maly, *Vivilovia formosa* (Stev.) A. Fed., *Ranunculus demissus* DC., *Alyssum baumgaertnerianum* Bornm. and *Heldreichia bupleurifolia* Boiss. which also can be found within the distributional range of subsp. *polychaetum*. Thus, the

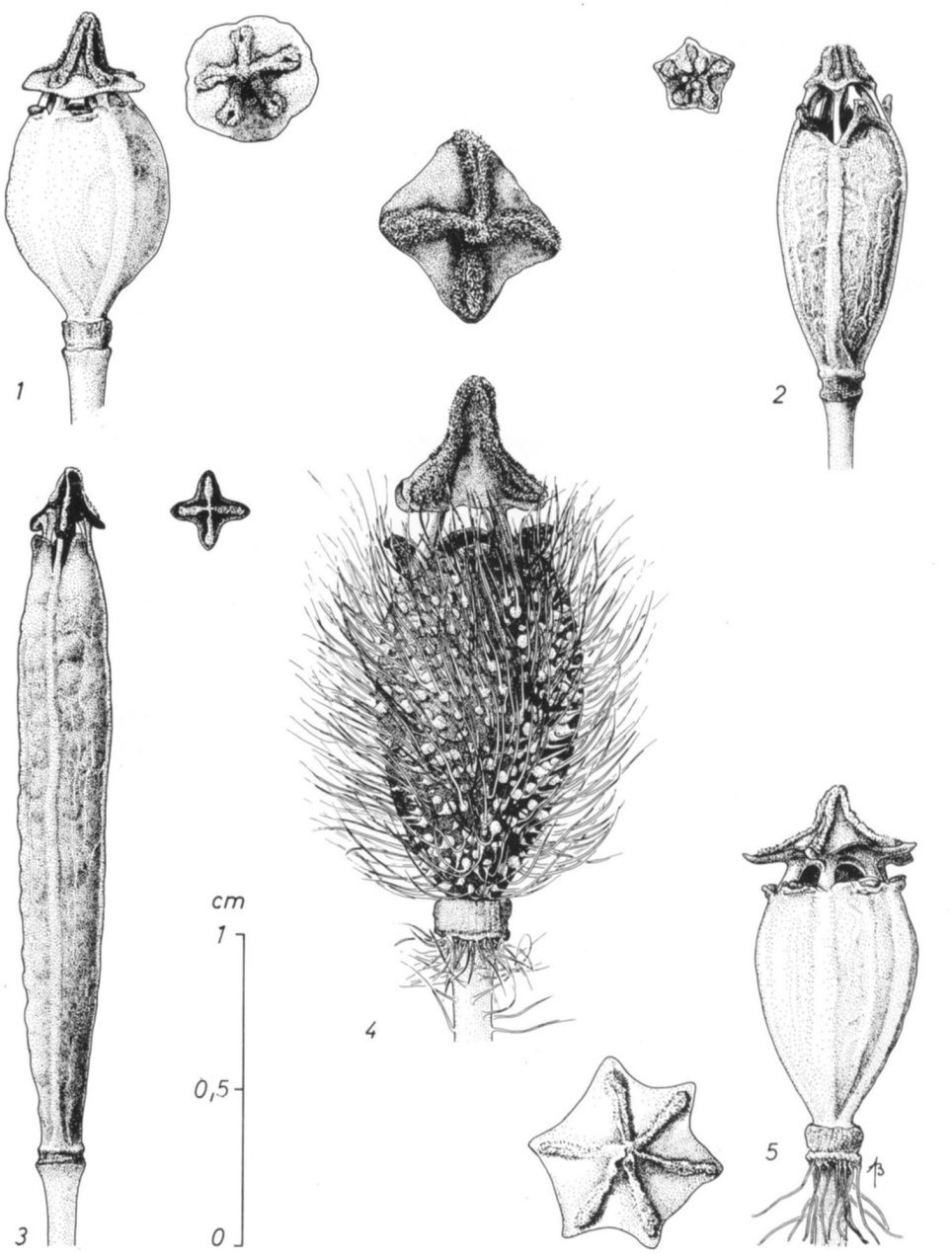

FIG. 2. Capsules of 1, *P. persicum* subsp. *microcarpum*; 2, *P. curviscapum*; 3, *P. libanoticum* subsp. *polychaetum*; 4, *P. persicum* subsp. *persicum*; 5, *P. persicum* subsp. *tauricolum*.

disjunct distribution of the two subspecies of *P. libanoticum* is paralleled by a number of members of its particular habitat.

The similarity of *P. polychaetum* to *P. libanoticum* has already been pointed out by Cullen (1965).

3. P. persicum Lindl., Bot.Reg. 1570 (1833).
Type: Bot. Reg., Plate 1570 (1833). Possible type material: Papaver e Persia ? Hort. Soc. Hort. Lond. 1832 (K!).

