THE GENUS *COLCHICUM* IN TURKEY. II. REVISION OF THE LARGE-LEAVED AUTUMNAL SPECIES

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Turkish autumn-flowering species of *Colchicum* (*Colchicaceae*) with large, broad hysteranthous leaves are taxonomically and morphologically revised, with comments on conditions in other areas covered by the distributions. Three new species are described (*C. paschei*, *C. dolichantherum*, *C. imperatoris-friderici*), all endemic to Turkey. Synonym lists, typifications, chromosome numbers, and notes on phenology, vegetative reproduction, phytogeography and ecology are provided for the whole group, and relationships to other species are discussed.

Keywords. Chromosome numbers, *Colchicum*, phytogeography, reproduction, taxonomy, Turkey and adjacent countries.

INTRODUCTION

The high frequency of species and endemics (c.35%) within *Colchicum* L. (incl. *Merendera* Ram.) in Turkey indicates this region as a major centre of diversity and speciation (Persson, 1993b). About 60% of the species are autumn-flowering with hysteranthous leaves. The confusion and taxonomic difficulties within this group are reflected both in literature and herbaria, and also in the fact that very few new species have been described in the twentieth century despite rather extensive collecting. Particularly the many Turkish species with large broad leaves have been the subject of frequent misinterpretations and erroneous determinations. In this article, the second of an intended series dealing with the genus in Turkey (No. 1: Persson, 1998), these species are revised. Many of them are not closely related, but all of them have hysteranthous leaves generally more than 4cm wide. A few other species than those treated here may occasionally have leaves conforming to these criteria, viz. *C. variegatum* L. (leaves usually to 3cm, very rarely around 4cm), *C. bivonae* Guss. (to 4cm, rarely more), and furthermore *C. umbrosum* Steven and the subsynanthous *C. baytopiorum* C.D. Brickell (both generally to 3.5cm, very rarely more).

MATERIAL AND METHODS

Most species were studied and collected in the field by the author. For further study these plants together with living material of all species supplied by other collectors were cultivated in the Botanical Garden, Göteborg, partly in pots in the experimental

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plots, partly free-planted in the bulb garden. In addition dried collections from a number of herbaria (see Acknowledgements) have been examined, and these are listed after each species.

All measurements and other features in the descriptions refer to wild material from Turkey, except for flowers of one species (*C. paschei*) not seen or collected in the floral state in the wild, and therefore described from cultivated material. Shape and size of leaves refer to mature basal leaves, colour of anthers to the condition before dehiscence, size of anthers and length of styles to the condition after anther dehiscence. Flower colour has for some species been compared with HCC, i.e. Horticultural Colour Chart (Wilson, 1939; 1942).

Chromosome numbers also refer to Turkish material, marked by an asterisk in the specimen lists. Chromosome preparations were made according the method described in Persson (1998).

For each species the general distribution is given, followed by a description of habitats and altitudinal distribution relevant for Turkey only, but with comments on conditions in other areas if divergent. The grid squares given for Turkey (e.g., A5, B3) are those used in the maps of Davis's *Flora of Turkey* (1965–1988). The distribution in Turkey is summarized and classified by geoelement terms (Fischer & Fischer, 1981) which indicate those phytochoria mainly covered by the distribution of the taxon concerned. The chorological concepts are based mainly on Davis (1971), Zohary (1971, 1973), Hedge & Wendelbo (1978), and Léonard (1989).

TAXONOMIC TREATMENT

1. **Colchicum kotschyi** Boiss., Diagn. Pl. Or. ser. 1, 13: 38 (1853). Ill.: **Fig. 1A**; Mathew & Baytop, 1984: Fig. 73.

Type: [Iran] In solo schistoso ad radices montis Elbrus prope pagum Dareke (Passgala), viii 1843, *Kotschy* 655 (holo. G-Boiss; iso. FI, LE, P, UPS).

Syn.: *C. candidum* var. *hirtiflorum* Boiss., Fl. Or. 5: 160 (1882); *C. balansae* var. *hirtiflorum* (Boiss.) Parsa, Fl. de l'Iran 5: 174 (1951). Type: as for *C. kotschyi.*

Merendera quadrifolia Stapf, Denkschr. Akad. Wiss. Wien Math.-Nat. Kl. 50: 19 (1885). Type: [Iran] Ad nives ad Sepujin, 5 v 1882 (fr.), *Pichler* (holo. WU).

C. obtusifolium Siehe ex Hayek, Ann. Naturhist. Mus. Wien 28: 182 (1914). Type: [Turkey C5 Adana] Masmutli Dagh [=Mazmılı Da.], 2000m, October, *Siehe* Fl. orient. 93 (lecto. JE [designated here]; iso LE).

[*C. laetum* sensu Baker, J. Linn. Soc., Bot. 17: 429 (1879) p. p., non Steven (1829).]

[*C. haussknechtii* sensu Bornm., Beih. Bot. Centralbl. 24, Abt. 2: 97 (1908) p. p. quoad coll. 3 v 1890 (fol.) et descr. fol., non Boiss. (1882).]

[*C. candidum* sensu Nábělek, Iter Turc.-Pers. in Publ. Fac. Scienc. Univ. Masaryk (Brno) 105: 30 (1929), non Schott & Kotschy ex Boiss. (1882).]

[*C. decaisnei* auct. non Boiss. (1882): Rech. f., Ark. Bot. 5: 77 (1960) et

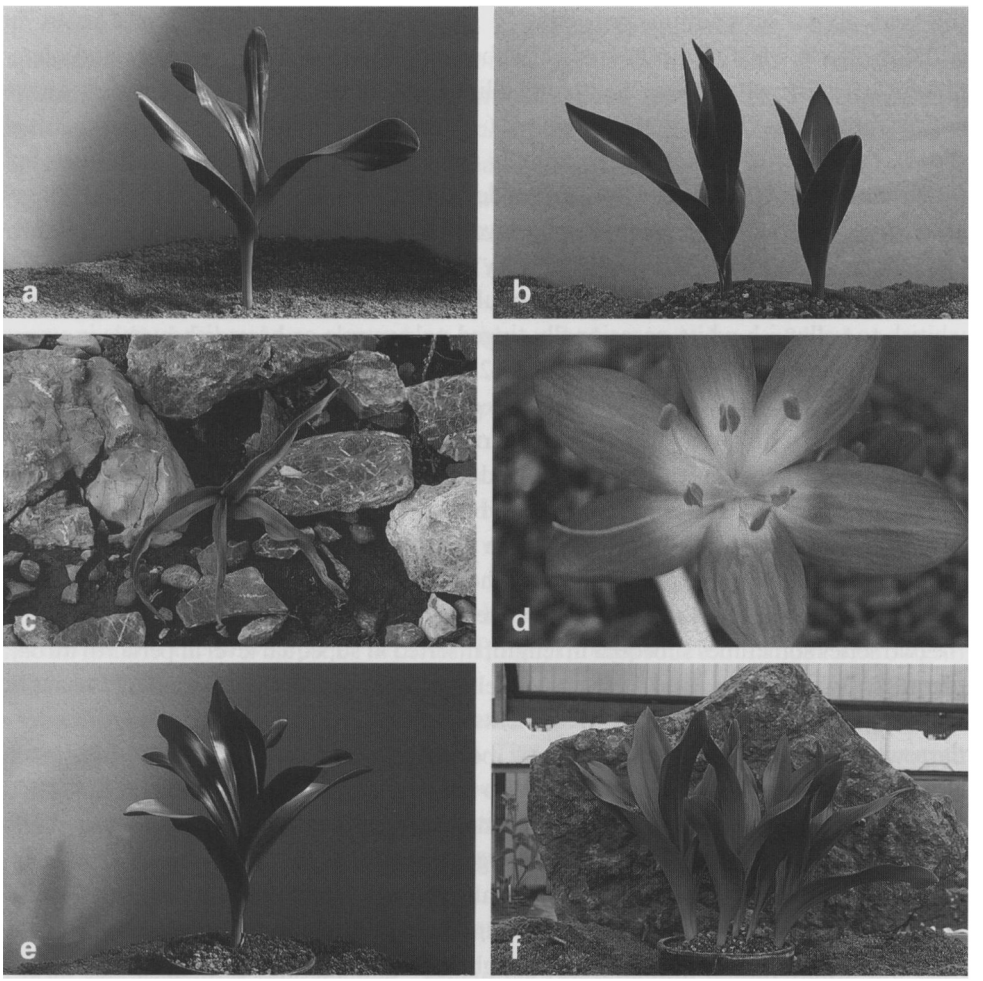

FIG. 1. A, *Colchicum kotschyi* (*Sønderhousen* 938, cult. 24 iv). B, *C. paschei* (*Pasche & Richter* 86-01, cult 29 v). C, *C. decaisnei* (*K. Persson* 428, l. n. 18 iv 1987). D, *C. sanguicolle*, tepals (*Kerndorff & Pasche* 93-68, cult. 19 ix); note toothed lamellae. E–F, *C. speciosum* (E, *Tobey* Ed. 805062, cult. 24 iv, 2 plants; F, *Furse & Synge* 825, cult. 19 iv, 6 plants).

Mouterde, Nouv. Fl. Liban Syrie 1: 205 (1966) p. p. quoad coll. ex Akher Dagh.]
[*C. speciosum* sensu Stefanov, op. cit.: 80 (1926) p. p., non Steven (1829).]

Description of Turkish plants (for Iraq and Iran, see respectively, Wendelbo, 1985: 53; Persson, 1992: 31). *Corm* narrowly ovoid to ovoid (to ellipsoid-ovoid), 3–5(–6) × (1.5–)2–3(–3.5)cm; tunics membranous to subcoriaceous, lustrous orange-brown to dull red-brown or mid-brown, produced into a neck c.3–9(–12)cm long, c.⅔ the length of the cataphyll to only slightly shorter. *Cataphyll* whitish to yellowish white, 4–14(–20)cm long above corm. *Leaves* 3–4 (rarely –6), hysteranthous, crowded

c.2–9cm above ground on projecting stem, 10–22(–25) × 2–5.5(–7)cm (leaves in addition after 4th leaf abruptly smaller), suberect to erecto-patent, (narrowly lanceolate-oblong to) narrowly oblong to oblong-elliptic (to elliptic), sometimes widest above middle, base of leaf blade slightly widened (± 'auricled') just above the completely fused sheath, (subacute to) subobtuse to broadly rounded (to truncate) at apex, flattish (but rather distinctly blunt-keeled on underside), often ± undulate-twisted, bright glossy green verging on yellowish green, young leaves with yellow-green tips and greenish yellow towards base, margins indistinctly or very narrowly cartilaginous, glabrous. *Flowers* (1–)2–6 (occasionally up to 11); perianth tube entire, exceeding the cataphyll by 2–8cm, whitish to yellowish white occasionally tinged pale purple or brownish purple in upper part; limb infundibular, segments (2.3–)2.6–4.6(–5.5)cm long, mostly differing by 2–8(–14)mm within a flower, 0.4–1.2 (in cultivation –2)cm wide, linear to oblong-oblanceolate (to oblanceolate), (subacute to) subobtuse to obtuse (rarely retuse), often cucullate, (cream to) white sometimes tinged pale mauve (HCC 433/2–3) or ± obscurely tessellated overall in pale pinkish purple to brownish purple (appr. HCC 030 'Magnolia Purple') with a short white median stripe on upper side, 9–17(–23) rather inconspicuous veins; filament channels puberulous to shortly pubescent usually all over. *Stamens* (¼–) ⅓–½ of perianth limb in length, outer 1.2–1.6(–1.9)cm, inner 1.4–1.9(–2.2)cm, the two series sometimes subequal in length, inserted at subequal level in perianth throat; filaments whitish, swollen base pale yellow to orange-yellow; anthers versatile, ½–subequal to (rarely longer than) filaments, (4–)5.5–11mm, yellow, thecae with a very narrow or distinct hyaline median wall; pollen yellow. *Styles* distinctly, often much overtopping stamens (usually reaching ½ to ⅓ from segment tips), white, thickened and slightly to distinctly curved at apex, stigmas scarcely decurrent or up to 1–3(rarely –4)mm. *Capsules* elevated on stem prolonged above ground, (2–)3–5 × 1.5–3cm, ellipsoid to broadly ellipsoid (to obovoid), usually short-pointed, not or indistinctly brown-dotted; seeds numerous, ± globose, 2.3–4mm diam., red-brown to brown, raphe merely a narrow keel or surrounded by a pale, slightly swollen area. Flowering without leaves (late July–)August–September(–early October); leaves and fruits May–June(–early July). Remnants of withered leaves and capsules are occasionally seen in early-flowering specimens in agreement with other *Colchicum* species exhibiting a similar pattern of phenology, e.g. *C. micaceum*, *C. heldreichii* (Persson 1998), and *C. speciosum* (see below). *Chromosome number*: 2n = 20. The same number was recorded for Iranian material (Persson, 1992: 32). As mentioned in Persson (1998), diploid numbers in *Colchicum* species with hysteranthous leaves are very unusual, occurring only in 6 such species, all from South West Asia (cf. Persson, 1993a). *C. kotschyi* is the only one with 2n = 20, the other ones have 18, 22 or 24. Diploid numbers are more clearly connected with the synanthous pattern of leaf appearance, occurring in more than twice as many species (in total, 86 species of the genus have been examined).

Similar species. Plants collected by Heldreich between Konya and Beyşehir (*Heldreich* 1257) were identified as *C. candidum* var. *hirtiflorum*, i.e. *C. kotschyi*, by Boissier (1882). However, these plants have now been assigned to the new species

C. heldreichii K. Perss. (Persson, 1998; cf. this article for differences between the two species). Stefanov (1926) incorporated both *C. persicum* Baker and *C. haussknechtii* Boiss. in *C. kotschyi.* The two first-mentioned have recently been recognized as synonyms (Persson, 1992), with *C. persicum* as the earliest name. Although that species may sometimes have very broad leaves at least in Iran, in size even approaching those of *C. speciosum* Steven, it can usually be identified on the higher number of leaves of a paler colour and a more leathery texture, and on the distinctly brown-dotted capsules (Persson, 1992). As for *C. speciosum*, material of *C. kotschyi* in leaf and fruit can be distinguished from that species in several features: leaves crowded (not spread), bright glossy green (not mid- to dark green), base of blade truncate to ±cordate above a fused sheath (in *C. speciosum* attenuate above a shortly open sheath), capsules short-pointed (in *C. speciosum* ±long-rostrate). All mentioned species are easily separated on floral characters.