Plants 35–100cm high, erect, unbranched or branched from base. Axes glabrous to densely covered with patent setae. Leaves up to 20 x 4.5cm, pinnatifid to 1–2-pinnatipartite, lobes patent to antrorse. Leaves mostly densely setose. Pedicels glabrous or with patent setae. Buds 9–13 x 5–9mm, ovoid to ellipsoid, glabrous or with dense indumentum of patent setae. Petals unknown. Filaments yellow. Capsules 5–18 x 4–12mm, ellipsoid to almost globose, glabrous or sparsely to very densely setose. Stigmatic disc often distinctly umbonate, with 3–6 rays, strongly to weakly or not emarginate between rays, light.

KEY TO SUBSPECIES

1a. Capsules setose _____ 2
1b. Capsules glabrous _____ 3

2a. Capsules with few more or less appressed setae. Plants from Taurus
ii. subsp.**tauricolum**
2b. Capsules with very dense cover of more or less patent setae. Plants from further E _____ i. subsp. **persicum**

3a. Buds glabrous. Plants from N Iraq and neighbouring SE Turkey
iii. subsp. **microcarpum**
3b. Buds setose _____ 4

4a. Plants from Taurus _____ ii. subsp. **tauricolum**
4b. Plants from further E _____ i. subsp. **persicum**

i. subsp. **persicum. Figs. 2, 4, 5.**

Syn.: *P. persicum* Lindl. subsp. *fulvum* Kit Tan & Sorger, Pl. Syst. Evol. 154: 111 (1986). Type: *Sorger* 71-45-29, Malatya: 74km SW of Malatya, rock outcrops, 1550 s.m., 25 vi 1971 (Hb. F. Sorger !).

Buds setose. Capsules mostly densely setose, rarely glabrous (apparently individuals with glabrous capsules often in populations dimorphic for this character). Disc mostly strongly umbonate.

Scree, rocks or shale, partly calcareous. 1100–2200m. Flowering May to August.

The distribution of subsp. *persicum* is shown in Fig. 5.

Davis 20427, 30 vii 1952, Prov. Maras: Elbistan (E); *Davis* 21992, 18 vi 1954, Prov. Malatya: Gürun–Pinarbasi, 5500ft (BM); *Davis* 29234, 7 vi 1957, Prov. Tunceli: Tunceli–Pülümür, 17

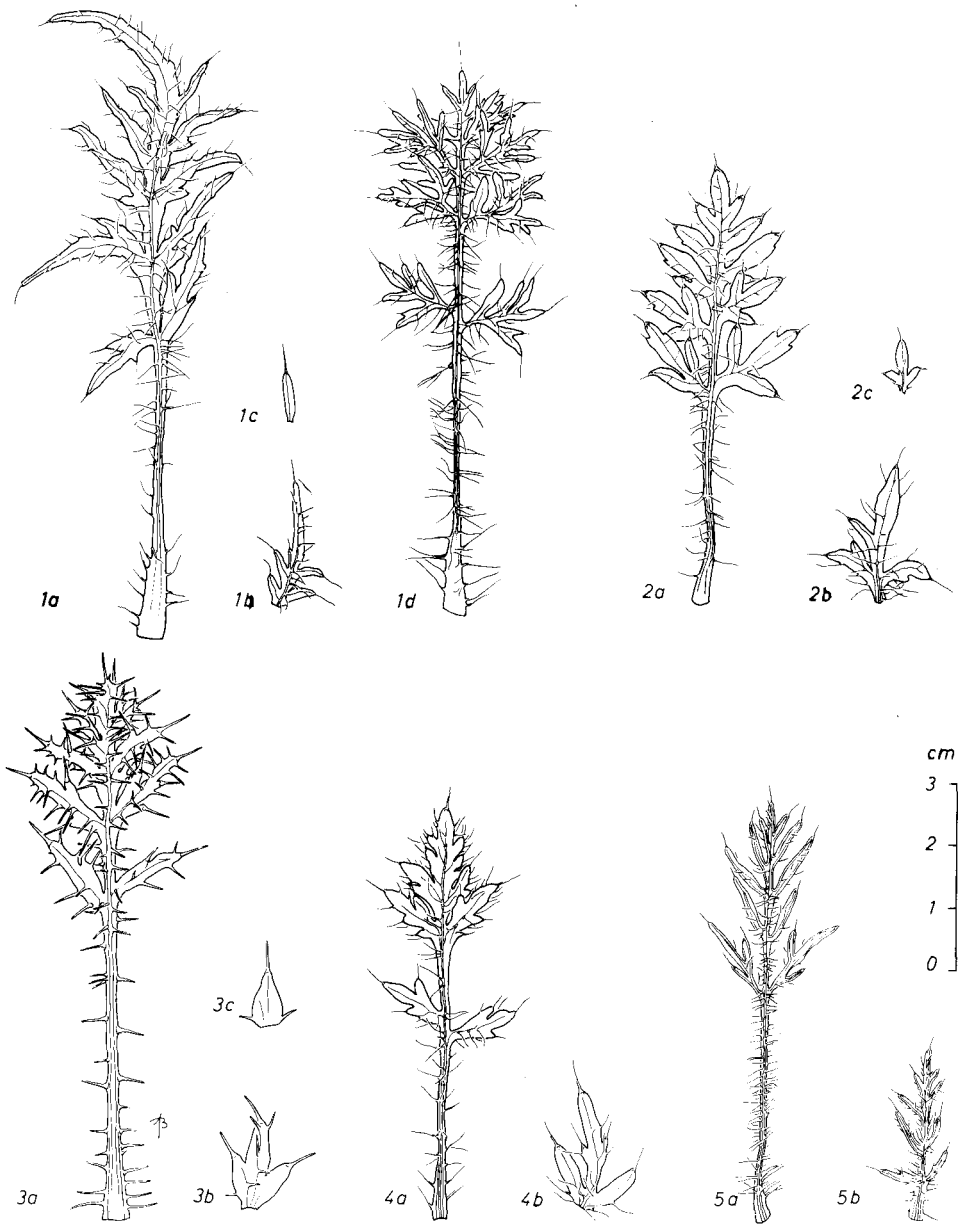

FIG. 3. Lower, middle and upper cauline leaves of 1a–d, *P. armeniacum* subsp. *armeniacum*; 2a–c, subsp. *microstigmum*; 3a–c, subsp. *pilgerianum*; 4a–b (lower and upper leaves only), *P. libanoticum* subsp. *libanoticum*; 5a–b (lower and upper leaves only), subsp. *polychaetum*.

miles from Tunceli, 1100m (BM, W); *Rechinger* 10758, 4–9 vii 1957, Iraq, Distr. Mosul. Ad confines Turciae prov. Hakkari, in ditione pagi Sharanish, in montibus calc. a Zakho sepentrionem versus, Jabal Khautur, 1200m (E, W); *Rechinger* 10960, as preceding, ca-cuminis Zaurita (?), 2000m (W); *Rechinger* 11375, 10–14 viii 1957, Iraq: Distr. Erbil. Mons Helgurd ad confines Persiae, c.36°40' N, 44°50' E, c.2000–2600m (W); *Rechinger* 11523, as preceding, supra pagum Basingera (W); *Siehe* 465, vii 1906, Masmutli Daghs. 2000m. Oberhalb Golakly. Vilajet Ronia (BM, E, W); *Thesiger* 866/880, 15 v 1951, Iraqi Kurdistan, Baradost Mountain, 6780 ft (BM); *Wheeler Harris* s.n., 20 vi 1961, Zeita, nr. Shirwan Maza, (E).

Capsules glabrous:

Rechinger 11375 (as above) (E); *Wheeler Harris* s.n., Kari Mam Sherin, nr. Shirwan Maza, (E); *Wheeler Harris* s.n., 19 vi 1961, Zeita nr. Shirwan Maza, 4000ft (E).

As regards the type material of *P. persicum*, the specimen named above, which is very similar to the plate in the Botanical Register particularly in terms of capsule indumentum, probably stems from the garden material Lindley worked with. Unfortunately, capsule indumentum in this specimen differs from the majority of the material of subsp. *persicum*, which has a much denser indumentum. However, also specimens of subsp. *persicum* with glabrous capsules exist. No name for such specimens within subsp. *persicum* is available. The type specimen of *P. persicum* Lindl. var. *brachycarpum* (O. Kuntze) Kit Tan falls into subsp. tauricola. This name will be discussed more fully under that subspecies.

The type material of *P. persicum* is somewhat similar to rare specimens of *P. armeniacum* with a sparse capsule indumentum (described as *P. bartschianum* by Fedde 1909). From these, however, it differs by the oblong shape of its uppermost leaves typical of all three subspecies of *P. persicum.*

Papaver persicum subsp. *fulvum* Kit Tan & Sorger, described as differing from subsp. *persicum* by the golden-brown capsule indumentum and only shallowly umbonate capsule discs is not recognized here for mainly two reasons. First, the character correlation observed by Kit Tan & Sorger (1986) is not very tight, and both specimens with golden-brown capsule indumentum and very distinctly umbonate discs (e.g., *Davis* 21992) or specimens with white capsule indumentum but only shallowly umbonate discs (e.g., *Thesiger* 866) exist. Specimens of intermediate nature between subsp. *persicum* and subsp. *fulvum* were also reported by Kit Tan and Sorger (1986) themselves. Second, variants fitting their description, although they undoubtedly exist, are not definable geographically. Although being concentrated in the Antitaurus, Kit Tan & Sorger (1986) cite one specimen from SE Lake Van (*Sorger & Buchner* 82-57-45), close to typical subsp. *persicum*, and mention the possibility of an occurrence of their new subspecies in N Iraq and NW Iran. Accordingly, if at all, such forms should be recognized at varietal rank only. In general, the shape of the stigmatic disc is a very variable character in sect. *Meconidium* (see also *P. armeniacum*). The variability of subsp. *persicum* in relation to the distinction of three subspecies will be discussed below.