Siehe's *C. obtusifolium* (nom. nud.) was taken up and described by Hayek (1914). The description of the leaves is obviously based primarily on *Siehe* Fl. orient. no. 93, which is also mentioned first among the two listed collections, and therefore chosen here as a lectotype. The type material is very similar to e.g., *Haussknecht* no. 923 from Terek (C8 Mardin). Stefanov (1926) refers the leaves of *C. obtusifolium* to *C. speciosum* and the flowers to *C. decaisnei* Boiss., though different origins seem highly improbable as Siehe generally appears to be a conscientious collector. The flowers of Siehe's collection no. 86 ('western Lycaonia') are rather small (limb c.3cm) but seem to originate from cultivated material. The stamens equal c.⅓–½ of the perianth segments in length, with anthers ½ to subequal to filaments. The styles are distinctly overtopping the stamens, and and have stigmas decurrent along the curved tips for about 1–1.5mm. These floral characters are not incongruous with an identification as *C. kotschyi.*

For differences from *C. paschei* K. Perss., see below.

Corms and vegetative reproduction. Vegetative reproduction is apparently not very effective in this species as 'reserve' buds only rarely give rise to independent plants.

Distribution and habitat. SC and SE Turkey (Fig. 3), NE Iraq, Iran. Mountain slopes on rocky and stony ground or sometimes in heavy red clay, oak scrub, gorges, screes, generally in dry situations; on limestone or more rarely granite; (900–)1100–2900m. Irano-Turanian element (in Turkey mainly East Anatolian [Armeno-Kurdic] district).

In Iran *C. kotschyi* has been found up to c.3000m (Persson, 1992). Here the species has been observed in flower through October and even early November.

Both Furse (1968) and Burtt (1968) emphasize the preference of *C. kotschyi* to slightly warmer, drier situations as compared with *C. speciosum.*

Additional specimens. TURKEY. B8 Elâzığ: Kuruca pass 35km W of Bingöl, 1900–2000m, 1988, *Sønderhousen* 1098* (GB). Bingöl: Buğlan geçidi, 1900–2000m, 1988, *Sønderhousen* 1101* (GB). Muş: In devexis subalpinis ad Musch, 6000ped, ix 1859, *Kotschy* 553 (G-Boiss, S). Bitlis: In monte Meleto Dagh inter vicum Hasoka et pedem cacuminis ad rivulos, 1800–

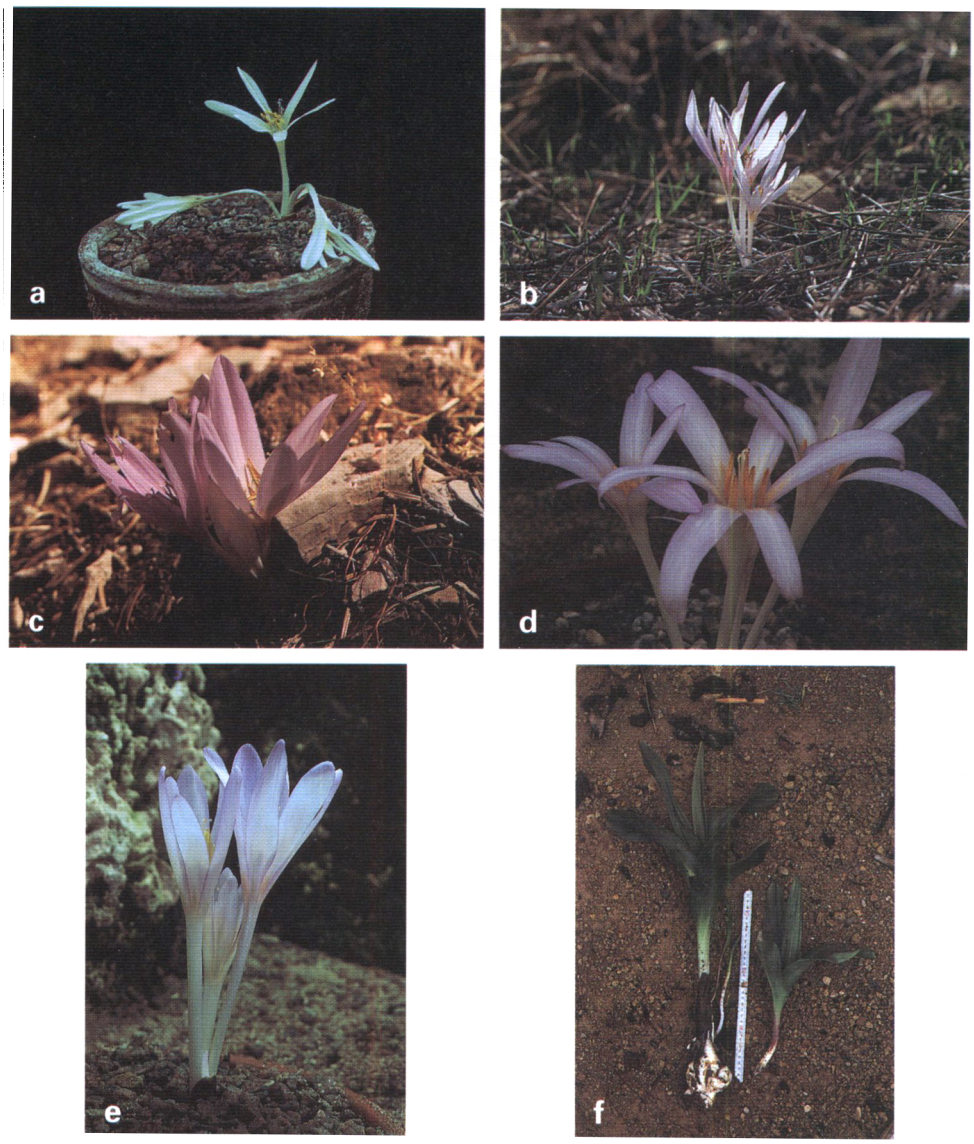

FIG. 2. A, *Colchicum paschei* (*Pasche & Richter* 86-01, cult. 24 vii). B, *C. decaisnei* (*K. Persson* 461, l. n. 24 x 1988). C–D, *C. dolichantherum* (C, *K. Persson* 556, l. n. 31 viii 1994; D, *K. Persson* 465, cult. 12 x). E–F, *C. imperatoris-friderici* (E, *K. Persson* 445, cult. 13 xii; F, *K. Persson* 453, l. n. 30 iv 1987).

2200m, 10 viii 1910, *Handel-Mazzetti* 2744 (WU). B9 Bitlis: Başhan, *T. Baytop* ISTE 23304 (ISTE); Foot of Karz Dağ near Kotum, on sides of gully, 1900m, 25 viii 1954, *Davis & Polunin* 24554 (E, GB); c.25km from Hizan towards Tatvan, among deciduous *Quercus* scrub on slopes, 1800m, 11 vi 1985, *J. & J. Archibald* 6662* (GB). Van: Southern shore of lake Van, some kilometers W of Gevaş below Kutis church, 1800m, 13 vi 1986, *Pasche & Richter* 86-03*

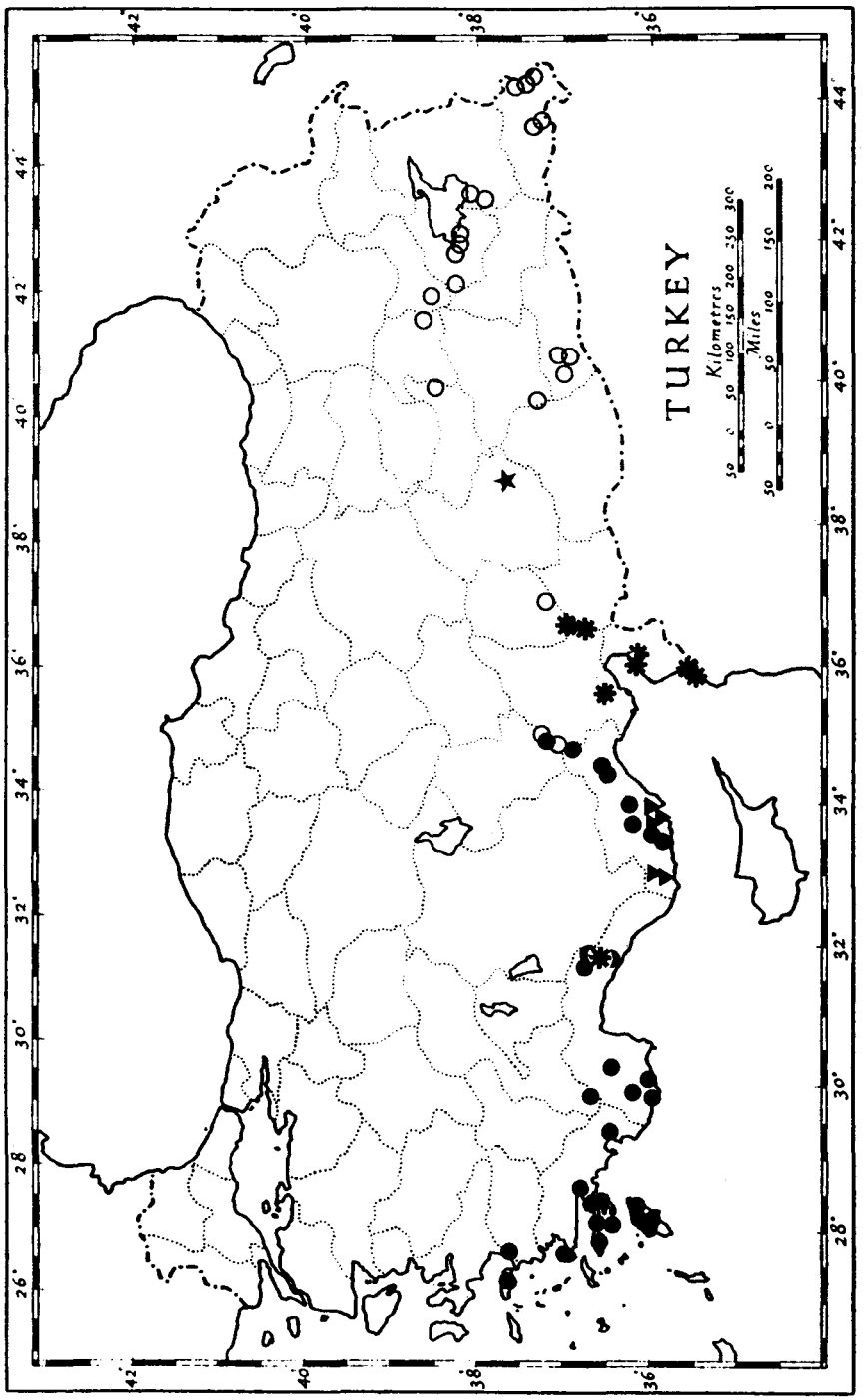

FIG. 3. Distribution of *Colchicum kotschyi* (○), *C. paschei* (★), *C. dolichantherum* (✱), *C. imperatoris-friderici* (▼), and *C. balansae* (●) in Turkey and the East Aegean Islands according to material seen. *C. kotschyi* occurs also in NE Iraq and Iran, *C. balansae* in Attica and Poros (Greece).

(GB); Artos Dağ, 2100m, 14 vi 1986, *Pasche & Richter* 86-05* (GB); Lower slopes of Kavuşşahap Dağları, E of Bahçesaray (Müküs), open sandy limestone slopes, among steppe vegetation, 2300m, 2 vii 1986, *J. & J. Archibald* 7620* (GB). C5 Adana: Pozantı, Kara Sivri (Başoglu), Kalkfelsspalten, 2400m, 20 viii 1958, *Markgraf* 11242 (Z). C6 Maraş: Akher Dagh [=Ahir Dağı], 15 ix 1884, *Post* 227 (G); *ibid.*, 6000ped, vii 1907, *Haradjian* 1561 (G, W). C7 Diyarbakır: 60km SW of Diyarbakır, 1050m, 1970, *Leep & Pasche* 70-36 (GB in cult.). C8 Mardin: In humid. pr. Terek [=Derik], 3000ped, iv 1867, *Haussknecht* 921 (G-Boiss, JE); Mardin, in declivibus montium, 1 vi 1888, *Sintenis* 1167 (LD); SSW of Mardin, N- & W-facing limestone slopes among *Phlomis*, *Euphorbia* spp., grasses, 1200m, 12 v 1985, *J. & J. Archibald* 6196* (GB); 10km N of Mardin, 1100m, 1970, *Leep & Pasche* 70-37 (GB in cult.). C9 Hakkâri: Djezra in montibus Dželo [=Cilo Dağı] prope Koçanes, in pascuis alpinis, 1800–2000m, 7 ix 1910, *Nábělek* 2205 (SAV); In declivibus supra Koçanes versus mer. spect., in quercetis, 1700m, 6 ix 1910, *Nábělek* 2204 (SAV). C10 Hakkâri: Cilo Dağı, Orissa–Der i Cafer, 2900m, 18 viii 1968, *Vogel* (M); Zentralkurdischer Taurus, Serpiltal, Vorfeld des Kelesin Ostgletschers [=Cilo Dağı], Trockenhang, 24 viii 1956, *Deutschmann* (LINZ); Hakkâri to Esendere, NE of Yüksekova, steppe vegetation in heavy red clay, 1800m, 31 v 1985, *J. & J. Archibald* 6555* (GB); Yüksekova–Şemdinli pass, 25km SE of Yüksekova, steep slopes among steppe vegetation, 1700m, 31 v 1985, *J. & J. Archibald* 6576* (GB); SE of Yüksekova, eroded shale hills, on bare patches, 1400m, 31 v 1985, *J. & J. Archibald* 6592* (GB); 12km N of Şemdinli, 1800m, *Sønderhousen* 938* (GB); NW of Şemdinli, pockets and ledges of grit among granite rocks in gully, 1500m, 31 v 1985, *J. & J. Archibald* 6587A* (GB).

For localities in Iraq and Iran: see Wendelbo (1985); Persson (1992).