Papaver acrochaetum Bornm. ex Fedde in Engler, Pflanzenr. 4, 104: 350 (1909) must be regarded as a synonym of *P. persicum.* As the type material (Kuh-i-Sefin, oberhalb Schaklawa, 1200m, 10 v 1893, *Bornmüller* no.842 JE!) does not have capsules, its

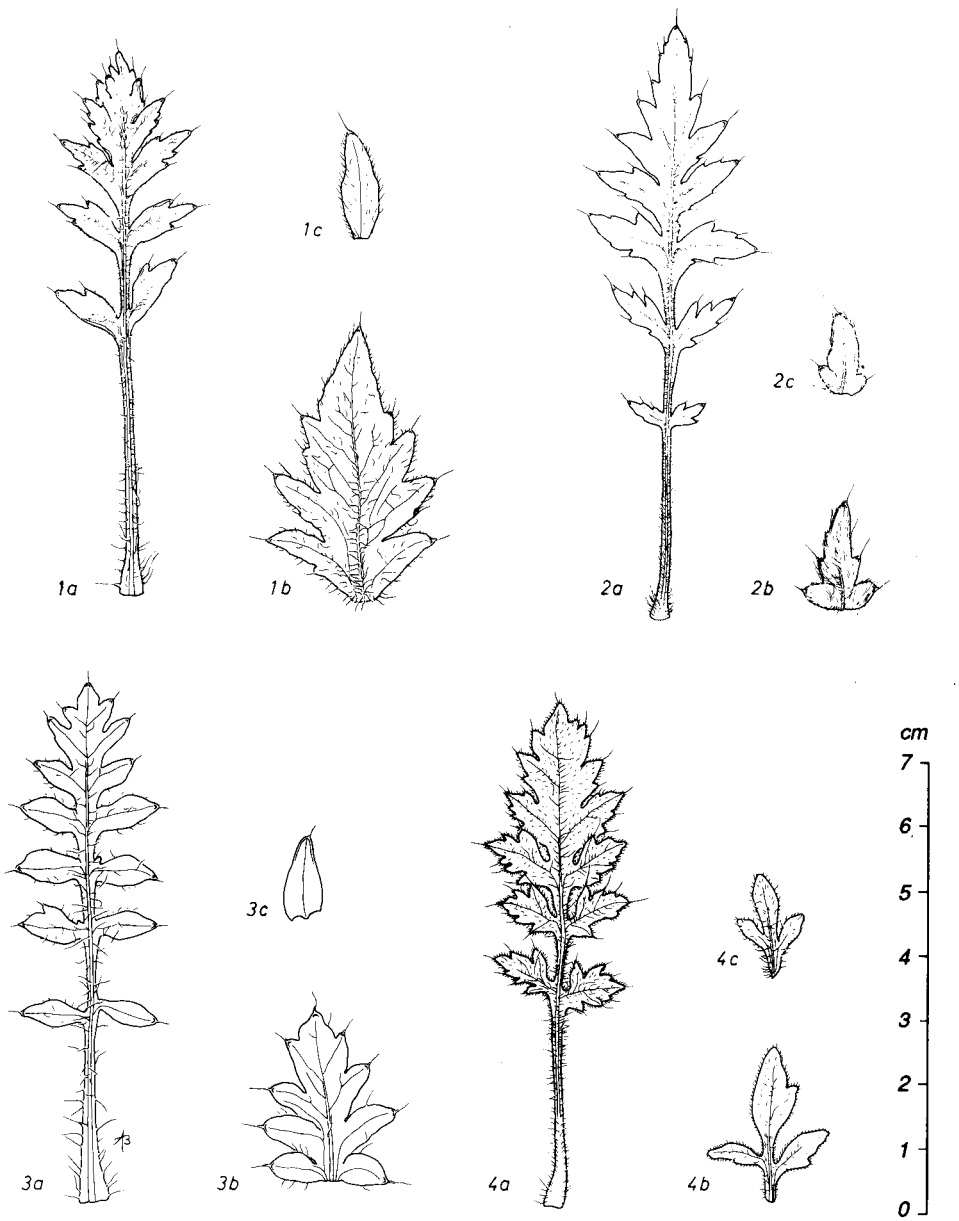

FIG. 4. Lower, middle and upper cauline leaves of 1a–c, *P. persicum* subsp. *persicum*; 2a–c, subsp. *tauricolum*; 3a–c, subsp. *microcarpum*; 4a–c, *P. curviscapum*.

assignment to one of the three subspecies recognized here is impossible. Its geographical origin, however, excludes an assignment to subsp. *tauricolum*.