2. Colchicum paschei K. Persson, **sp. nov. Figs 1B, 2A.**

Species habitu cum *C. kotschyi* optimo congruens, sed differt foliis ad terram congestis (caule foliifero non emergenti), basi attenuatis (in *C. kotschyi* truncatis vel cordatis), margine vix undulatis, apice initio purpureis; antheris minoribus, longitudine vix ultra ½ filamentorum partes aequantibus.

Type: Turkey. C7 Adıyaman: Nemrut Dağı, 2000m, 9 vi 1986 (fr.), *Pasche & Richter* 86-01* (holo. GB).

The new species is named in honour of my friend Erich Pasche who has collected this and a large number of other bulbous species for me and for the Botanical Garden of Göteborg.

Corm ovoid-globose to globose, c.2.5–3.5cm diam.; outer tunics submembranous, mid-brown, inner membranous, rather glossy yellowish brown, produced into a neck c.2.5–5cm long, extending at least along lower half of cataphyll. Cataphyll yellowish white, c.5–8cm long above corm. *Leaves* 3 (rarely 4), hysteranthous, crowded at ground surface (stem not projecting), 12.5–16 × 1.6–4.5cm, erecto-patent-arcuate, narrowly oblong to oblong-oblanceolate (usually slightly wider in upper half) with attenuate base and a short open sheath, subobtuse to obtuse, shallowly channelled and blunt-keeled, sometimes slightly twisted, mid-green often glossy, young leaves often tinged dark crimson-purplish towards apex, margins indistinctly or very narrowly cartilaginous, glabrous, not undulate. *Flowers* 1–2; perianth tube entire, exceeding the cataphyll by 4–6cm, rather stout (to c.4mm wide), whitish; limb narrowly infundibular, segments 2.6–3.5cm long, mostly differing by 3–8mm within

a flower, 4–7(–8.5)mm wide, linear to narrowly oblanceolate-oblong, subobtuse to obtuse, often cucullate, white seldom flushed palest mauve, 7–13 inconspicuous veins; filament channels shallow, indistinct, glabrous or sparsely papillose. *Stamens* ⅖ to more than ½ of perianth limb in length, outer 1.3–1.4cm, inner 1.4–1.6cm, mostly inserted at subequal level in perianth throat; filaments white, narrow base concolorous or pale yellow; anthers versatile, c.⅓–½ as long as filaments, 4.5–6mm, pale yellow, thecae with a broad hyaline median wall; pollen pale yellow. *Styles* ±equalling or distinctly overtopping stamens, white, curved at apex, stigmas scarcely decurrent 0.5–1mm. *Capsules* at ground level, 2.8–3.6 × 1.6–2.0cm, ellipsoid, acuminate to broad-rostrate, not brown-dotted; seeds numerous, ±globose, 2.5–4mm diam., brown, raphe particularly near micropyle surrounded by a pale, slightly swollen zone. Flowering without leaves late July–August; leaves and fruits May–June. *Chromosome number*: 2n = 48.

Similar species. *C. paschei* and *C. kotschyi* are somewhat alike in general facies, but *C. paschei* may be distinguished by its often smaller stature and more delicate features; furthermore by its leaves (cf. Fig. 1A,B), crowded at ground surface (not on a projecting stem), hardly twisted-undulate, attenuate at base (not truncate or ±cordate); filament channels glabrous or almost so (not ±pubescent); and anthers mostly less than half the length of filaments (in *C. kotschyi* more than half, often subequal or even longer than filaments). Pale forms of *C. umbrosum* Steven may resemble *C. paschei* but the flowers of the former species are firmer in texture and smaller in all parts, e.g. perianth segments, stamens, anthers, and stigmas. Its leaves often number 4, rarely 5, and they are lorate, mostly more than 15cm long. Although the chromosome number of *C. paschei* is double the number of *C. umbrosum* (which has 2n = 24), a closer relationship between the two species is unlikely. 2n = 48 probably has a more complicated hybrid origin and is not a polyploidization of 24.

Distribution and habitat. Endemic to SE Turkey (Fig. 3). Mountain steppe on stony and rocky ground; c.2000m. Irano-Turanian element.

Additional specimens. TURKEY. C7 Adıyaman: In monte Nemrud Dagh, 1883 (fr.), *Luschan* (WU). This collection is listed as '*Colchicum* sp. (indeterm.)' in Stapf, 1885 (p. 81).

C. paschei is so far only known from Nemrut Dağı, a famous archeological site and a mountain in the great range Güneydoğu Toroslar. Luschan collected here in 1883, and many of his plants were described as new species by Stapf (1885), of monocotyledons e.g., *Ornithogalum luschani*, *Tulipa foliosa*, *Gagea luteoides*, and *Gladiolus humilis*. More recent collectors on the mountain have also supplied material for a number of new species, e.g. Sorger and Kit Tan (*Nepeta sorgerae* Hedge & Lamond, *Allium nemrutdaghense* Kit Tan & Sorger).

3. Colchicum decaisnei Boiss., Fl. Or. 5: 157 (1882). **Figs 1C, 2B.**
Type: [Lebanon] Ghazir, rochers calcaires à l'Est du village, 25 x 1861, *Gaillardot* 2804 (lecto. G-Boiss [designated here]; iso. JE, LE, P, S).

Syn.: *C. brevistylum* Feinbrun in Eig, Zohary & Feinbrun, Anal. Fl. Palest. 355, 411, *nom. nud.*

[*C. laetum* auct., non Steven (1829).]

[*C. troodi* sensu C.D. Brickell in Davis (ed.), Fl. Turk. 8: 342 (1984), non Kotschy (1862).]

Description of Turkish plants (for Lebanon–Israel, see Feinbrun, 1953: 84; Feinbrun-Dothan, 1986: 30) Main part of *corm* (oblong-ovoid to) ovoid to ovoid-globose, 2–4 × 1.5–3.7cm, hypopodium sometimes rather prominent (up to c.2cm long); tunics (membranous to) submembranous to subcoriaceous, often in many layers, outer sometimes coriaceous, light brown or reddish brown to dark brown, produced into neck c.3–9cm long, equalling or somewhat shorter than the cataphyll. *Cataphyll* yellowish white, sometimes purplish carmine at mucronate apex, c.4–11cm long above corm. *Leaves* 3–5(–6), hysteranthous, crowded at ground surface, (10–)12–20(–30) × (0.7–)1.2–4(–7)cm (leaves in addition after 4th or 5th leaf abruptly smaller), erecto-patent to arcuate-procumbent, lanceolate-linear or lanceolate-lorate to lanceolate (to narrowly ovate) usually long-tapering to a narrowly subobtuse to obtuse (rarely broadly obtuse or emarginate) apex, ±channelled at least in lower part with a distinct mid-vein, usually somewhat undulate-twisted, mid-green to (greyish)green, occasionally ±pubescent dorsally at base and on sheath, margins very narrowly to narrowly cartilaginous, glabrous to densely ciliate. *Flowers* (2–)3–6(–13); perianth tube entire, exceeding the cataphyll by 2–6cm, slender, whitish sometimes tinged pale pinkish lilac or pinkish purple at least in upper part; limb narrowly to widely infundibular, segments (2–)2.6–4.5cm long, often of very unequal length within each flower (outer and inner differing by up to 12mm), (2.5–)4–10mm wide, linear to narrowly oblong-oblanceolate (to narrowly oblanceolate) often very narrow ±canaliculate at base, subobtuse to obtuse (rarely retuse), ±cucullate, pure white often tinged pale pinkish lilac or sometimes pale pinkish purple overall, untessellated, 7–15 rather inconspicuous veins; filament channels indistinct, ±puberulous at least on margins (rarely glabrous). *Stamens* more than ⅓ to ±½ (–⅔) of perianth limb in length, outer 1.2–2cm, inner 1.4–2.4cm, inserted at subequal level in perianth throat; filaments thin, whitish, yellow at base; anthers versatile, less than ⅓ to ±½ as long as filaments, 4.5–7(–8)mm, pale yellow to yellow, thecae thin, with a distinct median hyaline wall; pollen pale yellow to yellow. *Styles* equalling (to scarcely overtopping) stamens, white, slender, erect or slightly curved at apex, stigmas punctiform to slightly decurrent 0.5–1mm. *Capsules* at ground level, 1.5–3.5 × 0.8–1.5cm, ellipsoid-oblong to ellipsoid, acute to short-acuminate, obscurely or finely brown-dotted; seeds up to c.15 per locule, ±globose, c.2.5–3.5mm diam., brown, with a low, yellowish white appendage. Flowering without leaves (late September–)October–November; leaves and fruits (February–)March–May. In the Middle East the leaves will often appear only a short time after the flowers have withered, the same as in cultivation (here they may develop directly afterwards).

Chromosome number: 2n = 54. The same number has been established for the species in Israel (Feinbrun, 1958: 173) and Lebanon (Persson, unpubl.).

Similar species. *C. decaisnei* has often been misunderstood in the past. Boissier (1882) was uncertain about matching flowering material with the correct leaves, as is evident both from his description and his herbarium in which leaves and fruits of *C. brachyphyllum* Boiss. & Hausskn.! (from Amanus between Beilan and Ain el Beitha, coll. *Haussknecht*) are included in the batch of *C. decaisnei.* The classification *C. decaisnei* has since Boissier been used to include almost any *Colchicum* with hysteranthous leaves in the Middle East. However, in modern times the taxonomic confusion involving *C. decaisnei*, *C. hierosolymitanum* Feinbr., *C. polyphyllum* Boiss. & Heldr., *C. persicum* Baker, and *C. feinbruniae* K. Perss. has been sorted out by Feinbrun (1953) and Persson (1993a). Feinbrun's description of the leaves and capsules of *C. decaisnei* is really based on material of that species, though this was doubted by Brickell (1984).

Plants in the Middle East (Lebanon to Israel) are often much larger than in Turkey, with corms up to c.6.5 × 4cm, and flowers with up to 6.5cm long, 1.8cm wide segments. In this area (Feinbrun-Dothan, 1986: Pl. 42), and also in the Turkish province Hatay, specimens with broad leaves are more commonly found than in the western part of the distribution area. They may be distinguished from *C. dolichantherum* K. Perss. (see below) by their more patent-arcuate, somewhat thicker, hardly plicate, distinctly mid-veined leaves. In flower the two species are easily separated on their anthers (equalling or longer than filaments in *C. dolichantherum*).

Meikle (1985) and Brickell (1984) were convinced that the alleged differences between *C. decaisnei* and *C. troodi* Kotschy were illusory and that the two taxa are conspecific; the latter is then not endemic to Cyprus but instead distributed over a wide area in the eastern Mediterranean. However, Meikle's description includes a number of diagnostic characters, particularly of the leaves, that are representative of *C. troodi s. str.* but not really of *C. decaisnei* as I know the species from nature (Turkey), cultivation (Turkey and Lebanon) and the herbarium (the whole area). Distinguishing features of *C. troodi* are: corm tunics thinner, more papery (never subcoriaceous as often in *C. decaisnei*); leaves strap-shaped, rather flat (but with a distinct mid-vein), hardly twisted, lustrous and very dark green (in *C. decaisnei* ±lanceolate, channelled at least in lower part, usually somewhat undulate-twisted, not particularly glossy, mid-green or glaucescent); perianth segments always very pale, whitish or tinged with purplish pink (in *C. decaisnei* flowers of a deeper colour are not uncommon), glabrous (versus ±puberulous at base). The two species share other features such as leaves often ciliate or sometimes pilose all over (dorsally), relatively long stamens as compared with other pale-flowered species in South West Asia, slender anthers and filaments, the former with distinct median hyaline walls, slender styles hardly overtopping the stamens and very short stigmas. There is no doubt that *C. decaisnei* and *C. troodi* are closely related, but they have diverged so far from each other that specific rank for both seems justified.

Corms and vegetative reproduction. 'Droppers' up to a length of c.2cm are formed yearly by the corms of younger plants thereby sinking them gradually into the soil

to a maximum depth of c.10cm. Reserve buds develop intermittently into new plants, though they rarely produce flowers concurrent with those from the renewal bud (axillary to the lowermost green leaf).

Distribution and habitat. S Turkey (Fig. 6), W Syria, Lebanon, N Israel. Rocky and stony places in pine forests, oak scrub, macchie, usually in sheltered, shady or north-facing positions; on limestone and shale; nr. sea level–c.1000m (possibly higher, at least in the Hatay province). East Mediterranean element (in Turkey W Taurus & Amanus districts).

There is a marked discontinuity in distribution in southern Turkey: *C. decaisnei* seems confined to the humid type of the Mediterranean climate zone (Akman & Ketenoğlu, 1986) which is particularly evident in the coastal lands of the Mediterranean region but exhibits a gap with somewhat drier conditions in the central part of the Taurus mountains (Isauria and western Cilicia). The geology is also different here (Davis, 1965).

In the Middle East, *C. decaisnei* ascends to c.1700m according to Feinbrun (1953) and grows on a variety of substrates, such as limestone and sandstone, mainly in macchie, where it may be found in flower as late as December.

Additional specimens. TURKEY. C3 Antalya: Kemer to Yayla Kuzdere, 600m, 4 x 1996, *Kerndorff & Pasche* 96-16 (GB); Antalya to Altınyaka, 8km off Antalya–Kemer road, pine forest, 300m, 3 xi 1988, *K. Persson obs.*; Pass S of Debek (ENE of Antalya), 800m, 29 iv 1972, *Runemark & Wendelbo* 389* (GB); N of Deniztepesi, 180m, 17 xi 1995, *Kerndorff & Pasche* 95-50 (GB); 3 & 5km S of Beşkonak, pine forest, shale & limestone, 150–200m, 24 x 1988, *K. Persson* 461* (GB) & *obs.*; N of Bademli, 1300m, 2 x 1996, *Kerndorff & Pasche* 96-13 (GB); Manavgat to Akseki, 4km N of Fersin, forest road 2km off the main road, edge of *Pinus brutia* forest, stony ground, 850m, 19 iv 1987, *K. Persson* 432* (GB); *ibid.*, near (N) Murtiçi, *Quercus* scrub, stony clay on shale, 550m, 31 x 1988, *K. Persson obs.* & 19 x 1977 (GB), *Leep* L77/T68 (photo); Manavgat to Gündoğmuş, 20km from G., border of a field, 800m, 5 iv 1988, *Zetterlund* 88-16* (GB); *ibid.*, 10km from G., stony ground in *Quercus coccifera* scrub, 1000m, 19 iv 1987, *K. Persson* 430* (GB); 2km from Güzelbağ to Güney, stony hillsides between fields, 870m, 18 iv 1987, *K. Persson* 428* (GB). C4 Antalya: Alanya, rocky slope near the castle, 250m, 17 x 1978, *Leep* L78/T44* (GB); Demirtaş to Göktepe, 12 & 15km before Başköy, clearings in pine wood among *Quercus, Cistus & Paliurus*, on shale, 175–250m, 30 x 1988, *K. Persson* 469* (GB) & *obs.* C5 Hatay: Mağaracık, 20m, 31 iii 1989, *Pasche & Schacht* 89-07* (GB). C6 Hatay: 6.2km N of Yayladağı, macchie, stony ground (limestone), 700m, 2 iv 1987, *Sønderhousen* 1041* (GB).

For localities (incl. map) in Lebanon–Israel: see Feinbrun (1953).

4. **Colchicum inundatum** K. Persson, Edinb. J. Bot. 56(1): 99, Figs 2B, 4D (1999). Type: Turkey. C3 Konya: 20–30km from Gencek to Aydınkent (Ibradi), 37°47′ N, 28°49′ E, masses on large flat meadows (periodically waterlogged), with *Lagotis stolonifera*, 1200–1250m, 17 iv 1991 (fr.), *K. Persson* 505* (holo. GB; iso. E).

Description: see Persson (loc. cit.). Flowering without leaves September–October (?); leaves and fruits April–May.
Chromosome number: 2n = 54 (Persson, 1998).

Similar species. *C. inundatum* is probably related to *C. persicum* Baker, an Irano-Turanian species distributed from Iran to Lebanon and also in SC Turkey (Gaziantep and Urfa). The two species resemble each other in leaf, but are rather different in the floral state (Persson, 1998). Differences between *C. inundatum* and other pale-flowered hysteranthous species are enumerated in Persson (loc. cit.).

Distribution and habitat. Endemic to S Turkey. Meadows, flat alluvial plains periodically waterlogged; c.1200–1300m. Irano-Turanian element (Central Anatolian district, peripheral in the south).

For map and list of localities, see Persson (1999).

5. **Colchicum sanguicolle** K. Persson, Edinb. J. Bot. 56(1): 92 (1999). Ill:. **Fig. 1D;** Persson loc. cit.: Figs 1E, 4B.

Type: Turkey. C2 Antalya: Akçay, Ak Dağ near Yeşilgöl, 1650–1800m, 29 ix 1976, *T. Baytop & Leep* ISTE 36226* (holo. ISTE; iso. GB).

Syn.: [*C. cilicicum* sensu C.D. Brickell in Davis (ed.), Fl. Turk. 8: 348 (1984) p. p., non Dammer (1898).]

Description: see Persson (loc. cit.). Flowering without leaves September–October; leaves and fruits March–June.

Chromosome number: 2n = 22 (Persson, 1998).

Similar species. Material of *C. sanguicolle* has been included under *C. cilicicum* (Boiss.) Dammer, e.g. in Brickell (1984), probably because of the long styles and the large size of the leaves. The toothed lamellae covering the filament channels of *C. sanguicolle* (Fig. 1D) and the dark purple cataphyll are unusual, perhaps unique, characters in autumn-flowering colchicums with hysteranthous leaves.

Distribution and habitat. Endemic to SW Turkey. Meadows, open slopes, edges of cedar forest; 1200–1800m. East Mediterranean element (Lycian Taurus district).

For map and list of localities, see Persson (1998).

6. **Colchicum speciosum** Steven, Nouv. Mém. Soc. Imp. Mosc. 1: 265 (1829), preprint in Acta Mosqu. 7: 69 (1824? at least before September 1828, cf. Stafleu & Cowan 1985: 914). Ill.: **Figs 1E–F, 4A**; Mathew & Baytop, 1984: Fig. 78.

Type: [Caucasia] 'Ex Iberia bulbos misit *D. Wilhelms*' (holo. H n. v.; iso. LE).

Syn.: *C. bornmuelleri* Freyn, Ber. Deutsch. Bot. Ges. 7: 319 (1889). Type: [Turkey A5 Amasya] In monte Ak-Dagh, 1800m, *Bornmüller*, ix 1889 'aus den von *Bornmüller* gesendeten Knollen zur Blüte gebracht', *J. Freyn* (holo. BRNM).

C. giganteum hort. Leichtlin ex S. Arnott, Gard. Chron. Ser. 3, 32: 435 (1902).

C. lenkoranicum (Miscz.) Grossh., Fl. Kavk. 1: 191 (1928); *C. speciosum* var. *lenkoranicum* Miscz., Fl. Cauc. Crit. 2: 108 (1912). Type (syntypes): [Azerbaidzhan] Lenkoran, 1834, *C. A. Meyer*; in montibus Talüsch pr. Swant et in sylvaticis pr. Lenkoran, 1834, *Hohenacker*; Talüsch, 1844, *C. A. Meyer* (all LE).

Description of Turkish plants (for Iran, see Persson, 1992: 33; Caucasus: Czerniakovska, 1968: 23). *Corm* narrowly oblong-ovoid to ovoid (to broadly ovoid),

often ±straight-sided and flattened, (3–)4.5–8 × (1.5–)2–4cm; outer tunics rather tough, submembranous to subcoriaceous (occasionally coriaceous), smooth, red-brown to mid-brown, inner membranous to submembranous, often lustrous, orange-brown to reddish brown; neck c.(2–)3.5–12cm long, covering entire or at least ¾, rarely less, of the cataphyll. *Cataphyll* yellowish white, sometimes pale greenish yellow, thick, c.(2–)3.5–13cm long above corm. *Leaves* (3–)4 (rarely to 5), hysteranthous, usually spread on a tall stem (projecting up to 25cm or more above ground), (10–)15–32 × (2.5–)3.5–9cm, suberect to slightly patulous or arcuate, (narrowly lanceolate-oblong to) narrowly oblong to oblong-elliptic with attenuate base and a long sheath clasping the stem (but open for about 1.5–3cm), subobtuse to obtuse (to broadly rounded), ±flattish but rather distinctly blunt-keeled underneath, not or somewhat plicate, sometimes slightly twisted, often rather glossy, mid- to somewhat dark green, young leaves often tinged brownish red at apex and sometimes outside, margins indistinctly cartilaginous, glabrous. *Flowers* 1–2(–3), rather sturdy, with a strong but somewhat unpleasant smell; perianth tube entire, thick and fleshy (to c.6mm diam.), exceeding the cataphyll by c.(3.5–) 5–15(–17)cm, yellowish white or pale yellow to yellow-green, sometimes suffused purplish in upper part; limb campanulate-infundibular to widely campanulate, segments (3.8–)4.3–8(–8.9) × (1–)1.2–2.8(–3.8)cm, outer and inner generally differing by 2–11(–14)mm in length, narrowly oblong-elliptic or oblong-oblanceolate to narrowly obovate, occasionally slightly twisted distally, (subacute or) subobtuse to blunt-apiculate or broadly rounded (sometimes retuse) at apex, mid-pinkish purple to deep rose- or violet-purple (occasionally faintly tessellated) merging into a large whitish base or coloured throughout, sometimes with a narrow white median line on upper side; veins numerous, outer ones often divergent (arcuate-pinnate); filament channels puberulous to densely short-pubescent, especially on margins. *Stamens* ⅓ to almost ⅔ (usually around ½) of perianth limb in length, outer 1.8–3(–3.7)cm, inner 2.1–3.5(–4)cm, inserted at subequal level in perianth throat or inner series slightly higher; filaments rather stiff and stout, pale yellow or yellow-green to green, scarcely swollen and not or only slightly darker at base; anthers versatile, ⅓–c.½ as long as filaments, (7–)8–13 × 1.5–2mm, pale yellow to golden yellow, in NW Anatolia (A3–A5) mostly purple or purple-brown, thecae with a vestigial or no hyaline median wall; pollen yellow. *Styles* somewhat or much overtopping stamens, rather stout, whitish or pale yellow, straight or slightly curved, usually only slightly thickened at apex, stigmas hardly or shortly decurrent 0.5–1.5(–4)mm. *Capsules* shortly pedicelled (but often high above ground on tall stem), (3–)4–6cm long (excluding 0.7–1.6cm long rostrum), (1.2–)1.5–3cm wide, narrowly oblong-ellipsoid to ellipsoid or obovoid, usually long-rostrate, not or obscurely brown-dotted; seeds numerous, ±globose to somewhat oblong, 3–4.5 × 2–4.5mm, red-brown or brown (to dark brown), raphe often partly very distinct and surrounding region swollen to a yellowish white, low to rather thick appendage, this and sometimes whole testa soon sticky from a sugary exudate, surface in dry seeds ±rugose. Flowering without leaves (late July–)August–September(–mid-October); leaves and fruits June–July. Withered

leaves and capsules from the preceding generation sometimes remain when the flowers appear in early-flowering plants.

Chromosome number: 2n = 38. Earlier records: 2n = 38 (Bokeriya, 1988: 453, material from Caucasus); 2n = 38, 40 (Levan, 1940: 319, material of horticultural origin); 2n = 40 (Persson, 1992: 34, material from Iran).

In NW Anatolia (A3–A5) many plants (but not all) have fuscous anthers (Fig. 4A) and have been described as *C. bornmuelleri* Freyn. However, plants with purple and yellow anthers, respectively, are often found even in the same population (e.g. in *K. Persson* 554, see locality list). Other distinctive features are allegedly found in leaves (narrower in *C. bornmuelleri*) and styles (see below). In my opinion there is no foundation for distinguishing these plants as a separate species. They are very similar to *C. speciosum* s. str. in general appearance and pattern of variation (leaves, flowers, styles etc.), except for anther colour. Even this is not exclusive for these western populations: *C. speciosum* var. *lenkoranicum* from the Talysh area was described by Misczenko (1912) as having 'antheris purpurascentibus'. In the publication of the closely related (and perhaps conspecific) *C. woronowii* (Bokeriya, 1990) from Abkhazia, this species is stated to have yellow anthers as opposed to *C. speciosum* with 'dark brown' anthers (!), though in plants cultivated in Göteborg from 1991 that were collected by Cuba (*J. Cuba* 11689) in the distribution area and at an altitude characteristic of *C. woronowii* (Russian Federation, W Caucasus, Sochi, Matsesta, 100m), it is the other way around: the anthers are here purple (otherwise their flowers are typically *C. speciosum* s. str., i.e., ±campanulate and with a large white base).

Plants with paler and ±concolorous, broadly funnel-shaped flowers, corresponding to *C. giganteum* of horticulture, are seen now and then in Turkey, though not as frequently as in Iran where they are often found growing together with individuals bearing more campanulate, pale to deep purple flowers with or without white centres (Persson, 1992). The shape of the flower is often just a function of the shape of the individual segments: rather straight-sided, oblong segments give a more funnel-shaped flower. Material that can be accepted as representing Arnott's type material has not been traced. According to Brickell (1984), the length of the stigmatic surface may be important in distinguishing *C. giganteum* from *C. speciosum* s. str., the purported differences being that the stigmas are decurrent for only 0.5–1mm in the former species compared with 2–4mm for *C. speciosum.* No such correlation has been found in the present investigation. The same applies for *C. bornmuelleri* Freyn, which Brickell (loc. cit.) accepted as a separate species described as having shorter stigmas (0.5–1.5mm) than *C. speciosum* s. str. In the material originating from A3–A5 studied for this article and mostly with purplish anthers, the length of the stigmatic regions have been found to vary between 0.5 and 2mm or more; in Freyn's type material (in BRNM, collected by *Bornmüller* in A5 Amasya) the stigmas are close to 3mm! Freyn himself (1889) describes the styles as 'conspicue unilateraliter stigmatosis'.

Similar species. Post & Dinsmore (1933) register *C. speciosum* for Amanus (flowering July). The description just seems to be taken from Misczenko (1912), but the record

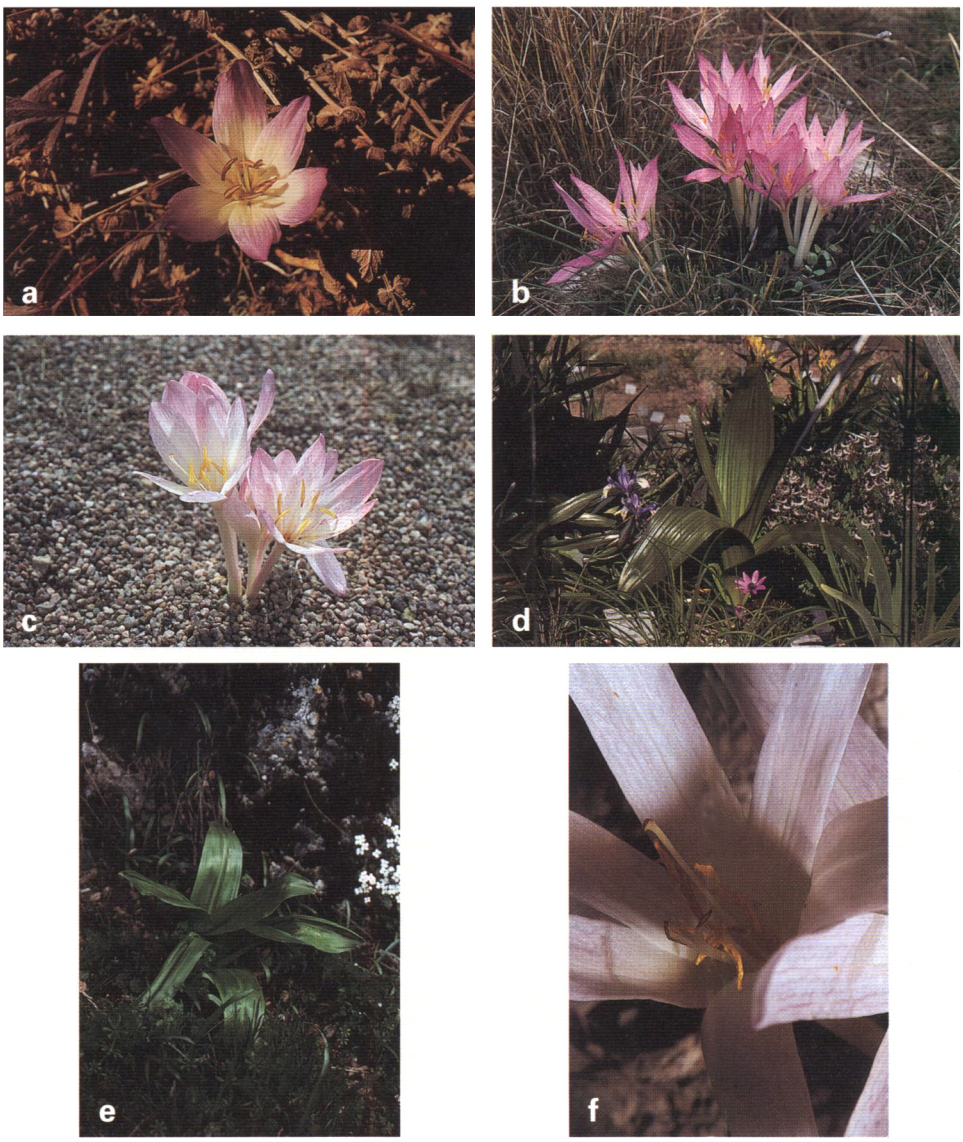

FIG. 4. A, *Colchicum speciosum* (*K. Persson* 554, l. n. 24 viii 1994). B, *C. cilicicum* (*K. Persson* 468, l. n. 29 x 1988). C, E, *C. davisii* (C, *Davis* 26938, cult. 25 viii; E, *Kammerlander et al.* 90-100, l. n. 7 iv 1990). D, *C. dolichantherum* (*Sønderhousen* 1070, cult. 17 iv). F, *C. balansae* (*Runemark & Wendelbo* 9, cult. 11 x).