Papaver acrochaetum var. *linguaebracteatum*, however, belongs to *P. armeniacum* (see above). The name *P. macrochaetum* Zoh., Rep.Agr. Iraq Bull. 31: 63 (1950) is a misspelling of the above *P. acrochaetum*.

ii. subsp. **tauricolum** (Boiss.) Kadereit, **comb. et stat. nov. Figs. 2, 4, 5.**
Type: Kotschy no. 14, 1836, In monte Tauro (BM!, K!, W!).

Syn.: *P. tauricolum* Boiss., Fl.Or. 1: 109 (1867).

P. tauricolum Boiss. f. *leiocarpa* Boiss., Fl.Or. 1: 109 (1867). Type: Kotschy Iter Cilicium in Tauri alpes 'Bulgar Dagh' 139a. In fauce scopulosa alpina Karli Boghas dicta inter fragmina rupestria copiosa. Die 30. Julii 1853.

P. pilosum Sm. var. *brachycarpum* O. Kuntze, Acta Horti Petrop. 10: 156 (1887). Type: as *P. tauricolum* Boiss. f. *leiocarpa* Boiss.

P. tauricolum Boiss. var. *leiocarpum* Fedde, in Engler, Pflanzenr. 4, 104: 347 (1909).

P. persicum Lindl. var. *brachycarpum* (O.Kuntze) Kit Tan, Pl. Syst. Evol. 154: 113 (1986).

Buds setose. Capsules mostly glabrous, rarely with few more or less appressed setae. Disc mostly weakly umbonate.

Rocks and scree, partly calcareous. 1300–1500m. Flowering June to August.

The distribution of subsp. *tauricolum* is shown in Fig. 5.

Subspecies *tauricolum* is variable as regards capsule indumentum, as forms with sparse indumentum and such without indumentum exist, of which the latter appear to be more common. Although most of the large number of specimens from the type collection have setose capsules, one sheet from W contains both a specimen with and one without indumentum. Specimens without indumentum should, if named at varietal rank, be called var. *brachycarpum*. Although Boissier (1867) published the name f. *leiocarpa* for specimens with glabrous capsules, he did this without description. This was provided only by Fedde (1909), who recognized this form at varietal rank. Fedde, however, was preceded by Kuntze (1887), who described, using the same type as Boissier (1867) for his f. *leiocarpa*, *P. pilosum* Sm. var. *brachycarpum*. At this rank, the latter name has priority. If used for forms of subsp. *tauricolum*, however, a new combination would be required, as the combination var. *brachycarpum* (O. Kuntze) Kit Tan was made for subsp. *persicum*.

Balansa, s.n., viii 1855, ruines du chateau dominant le defile des Portes Ciliciennes (BM); *Balls* 259, 6 vi 1934, Burujik, Gilbe Kur, Cilician Taurus, 4000 ft (BM); *Davis* 19234, 27 vi 1952, rov. Kayseri: Kisge at W foot of Bakir Dag. 1300m (E); *Siehe* 574, 1895, Bulghar Maaden. 1500m (BM, E).

iii. subsp. **microcarpum** (Boiss.) Kadereit, **comb. et stat. nov. Figs. 2, 4, 5.**
Type: *Kotschy* no. 385, 1841. Pl. Mesopot., Kurdistan. & Mossul., In rupestribus montis Gara Kurdist. (BM!, K!, W!)