might refer to *C. davisii* C.D. Brickell (see this species below for differences). Most herbarium sheets with Haradjian's collections of *C. davisii* from Amanus are labelled as 'C. speciosum'. These sheets are also listed under that name in Rechinger (1960). See below under Distribution and habitat, however.

Corms and vegetative reproduction. Hypopodia ('droppers') are fairly often well developed. Vegetative reproduction is ensured through the development of new shoots from 'reserve' buds on enlarged lobes from the main corm. These 'extra' plants often reach mature size during the first year and will even come into flower simultaneously with the main shoot. In this way, large clumps of plants are formed both in nature and in cultivation.

Distribution and habitat. N Turkey (Fig. 6), Caucasus, N Iran. Light macchie and woodland, subalpine and alpine meadows, gullies, moist grassy or stony slopes, often N-facing; on a variety of substrates; 700–2600m. Euro-Siberian element.

One of the collections of *C. speciosum* (positive identification) received from O. Sønderhousen (*Sønderhousen* 746) and also seen by me in his garden, was stated by him very definitely to originate from the Haruniye area (C6 Adana) at an altitude of 700–900m. Until it can be verified on the locality in question, this origin is still questionable. However, such an outskirt locality at the southern end of the 'Anatolian Diagonal' (Davis, 1971) of an Euro-Siberian element is not entirely inconceivable, as the mountain chains in SE Turkey, e.g. the Amanus mountains, do contain several southern enclaves of Euxine or Euro-Siberian vegetation (Davis, loc. cit.; S.D. Davis *et al.*, 1994).

In the Caucasus and in N Iran *C. speciosum* grows in much the same habitats as in Turkey, but ascends to c.3000m (Misczenko, 1912; Czerniakovska, 1968; Persson, 1992).

Additional specimens. TURKEY. A3 Bolu: Sünnice Dağ nördlich Bolu, Trockenrasen an entwaldeter Stelle am Kamm des Höhenzuges, 1600m, 12 ix 1957, *Wagenitz & Beug* 90 (GOET); Yedigöller, 1500m, 9 ix 1977, *Ilarslan* 92 (ISTE); Aladağ, Kartalkaya, acid rocks, 1870m, 15 ix 1986, *K. Persson* (photo). A4 Ankara: Bergland westlich von Kızılcahaman, 1300m, 22 ix 1981, *Ern & Krone* 7080 (B). Kastamonu: N side of Ilgaz Dağ, open grassy banks in Abietum, 1700m, 8 ix 1954, *Davis & Polunin* 25061 (E, GB); Ilgazdağı geçidi, N-facing slope E of the pass, 41°04' N, 33°46' E, openings (grassy meadows) in *Abies* forest, 1750m, 24 viii 1994, *K. Persson* 554* (GB). A5 Kastamonu: Paphlagonia, Tossia, Kutschuk-Ilkazdagh, in prat. subalp. & alp. & in fruticet. prope pag. Jarakun, 4 vi 1892, *Sintenis* 4156, 4157, 4157b & 4157e (G, GOET, JE, LD, P, WU). Amasya: Merzifon, 1835, *Wiedem* (LE); Ak Dağ, 1600m, 15 vii 1890, *Bornmüller* 2593 (BRNM); *ibid.*, Fluren, 6 ix 1892, *Manissadjian* 585 (M); *ibid.*, Nordwestabhang c.30km von Amassia, 1891/92, *Manissadjian* 582 (LE, LD, M, P, S, UPS). Samsun: Nebiyon Dagh, near Bafra, 1980, *Tobey* Ed. 805062* (cult. E, GB). A7 Gümüşhane: Zigana Pass, 2000m, 1959, *Richter** (cult. GB); *ibid.*, N slopes, steep stony banks, 6000ft, 22 viii 1962, *Furse* 4111 (G, K); *ibid.*, N slopes just below summit, damp grassy slopes, 6000ft, 27 viii 1971, *Grey-Wilson & Hewer* 1708 (GB, W); *ibid.*, just below S side of pass, very stony slopes, 1800m, 22 v 1985, *J. & J. Archibald* 6460 (GB); Ciganadagh, in summo, 20 vii 1889, *Sintenis* 1444 (LD, S); *ibid.*, in pascuis subalpinis, 22 viii 1890, *Sintenis* 3397 (G, JE, LD, P, WU); Lazistan, Kale, 19 viii 1917, *Schischkin* (LE). A8 Gümüşhane: Bayburt, *Furse & Synge* 825* (GB). Rize: Rize, on the Black Sea, *Hodgkin* *(cult. E, GB); Hemşin, Cermesk yayla above Ortaköy, in pasture, 2600m, 30 viii 1952, *Davis & Dodds* 21167 (E, GB). Çoruh: 45km SW of Artvin, 2300m, 1 vii 1988, *Mertens & Pasche* 88-12* (GB); 33km SW of Artvin, 1350m, 23 vi 1988, *Mertens & Pasche* 88-05A* (GB); Artvin, in monte Egre-su, 2300m, 15 vii 1912, *Holmberg* 2047 (LD); Harhan near Artvin, 9 x 1957, *Nitzelius** (GB); Genya Dağ above Artvin towards Mahallesı Dere, open areas on steep slopes wooded with *Picea*, *Fagus*,

Rhododendron, etc., 1700m, 14 vii 1986, *J. & J. Archibald* 7763* (GB); Sacinka near Artvin, S-slope, 750m, 10 x 1957, *Nitzelius* (GB); Adjarie, Karçal Dağ, 21 viii 1910, *Popov* (LE).

For localities in Caucasus: see Misczenko (1912), map in Grossheim (1940, no. 114); for Iran see Persson (1992).

7. **Colchicum cilicicum** (Boiss.) Dammer, Gard. Chron. Ser. 3, 23: 34 (1898); *C. byzantinum* var. *cilicicum* Boiss., Fl. Or. 5: 160 (1882). Ill.: **Figs 4B, 5A**; Bot. Mag. 152: t. 9135 (1926), incl. leaves; Bowles, 1952: Pl. 28; Mathew & Baytop, 1984: Fig. 72.

Type: [Turkey C5 Içel] A regione pagi Güllek usque ad terminos sylvarum Cedrorum ad faucium devexa invenitur, 4000–6500ped, 22 ix 1853, *Kotschy* 84[d] (lecto. G-Boiss [designated here]; iso. G, GOET, K, LE, M, P, S, UPS, W).

Syn.: [*C. byzantinum* auct., non Ker-Gawler (1808).]

[*C. decaisnei* sensu Lynch, Gard. Chron. Ser. 3, 60: 604, f. 79 (1916), non Boiss. (1882).]

[*C. speciosum* sensu Stefanov, Monogr. Colchicum: 80 (1926) p. p., non Steven (1829).]

C. cilicicum sensu Hayek & Siehe in Hayek (1914) is *C. polyphyllum* Boiss. & Heldr. (Persson, 1993a).

Corm ovoid or ovoid-globose to ±depressed globose, (2–)3.5–6(–7) × 2.5–5.5(–6)cm; tunics of a ±papery quality, often in several layers, frequently split and torn, mostly with rather glossy insides, outer submembranous to subcoriaceous (rarely coriaceous), red-brown or mid-brown to dark brown, inner membranous to submembranous, light orange-brown to red-brown; neck c.(3–)4–15cm long, generally c.⅔ the length of cataphyll to only slightly shorter. *Cataphyll* white, sometimes purplish carmine at mucronate apex, (3.5–)7–17cm above corm. *Leaves* 3–4 (rarely 5), hysteranthous, somewhat spread on a stem projecting c.3–15cm above ground, 17–30(–40) × 4–7(–10)cm (a 5th leaf generally much smaller), suberect to erecto-patent-arcuate, narrowly oblong-lanceolate to elliptic-lanceolate or narrowly elliptic-ovate, sometimes narrowly oblong-elliptic, with base attenuate (rarely slightly widened) towards a long fused sheath, subobtuse to obtuse at apex, slightly to distinctly plicate, with a rather distinct mid-vein on upperside and keel on underside, often somewhat twisted, rather firm, usually somewhat matte green but occasionally rather glossy, young leaves often tinged dark crimson-purplish at apex, frequently suffused purplish on sheaths, margins indistinctly to very narrowly cartilaginous, glabrous. *Flowers* 2–7, rarely more, but extra shoots developed from the 'reserve' buds of the corm may produce a higher number of flowers per corm; perianth tube entire, exceeding the cataphyll by 4–11(–13)cm, 3–5mm wide, white to cream, sometimes suffused purple especially in older flowers; limb mostly widely open, campanulate-infundibular to infundibular, sometimes reflexed, mostly distinctly sharp-keeled at least in basal part, segments (3.3–)4–6(–7)cm long, generally differing by 2–7(–9)mm within each flower, (0.7–)1.2–2.5(–2.7)cm wide, (narrowly oblong to) narrowly elliptic to oblanceolate or narrowly obovate, often slightly acuminate to a

(subacute to) subobtuse or obtuse tip, pinkish lilac to deep rosy-purple or violet-purple, not or obscurely to lightly tesselated (to reticulate-tessellated), paler on keel outside and generally with a long (½–⅘ of segment) white mid-streak on upperside; veins (11–)13 to numerous, thin, usually ±parallel at regular distances but outwards often divergent, curved; filament channels puberulous to pubescent, especially on margins. *Stamens* usually more than ½ to ⅘ of perianth limb in length (occasionally equalling), outer (2-)2.4–3.5cm, inner (2.3–)2.6–4cm, inserted at slightly different levels in perianth throat; filaments filiform, mostly somewhat curved inwards, whitish (sometimes tinged pinkish lilac), slightly widened base pale yellow to golden yellow; anthers versatile, 'wobbly' (frequently held ±horizontally), sometimes slightly curved, ⅕–⅓ as long as filaments (in cultivation sometimes longer, to slightly less than ½), (5–)6–10 × 1–1.2mm, yellow to golden yellow, thecae narrow, without or with a very narrow hyaline median wall; pollen bright yellow to golden yellow. *Styles* very long, usually overtopping stamens, frequently excerted from corolla, filiform, white except for purplish extreme tip, straight to very slightly bent over just below stigmatic surface, stigmas punctiform or very shortly decurrent 0.4–1mm. *Capsules* elevated on stem prolonged above ground, 2.5–4 × 1.5–2.5cm, ellipsoid, short-pointed to short-acuminate, obscurely brown-dotted; seeds numerous, ±globose, c.3–4mm diam., brown, with a yellowish white, rather low appendage. Flowering without leaves (late August–)September–mid-November; leaves and fruits April–June(–July).
Chromosome number: 2n = 54.

Similar species. Boissier (1882) regarded *C. cilicicum* merely as a variety of *C. byzantinum* Ker-Gawl., a plant which has been in cultivation for a long time. However, both Bowles (1952) and Brickell (in Meikle *et al.*, 1973) present convincing evidence for the distinction of the two taxa as species, and I agree. Bowles points out that the garden stock now grown as *C. byzantinum*, probably the same as was described by Ker-Gawler (1808), seems to be sterile, never producing any capsules but instead propagating vegetatively by the multiplication of the corms. In cultivated material that I have checked, the anthers were thin, containing mostly deformed pollen without cytoplasm (only at the most c.5% seemed 'functionable'). The chromosome number of these plants was observed to be 2n = 45 or 46, which together with the sterility to my mind is an indication of a hybrid origin, possibly between *C. cilicicum* (2n = 54) and another plant, as yet unknown, with 2n = around 36.

Plants of *C. cilicicum* with narrowly oblong or oblanceolate, untessellated tepals and moderately long stamens may be superficially similar to *C. dolichantherum* K. Perss. or *C. imperatoris-friderici* Siehe ex K. Perss. (described below). Collections of the two latter species have also often been wrongly assigned to *C. cilicicum.* In this species, however, the corolla is always more open (segments more patent, often recurved), with more prominent, sharp ridges. *C. dolichantherum* and *C. imperatoris-friderici* generally have paler flowers, both have stamens less than ½ as long as segments, and still more significantly, their anthers are thicker, less mobile,

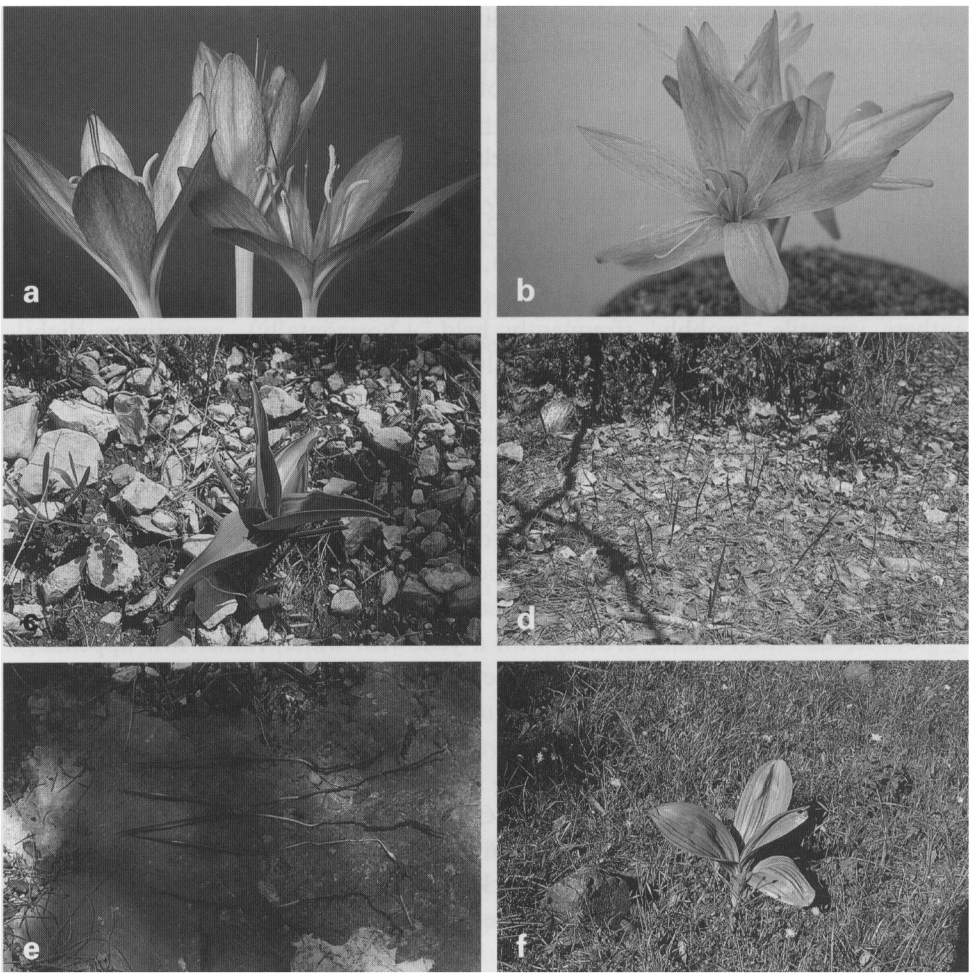

FIG. 5. A, *Colchicum cilicicum* (*K. Persson* 468, cult. 1 xi). B, *C. davisii* (*Kammerlander* et al. 90-100, cult. 7 viii). C, *C. balansae*, mature leaves (*K. Persson* 506, l. n. 17 iv 1991). D–E, *ibid.*, juvenile 1-leaved shoots from vegetative reproduction (between Akseki and Cevizli, 28 iv 1987; E, close-up of shoots). F, *C. macrophyllum* (Datça to Marmaris, 100m, l. n. 22 iv 1991).

and proportionally very long, usually as long as or at least only slightly shorter than the filaments. Furthermore, their styles are stouter, and swollen and often distinctly curved at apex. Leaves of *C. cilicicum* are more tapering to the apex, and not quite so glossy or pleated as those of *C. dolichantherum*. *C. imperatoris-friderici* has much thicker, almost leathery, glaucous leaves.

Characters distinguishing between *C. cilicicum* and *C. davisii* C.D. Brickell are listed below under that species.

For discussion on differences between the Syro-Palestinian *C. feinbruniae* K. Perss. ('*C. cilicicum*' misapplied) and the Turkish *C. cilicicum* s. str., see Persson (1993a).

Corms and vegetative reproduction. The often thick and rounded corms usually have only short hypopodia ('droppers'), and are sometimes supplied with additional ±well-developed lobes indicating development of extra corms from one or two 'reserve' buds.

Distribution and habitat. S & SC Turkey (Fig. 6), only just passing the Turkish border with a few localities in Syria south of Akra Dağı (Jebel Aqra). Rocky mountain slopes, often in light woodland (*Pinus, Cedrus*) or macchie, ravines; on limestone; 350–2300m. East Mediterranean element (Taurus & Amanus districts).

The distribution of *C. cilicicum*, with localities in the Cilician Taurus and Amanus, a gap in Isauria and an outskirt locality in Pisidia, is rather similar to that of another *Colchicum* species, *C. sieheanum* Hausskn., which occurs in Cilicia and has also been found near Bozkir (e.g., *Kerndorff & Pasche* 96-09, GB & Herb. Pasche). An even closer correspondence may be found in the monotypic genus *Leucocyclus*, with *L. formosus* ssp. *formosus* occurring in Pisidia (e.g. Dedegöl Dağ) as well as the area around the Cilician Gates, and ssp. *amanicus* in Amanus (Grierson, 1975; Davis *et al.*, 1994).

Additional specimens. TURKEY. C3 Isparta: Dedegöl Dağ, 1600m, vii 1965, *Sorger* *(cult. in GB & K). C5 Içel: Ost- und Westcilicien mittlere bis obere Waldregion bis 1700m, Oct., *Siehe* Fl. orient. 96 (JE, LE); Tarsus to Çamlıyayla, near (before) Meşelik (40km fr. Çamlıyayla), in crevices and among boulders of limestone, 350–400m, 29 x 1988, *K. Persson* 468* (GB); Sultan Dagh, on road to Tarsus, *Baker* (*Bowles* cult. K, 19 v 1949); Namrun, Felsen, 1500m, x 1895, *Siehe* Bot. Reise Cilic. 323 (G, JE, K, LE, P, WU); Prope Kagiraki, 600m, x 1895, *Siehe s. n.* (JE); Taurus in Pylis Ciliciae (Ghülek Boghas), 29 ix 1845, [*Heldreich*] 1272 (G-Boiss); Collines entourant le village turc de Gülek Boghas, à 10? au nord du Tarsous, Oct., [*Balansa*] 125 (G-Boiss); Défilé des Portes Ciliciennes, x 1855, *Balansa* (G, K, MPU, P); Güllek Boghas, 900m, x 1896, *Siehe* Bot. Reise Cilic. 89 (G, JE, K, LE, P, WU). Adana: Tekir Tepesı pass, S of Pozantı, Gökoluk Deresı, mountain pine woods, limestone, sporadic low maquis and light pine cover on stony slopes with outcrops, 1750m, 7 x 1966, *Cheese* et al. 2415 (K); Pozantı 3km N of Bürücek Yaylası, 10km SW of Venişlar village, pine forest, 1400m, 11 v 1969, *Uzunoğlu** (GB); Ala Dağ südlich der Hauptkette, Kalkschutt, S-Exposition, 2300m, 24 viii 1958, *Markgraf* 11228 (Z). Niğde: Demirkazık Dağ, calcareous rocks and slopes in a ravine, 1600–1700m, 16 iv 1990, *Kammerlander, Pasche, Persson & Zetterlund* 90-307* (GB). Hatay: Yeditepe, in grass under shrubs, 1300m, 5 iv 1987, *Sønderhousen* 1049* (GB); In cacumine montis Cassii [=Akra Dağı], v–vii 1846, *Boissier* (G-Boiss); Au sommet du Jebel Aqra [=Akra Dağı], 1739m, 11 v 1932, *Gombault* 3028 (P). C6 Hatay: NW of Hassa, 22 iii 1992, *Kerndorff & Pasche* 92-22* (GB); S of Hassa, 22 iii 1992, *Kerndorff & Pasche* 92-28* (GB); Attik, ix 1933 & 1934, *Villard* 78 & 186 (G); Ak Kaya, x 1936, *Villard* 264 (G); In decliv. flum. Nahr Beilan infra Beilan [=Belen], 27 ii 1865 (fr.), *Haussknecht* 392 (G-Boiss *sub C. cilicico*, JE), fl. cult. Hort. Genev. 25 x 1869, *'Ex Haussknecht'* (G-Boiss *sub C. decaisnei var.*); Deli Bekirli, 15 xi 1933, *Villard* 80 (G); *ibid.*, iv 1936, *Mouterde* 6215 (G); NW of Karaçay, 18 iii 1992, *Kerndorff & Pasche* 92-07* (GB); between Belindere and Serinyol, 630m, 18 iv 1993, *Kerndorff & Pasche* 93-05* (GB).

8. **Colchicum davisii** C.D. Brickell, The New Plantsman 5: 15 (1998). Ill.: **Figs 4C, E, 5B**; Brickell loc. cit.: Fig. p.17.

Type: Turkey. C5 Adana: d. Bahçe Dumanlı Dag, 1300m, edge of beech forest, 19 iv 1957, Davis 26938*. Cult. RBG Edinburgh 29.9.84 (holo. E, iso. GB, Wisley).

Syn.: [*C. speciosum* sensu Rech. f., Ark. Bot. 5: 78 (1960), non Steven (1829).]

Corm narrowly oblong-ovoid to ±irregularly ovoid (asymmetric) sometimes with a long hypopodium and short extra lobes containing developing 'reserve' buds; mostly rather flattened (sometimes even concave on shoot side), 4–7 × 2–4.5cm; tunics often in several layers, membranous to submembranous, generally ±papery, loose-fitting, often ±split, rather matte (yellowish brown to) light-brown to brown, produced into a neck c.(3–)5–14cm long, partly (½–) to wholly covering cataphyll. *Cataphyll* yellowish white, thick and stout, (5–)8–18cm long above corm, rather deeply split at mouth. *Leaves* 3, hysteranthous, generelly positioned closely together 4–6cm above ground on projecting stem, 17–35 × 5–7.5cm, suberect (to erecto-patent), narrowly lanceolate-oblong to elliptic-oblong or oblong, subacute to obtuse, rather abruptly converging at base into the entire, apically slightly widened sheath; shallowly channelled at least basally with a rather distinct mid-vein on upperside and a bluntish keel under, slightly twisted, not to scarcely plicate, rather thick, very glossy (yellowish)green, young leaves tinged ±crimson-purplish at apex, margins indistinctly or very narrowly cartilaginous, glabrous. *Flowers* (1–)2–5, very fragrant; perianth tube entire, exceeding the cataphyll by 3–10(–12)cm, rather stout (to 5mm), whitish to yellow-white, occasionally suffused purplish violet in upper part; limb infundibular-campanulate, segments 4–6(–6.5)cm long, outer and inner differing by 2–9mm in length, 0.8–2cm wide, narrowly oblong or elliptic-oblong to oblong-oblanceolate, rather bluntly keeled on the back, subobtuse to rounded at apex, occasionally slightly acuminate (but with obtuse tip), slightly to rather distinctly tessellated distally (then almost white in lower part) or overall in pale purplish lilac to deep purplish violet (HCC 34/35/636 'Bishops Violet/Amethyst Violet/Heliotrope'), paler outside at least on keels, uppersides with a median white streak along ⅓ to ½ (sometimes more obscurely to ¾) of segment; 13–21 coarse veins at irregular often wide intervals, usually ±parallel following outline of segment and with very slanting anastomoses, but in broad segments outer veins somtimes ±diverging; filament channels deep, puberulous to short-pubescent especially on margins. *Stamens* c.⅓ to ±½ (occasionally to ⅔) of perianth limb in length, outer 1.8–2.7(–3)cm, inner 2.2–3.2(–3.5)cm, outer series usually inserted in tube c.1–3mm below perianth throat; filaments whitish, scarcely swollen base shortly bordered in pale yellow; anthers versatile, often curved, c.½–⅔ as long as filaments, (9–)10–16 × 1.3–1.8mm, yellow, thecae without or with an indistinct hyaline median wall; pollen yellow. *Styles* usually distinctly overtopping stamens, sometimes nearly reaching tips of tepals, stout, white (rarely purplish apically), swollen and curved at apex, stigmatic region decurrent for 2.5–5mm, deeply channelled. *Capsules* not or shortly pedicelled but slightly elevated above ground on prolonged stem, c.2.5–3 × 1–1.5cm, narrowly ellipsoid to ellipsoid-oblong, short-rostrate; seeds in moderate numbers (c.10–15 per locule), subglobose somewhat flattened laterally, c.4–5mm diam., dark brown, raphe surrounded by a pale, slightly swollen area (note: only few capsules have been seen and measured). Flowering without leaves mid-August–September(–October); leaves and fruits April–May.
Chromosome number: 2n = 46.

Similar species. *C. davisii* was recently described by Brickell on the basis of the type material only, so a full decription including data from further collections is included here. The species can perhaps be perceived as in many ways intermediate between *C. cilicicum* and *C. speciosum.* Also the chromosome number is consistent with a hypothesized hybridogenic origin from these two species (*C. cilicicum* has 2n = 54, *C. speciosum* 2n = 38). If the latter does in fact occur in the Haruniye area (see above), all three species can be found not far from each other. However, *C. davisii* has been collected in more than one mountain (albeit in a limited area), it is perfectly fertile, and though somewhat variable in morphological features it is characterized by a consistent group of specific characters. The hybridization incidents that led to its formation are probably far removed in time, as are the subsequent processes of stabilization. *C. davisii* differs from *C. cilicicum* mainly in the the narrower, flatter, more irregular corms, matter tunics, more convolute, hardly plicate leaves with a more lustrous surface (Fig. 4E), sparser and coarser tepal veins, proportionally shorter stamens, longer and thicker anthers, and stouter styles with longer, more curved stigmas (cf. Fig. 5A,B). The leaves of *C. davisii* are reminiscent of *C. speciosum* but do not exceed 3 in number and are generally placed closely together on stem; furthermore they are more glossy yellowish green, thicker, and less pleated. In the floral state *C. davisii* differs from that species in the chequered flowers of a more violet hue (Fig. 4C), the whitish filaments, and the distinctly curved, long-decurrent stigma regions.