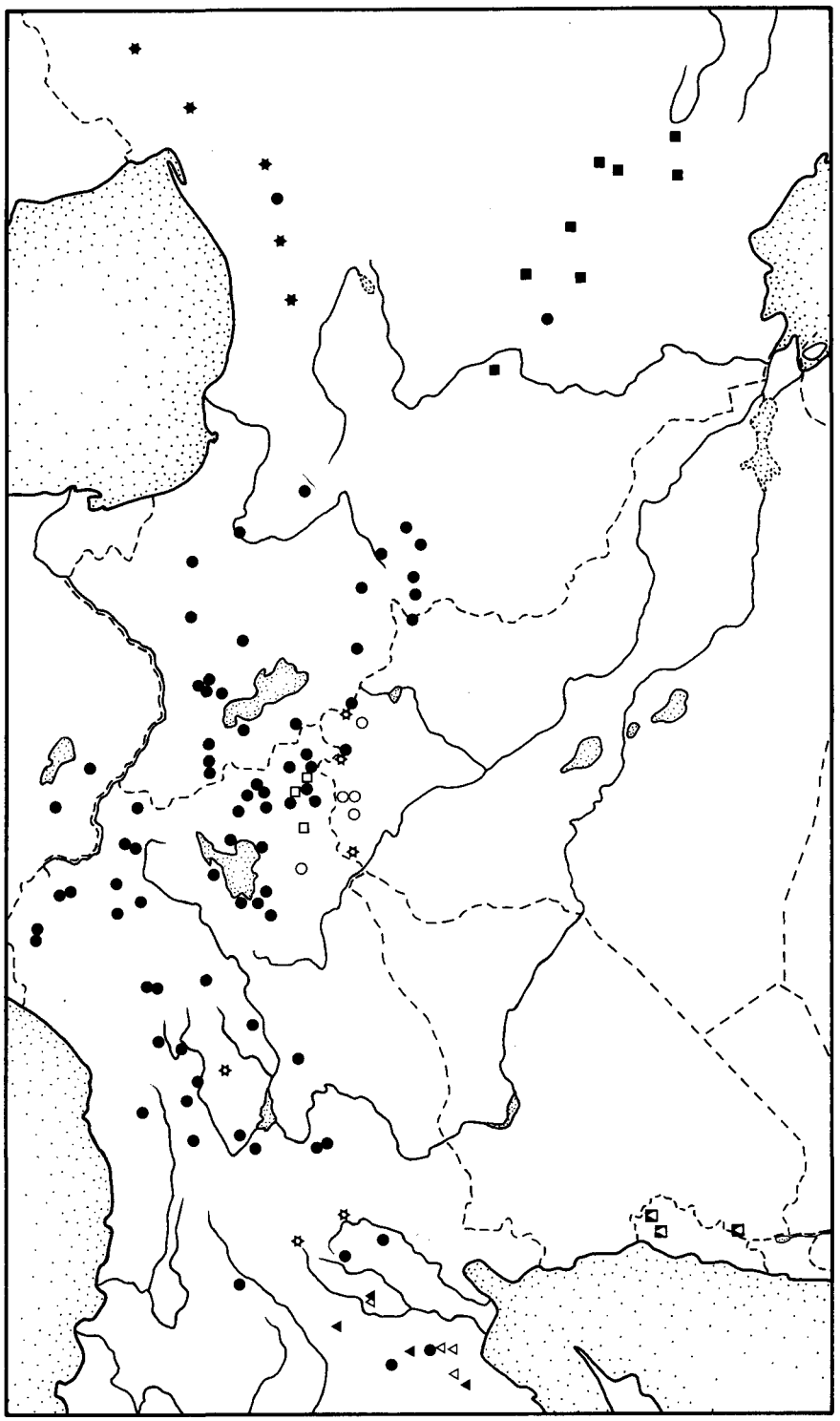

FIG. 5. Geographical distribution of (●) *P. armeniacum* subsp. *armeniacum*; (✱) subsp. *microstigmum*; (■) subsp. *pilgerianum*; (◘) *P. libanoticum* subsp. *libanoticum*; (▲) subsp. *polychaetum*; (✡) *P. persicum* subsp. *persicum*; (△) subsp. *tauricolum*; (○) subsp. *microcarpum*; (□) *P. curviscapum*.

Syn.: *P. tauricolum* Boiss. b. *microcarpum* Boiss., Fl.Or. 1: 109 (1867)

Buds glabrous. Capsules glabrous. Disc mostly strongly umbonate.

In probably always calcareous rocks and scree, often in wooded areas. 1000–1850m. Flowering May to June.

The distribution of subsp. *microcarpum* is shown in Fig. 5.

Davis 44757, 12 vi 1966, Turkey, Hakkari: Cukurca, 1200m. (E); *Frödin* s.n., 17 vi 1936, Hügel am östl. Fusse von Herakol dag, 1850m (W); *Rechinger* 11625, 10–12 vii 1957, Iraq: Distr. Mosul (Kurdistan). Ad confines Turciae prov. Hakari, inter Dohuk et Amadiya. Ab Amadiya c.3km occidentem versus, c.1000m (E, W); *Rechinger* 11660, 10–12 vii 1957, Iraq: distr. Mosul, ad confines Turciae prov. Hakkari, inter Dohuk et Amadiya , 1200m (W); *Wheeler Harris* 1805, 4 vi 1960, Sersark, 4000ft. (E); *Wheeler Harris* s.n., 14 v 1956, Rowarduz (E).