Corms and vegetative reproduction. The corms are often characteristically irregular in shape. Extra lobes connected with the frequent development of one or two buds in addition to the main renewal bud, enhance the asymmetry. The reserve buds rarely produce flowers concurrent with the main shoot, however.

Distribution and habitat. Endemic to S Turkey (Amanus/W Mesopotamia) (Fig. 6). Rocky slopes, often N-facing, in sheltered, shady situations; on limestone; 1000–1950m. East Mediterranean element.

Additional specimens. TURKEY. C6 Adana: Mountain above Osmaniye, 8 ix 1884, *Post* (G); Mont Amanus, 1899, *Haradjian* (W); *ibid.*, 1906, *Haradjian* 168 (G, S, W); *ibid.*, Kuslici Dağ, 5–6500ped, viii 1908, *Haradjian* 2674 (W). Gaziantep: Kartal Dağı, 45km before Gaziantep from Nur Dağı geçidi, steep N-facing calcareous slope, mostly at base of rocks with *Corydalis henrikii* and *Scilla melaina*, 1050m, 6 iv 1990 (fr.), *Kammerlander, Pasche, Persson & Zetterlund* 90-100* (GB).

Haradjian's collections from the Amanus mountains all stem with certainty from the Turkish part (Rechinger, 1960). Dumanlı Dağ, for instance, was botanized by him as well as by Davis (Davis, 1955). There is one specimen in the Boissier herbarium (G) stated to come from cultivated material (Le Rivage, 27 ix 1889) and which is supplied with Boissier's comments: 'Orig. Syrie. Me semble être le *C. speciosum* Stev. ou *C. latifolium* Sibth.' Under the latter name, collections from Amanus are included in Post & Dinsmore (1933) which may well be *C. davisii* (n. v.).

Amanus and the W Mesopotamian border mountains support numerous endemics and subendemics (Davis, 1971). On Kartal Dağı *Colchicum davisii* is growing with

Corydalis henrikii, a newly described species endemic to this and a couple of nearby localities (Lidén, 1991; Lidén & Zetterlund, 1997), and *Scilla melaina*, endemic to an area a little more extended to the west (Speta, 1980; Mordak, 1984). *Helleborus vesicarius*, which was also found on the same mountain slope, holds a rather isolated position within its genus and is endemic to the same general area as the new *Colchicum* (Davis & Cullen, 1965).

9. **Colchicum dolichantherum** K. Persson, **sp. nov. Figs 2C–D, 4D.**
In statu foliifero *C. cilicico* simile, sed foliis saepe usque ad 6 numero, majoribus, plicatioribus, cormi forma diversa; ab eo imprimis differt florum numero altiore, perianthii segmentis oblongis pallidis, staminibus longitudine ut maximum ½ perianthii partes aequantibus, antheris filamenta aequantibus vel eis longioribus.
Type: TURKEY. C6 Adana/Gaziantep: Nur Dağı geçidi, summit (1150m), in grass among *Quercus* scrub, 27 x 1988, *K. Persson* 465* (holo. GB; iso. E).
Syn.: *C. balansae* var. *macrophyllum* Siehe ex Hayek, Ann. Naturhist. Mus. Wien 28: 183 (1914), non *C. macrophyllum* B.L. Burtt (1951). Type: [Turkey C5 Adana] Auf sumpfigen Wiesen bei Missis am Pyramus [=Ceyhan river], Ende Oct., Nov., *Siehe* Fl. orient. 94 (holo. W? n. v.; iso. JE, LE).

[*C. speciosum* sensu Stefanov, Monogr. Colchicum: 80 (1926) p. p., non Steven (1829).]

Corm broadly oblong-ovoid to ovoid-globose (to depressed-globose), mostly straight-sided and 'high-shouldered', 3.5–6 × 3–5.5cm; tunics subcoriaceous (to coriaceous), tough, somewhat rufous brown to mid-brown, produced into a fibrous neck (finely ribbed outside, thin layer of fibres inside), c.4–15cm long, covering c.½ to ¾ of cataphyll. *Cataphyll* yellowish white, frequently flushed ±carmine-purplish in uppermost part, often stout, 7–19cm long above corm. *Leaves* 4–5(–6), hysteranthous, slightly spread on a somewhat projecting stem (basal leaf mostly near ground), 25–50 (or more) × 5–10cm, erecto-patent to erecto-patent-arcuate, narrowly lanceolate-oblong to broadly ligulate or elliptic-oblong with base attenuate towards short fused sheath, subobtuse to obtuse or sometimes truncate/retuse, longitudinally pleated, mid-vein not very prominent, somewhat undulate-twisted, firm, bright glossy green, young leaves with crimson-purplish tips; margins obscurely to distinctly cartilaginous, occasionally scabrid to short-ciliate basally. *Flowers* 5–15; perianth tube entire, exceeding the cataphyll by 3–6.5cm, 2–3(–4)mm wide, creamy-white; limb infundibular (to campanulate-infundibular), segments 2.8–5.5cm long, widely varying in length in the individual flower (differences up to 12mm), 0.5–1.3(–1.5)cm wide, linear or narrowly oblong to narrowly oblanceolate-oblong, bluntly to rather sharply keeled on the back, subobtuse to obtuse, mostly ±cucullate, rather firm, nearly white or pale mauve to rosy-lilac, not or sometimes obscurely tessellated, occasionally with a distinct white median stripe on upper side, 9–23 parallel obscure veins; filament channels glabrous or short-ciliate on margins. *Stamens* c.⅓ to ½ as long as perianth segments, outer 1.2–2.1(–2.4)cm, inner 1.5–2.3(–2.5)cm, the two

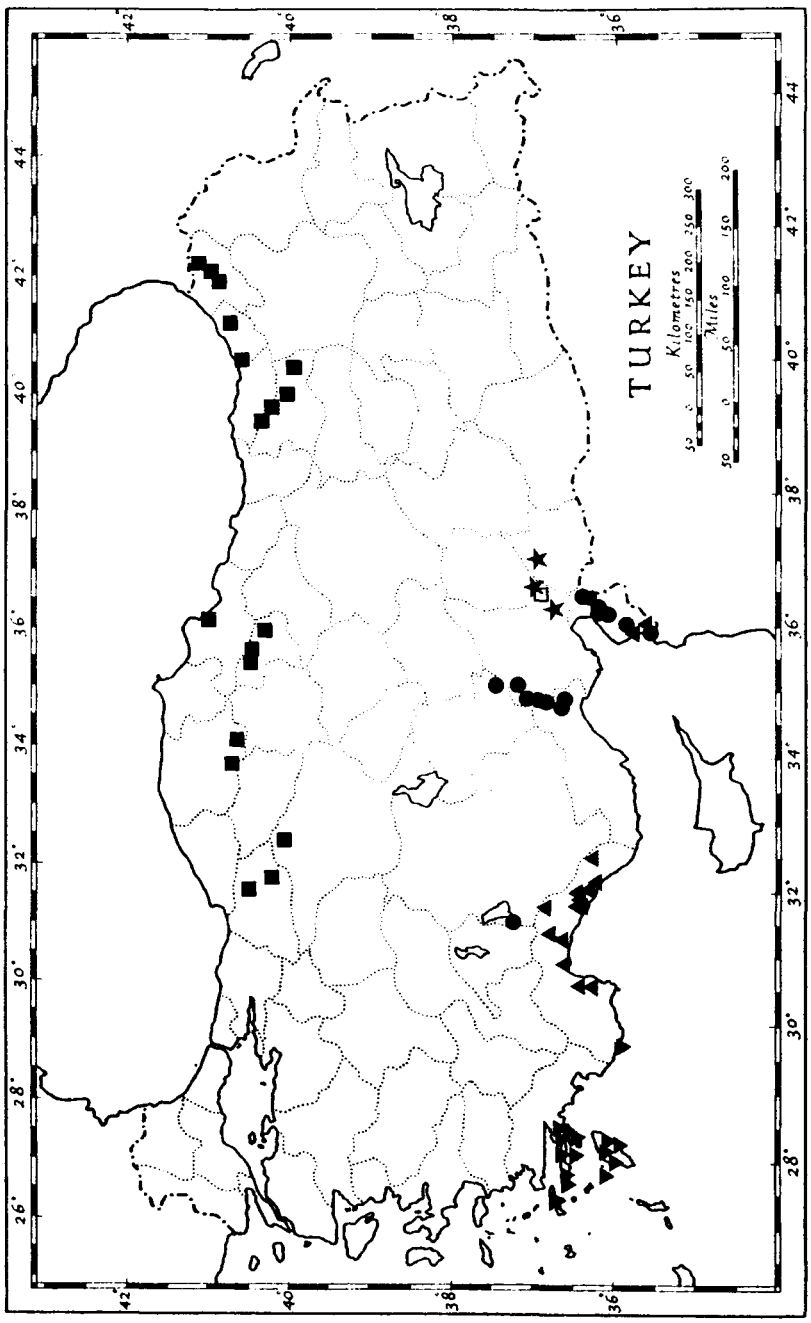

FIG. 6. Distribution of *Colchicum decaisnei* (▲), *C. cilicicum* (●), *C. davisii* (★), *C. macrophyllum* (▼), and *C. speciosum* (■, open symbol: material seen but locality questionable, not verified by the present author) in Turkey and the East Aegean Islands according to material seen. *C. decaisnei* occurs also in coastal Syria, Lebanon and N Israel, *C. cilicicum* in northwesternmost Syria near Turkish border, *C. macrophyllum* in Crete and S Evvia, and *C. speciosum* in the Caucasus and N Iran.

series sometimes subequal in length, inserted at subequal level in throat; filaments white, swollen base orange-yellow; anthers versatile, sometimes curved and/or twisted, slightly shorter to distinctly longer than filaments, 8–15 × 1.2–1.5mm, mid- to deep yellow, connective wide, thecae narrow with a narrow median hyaline wall; pollen yellow. *Styles* equalling to somewhat overtopping stamens, white, thickened and ±hooked to curved at apex, stigmas not or shortly decurrent, 0.7–2mm. *Capsules* at ground level or slightly above on projecting stem, 2.5–4(–5) × 1.2–2(–2.5)cm, ellipsoid to ellipsoid-oblong, short-rostrate, not or irregularly brown-dotted; seeds numerous, subglobose, c.3–4.5mm diam., red-brown to brown, raphe region swollen to a rather large yellowish white appendage. Flowering without leaves (late August–) September–mid-November; leaves and fruits April–May.
Chromosome number: 2n = 54.

Similar species. *C. dolichantherum* is one of the most floriferous species in the genus, generally producing whole bunches of flowers. The long anthers on relatively short filaments are also distinctive: the anthers seem to be crowded on invisible filaments at the bottom of the perianth limb (Fig. 2C–D). Among hysteranthous pale-flowered colchicums in Turkey, only *C. balansae* Planchon has comparable stamens (4F), but that species is easily recognized on its extremely long and coriaceous, thickly fibrous tunic necks. Localities of *C. balansae* given by Mouterde (1966) for Amanus, Jebel Aqra and northernmost Syria (Forêt de Frolouk) possibly refer to *C. dolichantherum*. The same is probably true for the collection *Aysoy* no. 440 (Gaziantep) listed as *C. balansae* in Birand (1952) and Brickell (1984). I have not seen the material in question, but the habitat, specified as 'Vineyards', is more typical of *C. dolichantherum*.

C. dolichantherum is also characterized by its very large leaves (4D), probably the largest (or at least the longest) in the genus. Siehe collected the species for his 'Flora orientalis' series (no. 94), calling it '*C. macrophyllum*' though the name was never formally published at the specific rank. On the label printed for the herbarium series he added: 'Blätter werden meter-lang' (i.e. 'leaves will reach one meter in length'). *C. imperatoris-friderici* also has fairly large leaves, but see that species for differences. Smaller specimens in leaf of *C. dolichantherum* can usually be distinguished from *C. cilicicum* on the more oblong shape of the leaves (more abruptly narrowed at apex), and these are also glossier and more heavily pleated. The corms are furthermore more straight-sided and high-shouldered than those of *C. cilicicum*.

Corms and vegetative reproduction. Cloning by means of 'extra' corms developing from 'reserve' buds occurs only rarely.

Distribution and habitat. S Turkey, probably also in N Syria (see above) close to the Turkish border (Fig. 3). Grassy meadows, dolines, oak scrub, macchie, stony banks in woods, vineyards; generally in rather moist and sheltered positions; on limestone, shale etc.; c.30–1500m. East Mediterranean element (Taurus/Amanus districts).

Additional specimens. TURKEY. C3 Antalya: 10km from Akseki to Cevizli on old road, 37°06′ N, 31°48′ E, dolines in mixed *Cedrus/Abies* forest on limestone karst, 1500m, 28 iv 1987, *K. Persson* 447* (GB); *ibid.*, 31 viii 1994, *K. Persson* 556 (GB). C6 Adana: Amanus, Altik, iv 1937, *Louis* (P). Adana/Gaziantep: Near Fevzipaşa in pass, *Quercus coccifera* scrub, grass, 1150m, 10 iv 1987, *Sønderhousen* 1070* (GB). Hatay: Above Belen, W side of pass, macchie of *Cistus, Quercus* etc., gravelly clay over shale, 700m, 6 v 1985, *J. & J. Archibald* 6171* (GB); Soğukoluk to Iskenderun, near (above) Müftüler, moist shady roadbanks among *Corylus* and *Hedera*, 675m, 28 x 1988, *K. Persson* 467* (G, GB); 5.3km N of Yayladağı under *Quercus coccifera* scrub on limestone, 625m, 1982, *Sønderhousen* 827* (GB).

10. **Colchicum imperatoris-friderici** Siehe ex K. Persson, **sp. nov. Fig. 2E–F.**
Differt a *C. dolichanthero* et *C. cilicico* foliis glaucoviridibus subcoriaceis, antheris stramineis, a *C. balansae* cormi tunicis tenuioribus in collum pro ratione breviter productis.
Type: [Turkey C4 Içel] Unweit der Calycadnus [=Göksu river] bei der Kirche der heiligen Thekla, Seleucia [=Silifkĕ, 100m, October, *Siehe* Fl. orient. 99 (holo. JE; iso. LE).
Syn.: [*C. speciosum* sensu Stefanov, Monogr. Colchicum: 80 (1926) p. p., non Steven (1829).]