The subdivision of *P. persicum* as suggested here may have to be changed once the eastern part of the range of the species becomes better known. As regards the recognition of subspp *tauricolum* and *persicum*, the situation is comparatively clear. Although individuals with glabrous and individuals with densely setose capsules look conspicuously different, particularly when capsule dimensions differ at the same time (much of the material of subsp. *persicum* has substantially larger capsules than the material of subsp. *tauricolum*), there exist individuals with a sparse capsule indumentum in both taxa, bridging the morphological gap. Also, these two subspecies are parapatric in distribution, another important criterion for their treatment at subspecific rank. The status of the material with glabrous capsules from the eastern part of the range of the species, recognized here as subsp. *microcarpum*, is more complicated. Basically no intermediates exist. Although individual specimens of subsp. *persicum* have glabrous capsules (see above under subsp. *persicum*) , such individuals appear to form part of polymorphic populations (e.g. *Rechinger* 11375, *Wheeler Harris*, Zeita, nr. Shirwan Maza) and have typically setose sepals, while individuals of subsp. *microcarpum*, which always have glabrous capsules, at the same time always have glabrous sepals. Furthermore, subsp. *microcarpum* is not clearly separated geographically from subsp. persicum. Although there exists a certain geographical separation in that subsp. *microcarpum* tends to occupy a more southern range than subsp. *persicum* in Iraq (on the basis of only a small number of specimens unambiguously located in that area the above is a bit of a daring conclusion), a certain overlap of ranges can also be observed. Probably this allows two taxonomic solutions. I hesitate to take either course for reasons of morphology. Either subsp. *microcarpum* is treated at varietal rank within subsp. *persicum*, since the only constant difference between the two is the indumentum of the sepals, or subsp. *microcarpum* is treated at specific rank separate from *P. persicum* subsp. *persicum* and subsp. *tauricolum*. In the former case, with subsp. *microcarpum* as a variety of subsp. *persicum*, I find the morphological differences of the majority of the material far too conspicuous. Treatment at varietal rank of subsp. *microcarpum* might also result in neglect. Treatment at specific rank, where critical material of the two species can be distinguished only on the basis of sepal indumentum, appears to have a dangerously slender morphological basis, particularly as indumentum in this group of species, as in

much of *Papaver*, tends to be not a very constant character. The recognition of subsp. microcarpum at that rank thus is a compromise, which can be justified both morphologically and geographically.

While Cullen in 1965 recognized *P. tauricolum* as different from *P. persicum* at specific rank, though considering the possibility of conspecifity, this author later (Cullen 1966, 1980) regarded the two taxa as conspecific.

4. Papaver curviscapum Nab., Publ.Fac.Sci.Univ.Masaryk, Brno 35: 20 (1928). **Figs. 2, 4, 5.**

Type: In Kurdistaniae Turcicae districtu Hakkiari in monte Choarra-Sia supra pagum 'Ain Nune inter pagos Araden et Hasitha dit. Amadia (ad septentr. ab urbe Mosul) alt. c.1500m. Legi 16. 1910. Nabelek no. 811 (ic.v.).

Plants 15–30cm high, erect or ascending, sometimes distinctly curved, profusely branched from base. Axes glabrous or with patent to slightly retrorse weak setae. Leaves up to 10.5 x 2cm, 1-pinnatipartite, lobes entire to coarsely serrate, patent to antrorse. Lower leaves setose, upper leaves setose or glabrous. Pedicels mostly curved, glabrous or with indumentum of half-appressed setae. Buds 8–9 x 6–8mm, broadly obovoid, with dense indumentum of patent setae. Filaments dark (red?). Capsules 8–10 x 4–5mm, ellipsoid, glabrous. Stigmatic disc with 4–5 rays, weakly emarginate between rays, light.

Growing in crevices and holes of steep to vertical, probably always calcareous slopes. 1250–2550m. Flowering May to June.

The distribution of *P. curviscapum* is shown in Fig. 5.

> *Davis* 45298, 21 vi 1966, Hakkari: Elkiyayla Da., above pass between Marunis and Beytüssebap. 2550m (E); *Davis* 45355, 21 vi 1966, Turkey, Hakkari: Zap gorge beneath (8km from) Hakkari. 1250m (E); *Trelawny* 1703, 10 vi 1970, Hakkari: near Talana (S of Cilo Da.). 1830m (E); *Wheeler Harris* 961, 17 v 1957, Sersarq, 4500ft. (E).

Both by the possession of dark, probably red filaments (all other species of this section have pale yellow filaments) and by its mostly recurved pedicels or sometimes recurved axes, *P. curviscapum* is a very distinct species. As regards the latter character, it is related to the exceptional ecology of the species. Growing on steep to vertical cliffs, probably always of calcareous nature, *P. curviscapum* appears to bury its capsules in crevices and holes. Such behaviour is otherwise unknown in the genus, but obviously the only means to persist in that type of habitat.

In his description of the species, Nabelek (1928) raised the possibility of perenniality. Although this possibility cannot be dismissed on the basis of the study of herbarium material, the species was described as monocarpic on the labels of two of the four collections I have seen (*Davis* 45298, 45355).

Apart from a certain variability in the indumentum, *P. curviscapum* is very uniform in leaf shape. Geographically, the species has a limited distribution in the Hakkari district of SE Turkey.

DISCUSSION

The concept of *Papaver* adopted in this discussion follows Kadereit & Sytsma (1992), who as the result of a restriction site analysis of chloroplast DNA came to the conclusion

that the arctic-alpine sect. *Meconella* Spach and the Mediterranean and S to C Asian sect. *Argemonidium* Spach should be excluded from the genus. *Papaver* then consists, besides sect. *Meconidium*, of three perennial sections, one group of annual species characterized by the possession of black filaments, which formerly (Kadereit, 1988) were regarded to belong to four sections, but as a consequence of the study by Kadereit & Sytsma (1992) may have to be united in one group, and the two geographically aberrant annual sects. *Horrida* and *Californicum*, which did not form part of the above study. Within a genus of such circumscription, the biennial sect. *Meconidium*, easily recognizable by its biennial habit and its distinctly valvate capsules with a mostly pyramidical stigmatic disc, shares certain characters with other sections. White to pale yellowish filaments are shared with sects. *Pilosa* Prantl, *Pseudopilosa* M.Pop. ex Guenther, *Horrida* and *Californicum*. Kadereit & Sytsma (1992) argued that the absence of black filaments in the above named sections of *Papaver* is best regarded as the result of secondary loss. It is also conceivable that it presents the plesiomorphic condition for *Papaver*. In both cases it cannot serve to discern the relationships of sect. *Meconidium*. Valvate capsule dehiscense and a somewhat pyramidical stigmatic disc can also be found in sect. *Californicum*. This character, however, again is best regarded as plesiomorphic, and should not be used to connect sect. *Meconidium* with sect. *Californicum*. As a consequence, the affinities of sect. *Meconidium* cannot be elucidated with morphological characters.

Equally, the results from the study of chloroplast DNA restriction site variation (Kadereit & Sytsma, 1992) are not entirely clear. Although that study identified a clade consisting of sect. *Meconidium* and the perennial sections of the genus in the most parsimonious tree found , with the annual species investigated as sister group of this clade, this grouping was lost in a consensus tree constructed from the most parsimonious tree and all trees one step longer (Kadereit & Sytsma, 1992), in which the annual, biennial and perennial species could not be differentiated. In case further data can support the relationship between the biennial sect. *Meconidium* and the perennial groups of the genus, it would be of interest to see that the monocarpic habit evolved at least twice in the genus (dependent on the affinities of sects. *Horrida* and *Californicum* it may have evolved up to four times), both as biennuality and as annuality.

The adaptive character of biennuality in sect. *Meconidium* is obscure, particularly as species of this section appear to co-occur with species of the perennial sect. *Macrantha* in the same geographical area under comparable ecological conditions as far as can be judged from the ecological information provided on herbarium labels and the description of the ecology of sect. *Macrantha* provided by Goldblatt (1974).

Section *Meconidium* in some respects conforms to general patterns of distribution in SW Asia. In the first place, it is worth mentioning that its distribution in the west of its range is very sharply delimited by Davis' (1971) 'Anatolian Diagonal'. Davis (1971) in fact lists *P. triniifolium* (here regarded as part of *P. armeniacum*) as an example of distribution along this diagonal. The majority of the range of the section belongs to the Irano-Turanian region. Only *P. libanoticum* subsp. *polychaetum* and *P. persicum* subsp. *tauricolum* penetrate the Mediterranean region in the Taurus area of Turkey, an area

extremely rich in endemics (Davis 1971), and *P. libanoticum* subsp. *libanoticum* penetrates the Mediterranean region in Lebanon. The affinities between these two areas has already been pointed out above. The occurrence of distinct taxa in the Elburz Mts (*P. armeniacum* subsp. *microstigmum*), the Zagros Mts (*P. armeniacum* subsp. *pilgerianum*) and a certain concentration of endemics S and SE of Lake Van (*P. curviscapum*, *P. persicum* subsp. *microcarpum*) all repeat well known patterns of distribution (Davis, 1971; Wendelbo, 1971).

As evident from the variability of past taxonomic treatments of the group, clear-cut differences between taxa are rare. This also makes it difficult to comment on affinities among the four species recognized here. To me it seems that the basic subdivision in the group is between *P. armeniacum* and *P. libanoticum* on the one hand, and *P. persicum* on the other hand. This conclusion is based partly on the vicarious distribution of the former two taxa, and their partly sympatric distribution with *P. persicum*. It is difficult to find morphological arguments supporting this notion. The affinities of the rather divergent and ecologically specialized *P. curviscapum* could be with either group. The fact that sect. *Meconidium* is not very well differentiated may also be reflected in the observation of only two (2n=12, 14) chromosome numbers (Federov, 1969; Novak, 1982). Contrary to the conclusion reached by Kadereit (1988), sect. *Meconidium* appears to represent the second instance of dysploid reduction of chromosome number in the genus. This phenomenon had been reported for sect. *Argemonidium* (Kadereit, 1986), which after the study of Kadereit & Sytsma (1992), however, should not be regarded as part of *Papaver* any longer.

An examination of secondary compounds by Kühn & Pfeiffer (1965) led the authors to the conclusion that the members of this section are not very well differentiated, while the section seems to be well delimited from other sections by the occurence of a benzylisochinolin alkaloid called armepavine (Kühn & Pfeiffer 1965, Santavy 1979, Preininger 1985, Novak & Preininger 1987). It should be remembered, however, both with regard to chromosome number and alkaloid chemistry, that in view of the taxonomic confusions in the section there exists the danger of past work being based on misidentified material.

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