[*C. balansae* sensu Hayek, Ann. Naturhist. Mus. Wien 28: 183 (1914) p. p., non Planchon (1855).]

[*C. kotschyi* sensu C.D. Brickell in Davis (ed.), Fl. Turk. 8: 341 (1984) p. p. quoad coll. *Siehe* 99, non Boiss. (1853).]

Siehe, one of the most significant collectors and students of the Anatolian flora, never published this new species but as often in his case it was only annotated on herbarium labels for his 'Flora orientalis' series. The reason for the specific epithet is also given on the label (no. 99): the species was named commemorating Emperor Frederick I Barbarossa, who while leading his troops on the Third Crusade, drowned as he crossed the Calycadnus (Göksu) river (adjacent to the type locality of the species!).

Corm ovoid to broadly ovoid, 6–8 × 4.5–8cm; tunics submembranous to subcoriaceous, often in several layers, rather fragile and papery, smooth, lustrous, brown to deep brown, produced into a stout neck, c.6.5–12cm long, covering c.¾ or most of the cataphyll. *Cataphyll* yellowish white, occasionally irregularly flushed purplish in upper part, often rather stout, 8–16cm long above corm. *Leaves* 4–5 (rarely to 6), hysteranthous, mostly crowded at c.2–6cm above ground level on projecting stem, 16–45 × 4.5–11cm, erecto-patent, narrowly oblong or lanceolate-oblong to oblong-elliptic or ovate-oblong, short-attenuate at base above wholly fused sheath, obtuse to broadly rounded/retuse at apex, rather flat but slightly plicate, mid-vein rather obscure above and under, somewhat twisted, very stiff and thick, rather matte, somewhat glaucous green, young leaves with pale yellow-green tips and yellowish green towards base; margins obscurely or very narrowly cartilaginous, glabrous. *Flowers* 5–10(–15); perianth tube entire, exceeding the cataphyll by 2–8cm, 2.5–4mm

wide, yellowish white often ±suffused pale purplish lilac; limb infundibular, segments 3.5–6(–6.5)cm long, differing by 2–9mm within a flower, 0.7–1.4(–1.7)cm wide, narrowly oblong (to narrowly oblanceolate-oblong), with low blunt keels on the back, subobtuse to broadly rounded (rarely retuse) at apex, often somewhat cucullate, in texture rather thin and delicate almost translucent, palest shimmering lilac to purplish lilac, paler almost white in young flowers and later especially outside on keels, not tessellated, 11–19 densely parallel rather distinct veins; filament channels usually densely pubescent. *Stamens* c.⅓–½ as long as perianth segments, outer 1.5–2.2cm, inner 1.6–2.5cm, the two series sometimes subequal in length, inserted at subequal level in throat; filaments whitish, often lilac in upper part, slightly swollen base buff yellow; anthers versatile, occasionally twisted, ½ to equalling filaments, (7–)8–10 × 1.2–1.4mm, Naples yellow to straw yellow, thecae narrow with a distinct hyaline median wall; pollen pale yellow. *Styles* equalling to somewhat overtopping stamens, white rarely purplish apically, thickened and ±hooked to curved at apex, stigmas not or shortly decurrent, 0.5–2mm. *Capsules* shortly above ground level on projecting stem, 2.3–4 × 1.2–1.6mm, ellipsoid, short-rostrate; seeds not known. Flowering without leaves (September–)October–November; leaves and fruits March–May.
Chromosome number: 2n = 54.

Similar species. The leaves are often quite impressive (Fig. 2F), in size only equalled or exceeded by those of *C. dolichantherum* but more glaucous, and thicker, almost coriaceous as in *C. balansae* Planchon or even surpassing that species. The tunics are thinner, less firm and tough than in both *C. cilicicum* and *C. dolichantherum,* and of course far removed from *C. balansae,* remarkable in its very thick and fibrous as well as extremely long tunics. Distinctive features of *C. imperatoris-friderici* are the thin, ±lilac-shimmering almost pearly texture of the perianth, and the straw-yellow anthers (Fig. 2E).

Corms and vegetative reproduction. C. imperatoris-friderici has king-size ('emperor-size'!) corms, in fact the largest known in the genus: giants of 8cm diam. are not unusual (Fig. 2F). Shoots are sometimes developed from 'reserve' buds.

Distribution and habitat. Endemic to S Turkey (Isaurian Taurus) (Fig. 3). Rocky ground in oak scrub and macchie, gullies in *Pinus brutia* forest; generally in deep soil on limestone; 30–1650m. East Mediterranean element.

Additional specimens. TURKEY. C4 Içel: 24km from Anamur to Ermenek, meadow fragment along gully in *Pinus brutia* forest, 500m, 30 iv 1987, *K. Persson* 453* (GB); *ibid.*, 25 x 1988, *K. Persson* (GB); 40km from Anamur to Ermenek, on limestone, 1600–1650m, 4 iv 1988, *Zetterlund* 88-4* (GB); 20km from Gülnar to Silifke, limestone slope, in deep earth under scrub, 1100m, 24 iv 1987, *K. Persson* 442* (GB); Liman Castle peninsula, 4km SW of Taşucu, rocky costal strip, limestone and terra rossa, thickets of evergreen *Quercus* maquis, in rock crevices and scree, 35m, 27 xi 1967, *Watson* et al. 3908 (K); *ibid.*, 26 iv 1987, *K. Persson* 445* (E, GB).

11. **Colchicum balansae** Planchon, Ann. Sci. Nat. sér. 4, 4: 145 (1855). Ill.: **Figs 4F, 5C–E;** Mathew & Baytop, 1984: Fig. 67.
Type: [Turkey C5 Içel] Région sous-alpine du Taurus au nord du défilé des Portes Ciliciennes, ix 1855, *Balansa* (lecto. P [designated here]; iso. G, K).
Syn.: *C. candidum* Schott & Kotschy ex Boiss., Fl. Or. 5: 159 (1882). Type: [Turkey C5 Içel] Bulgar Dagh, in monte Zyftlik solo argilloso in umbra *Juniperi foetidissimae*, 5000ped, 24 viii 1853, *Kotschy* 91[a] (holo. G-Boiss; iso. G, GOET, LE, M, P, S, UPS, WU).

[*C. laetum* sensu Baker, Journ. Linn. Soc., Bot. 17: 429 (1879) p. p., non Steven (1829).]

[*C. speciosum* sensu Stefanov, Monogr. Colchicum: 80 (1926) p. p., non Steven (1829).]

Description of Turkish and East Aegean plants. Corm broadly ovoid to ovoid-globose, 4–5 × 3–4cm, often with long hypopodium; tunics ±coriaceous (inner sometimes subcoriaceous), strongly fibrous (finely ribbed outside, thickly felted on the inside), dark brown to blackish brown (inner often deep red-brown), produced into a very long neck at least 20cm but frequently up to 50cm long or more, often rather narrow but sometimes up to c.2cm wide. *Cataphyll* yellowish white, sometimes greenish yellow in upper part, as long as tunic neck, fleshy. *Leaves* 3–4, hysteranthous, crowded at ground level or slightly above, 15–30 × (2–)3–6(–9.5)cm, suberect to (erecto-)patent, lanceolate-oblong to oblong or oblong-elliptic (inner ones and those of juvenile plants lanceolate-linear to linear-lanceolate), subobtuse to obtuse, flattish, not or shallowly plicate, with a sunken, rather distinct mid-vein, slightly keeled at least when young, slightly undulate-twisted, thick (thinner, with more prominent veins, in juvenile plants), rather matte glaucous green (greener in juvenile plants), margins narrowly but distinctly cartilaginous, glabrous. *Flowers* 3–6(–11); perianth tube entire, extremely long, exceeding the cataphyll by c.2–6(–9)cm, 2–4mm wide, whitish; limb infundibular, segments of limb connate for 1–8mm at base, (3.5–)4–7cm long, differing by up to 10mm in length within each flower, (0.4–)0.5–1.3(–1.7)cm wide, linear to narrowly elliptic-oblong or more seldom narrowly oblanceolate-oblong, subacute to obtuse, whitish or palest purplish lilac, sometimes obscurely tessellated in pale purplish violet (shades of HCC 34/35 'Bishops Violet/Amethyst Violet'); filament channels shallow, glabrous. *Stamens* ⅓–½ as long as perianth limb, outer 1.4–2.5cm, inner 1.6–3cm, at least outer series inserted in perianth throat below connation of segments; filaments white with the yellowish nectariferous part not basalmost but a little (1–3mm) way up; anthers versatile, sometimes curved, (½–)slightly shorter or longer than filaments, 8–16 × 0.8–1.2mm, yellow, thecae with a distinct hyaline median wall; pollen yellow. *Styles* mostly distinctly overtopping stamens, white or sometimes purplish in uppermost part, thickened and ±curved at apex, stigmas decurrent for 1.5–4mm. *Capsules* ±at ground level, 2.5–4 × 1–2cm, oblong-ellipsoid to oblong-ovoid, short-rostrate, not or obscurely

brown-dotted; seeds numerous, ±globose or somewhat flattened laterally, c.3.5–5mm diam., red-brown to brown, raphe region swollen to a yellowish, low to rather thick appendage, soon ±degenerating and sticky from a sugary exudate, in dry seeds ±rugose. Flowering without leaves (late August–)September–October; leaves and fruits (late March–)April–May(–June).

Chromosome number: 2n = 108. One record of 2n = 54 has been made (** in locality list). As these plants (probably from one clone) are completely sterile, having e.g. thin, empty anthers, and also exhibit other abnormal features and monstrosities beside being much smaller than normal plants (e.g. more narrowly ovoid corms, linear-lanceolate leaves), they are probably an example of the unusual phenomenon of haploidy. Also, on account of their pale flowers, long anthers, very long and fibrous tunic necks and/or long hypopodia, there is no doubt that they really belong to this species.

C. balansae is remarkable for the extreme depth at which the corms occur: they are often described as 'inextricable' by plant collectors on herbarium labels etc. The very long tunic necks are often rather narrow but tough on account of their thick fibrous texture. The rather unique length of the flower tube and styles are indicative of the very long way that pollen tubes have to grow in order for the ovules to be fertilized (sometimes more than 50cm!).

Similar species. On account of the characteristic texture and length of the tunics, in combination with the pale flowers and long anthers (Fig. 4F), or thick glaucous leaves (Fig. 5C), respectively, it is difficult to mistake this species for anything else, but see comments under *C. dolichantherum* and *C. imperatoris-friderici*.

Corms and vegetative reproduction. In nature, at least in Turkey, large stands of adult plants of *C. balansae* are rarely seen. In unfavourable conditions (?) the species commonly reproduces vegetatively, in a manner similar to many tulips. The corms formed from renewal and reserve buds under these circumstances are small, with proportionally very long and thin vertical to ±horizontal hypopodia acting as soboles and terminated by small knobs (cormlets) containing the shoot buds. The cormlets will be severed from the original corm sooner or later through the disintegration of the 'soboles' and will usually continue to multiply as before. Only one leaf is developing from each of these cormlets, rather similar in morphology to that of juvenile seed plants and so divergent from adult leaves as to be difficult to refer to the same species (Fig. 5E). Such leaves are small (c.10–15 × 0.4–1cm), narrowly lanceolate-linear, long-tapering towards apex, green (not glaucous), rather thin and with distinct veins. As in tulips, large areas can be covered by these one-leaved plants (Fig. 5D), and quite often only such non-flowering plants are found in a population, no mature plants. In *Crocus sativus* (Negbi *et al.*, 1989) vegetative reproduction was affected by planting depth in an artificial study of developmental processes. Shallow placement of the corms had a strong effect on the number of daughter corms produced per planted corm. Explanations provided included the effects of fluctuating

temperatures on the induction of flowering shoots, or damage inflicted on the renewal buds by unfavourable environmental conditions closer to the surface of the ground. Perhaps similar explanations are applicable in the case of *C. balansae*: disturbances in the ground may have resulted in more shallow situations of the corms resulting in enhanced vegetative reproduction, or unfavourable conditions have more directly an influence on this behaviour. The fact that *C. balansae* has a high chromosome number (dodekaploid) must also be taken into consideration: high polyploids often have a a disturbed sexual reproduction and tend to reproduce vegetatively. A curious deviation from the described pattern is apparent in the Greek Poros population (also dodekaploid), at least according to plants in cultivation (the locality has not been visited by the present author). Here no sign of vegetative reproduction has been noted. Conditions in Attica are unknown.

Distribution and habitat. S & SW Turkey, E Aegean Islands north to Samos (Fig. 3), Greece (Attica, Poros). Stony clayey slopes, meadows, among *Juniperus foetidisssima*, oak scrub, pine forest; on limestone, schist; 50–1700(–2000)m. East Mediterranean element (in Turkey West Anatolian & Taurus districts).

As mentioned above under *C. dolichantherum*, *C. balansae* is stated to occur in Forêt de Froulok, northwestern Syria close to the Turkish border (coll. Pabot), as well as in Amanus and Jebel Aqra (Mouterde, 1966). I have not seen material of *C. balansae* east of Cilicia, so in view of Mouterde's description, e.g. 'flowers white or of a very pale pink', the plants identified as *C. balansae* are as likely belonging to *C. dolichantherum*.

In the East Aegean and Greece *C. balansae* is generally found at low altitudes (often near sea level), mainly flowering in October. It was first collected on Poros by Melvyn Jope in 1984 (plants from this collection are in cultivation at Kew and Göteborg). Herbarium sheets with material collected in Attica are at ATHU (Herb. *Orphanides*, 'legit in Pentelicon 1850') and WU (leg. *Guiol* 1928 & 1929 sub *C. Frossii sp. n.*, 'cultum in horto D^{ris} F. Lemperg in Hatzendorf, Stiria orient., 1930 & 1931'). The distribution pattern of *C. balansae*, with localities in SW Anatolia, the East Aegean area and a few localities in the central part of eastern mainland Greece, has also been observed in a small number of other species, among colchicums *C. macrophyllum*, though this exhibits different ecological preferences than *C. balansae* and has also spread further along the former land-bridge SW Anatolia–SE Aegean–Karpathos–Crete, namely, to the latter island (see below). Other examples of species occurring east, west and often also south of the Aegean sea but missing in all, or all except the northernmost of the Cyklades (the so-called 'Kykladenfenster', Rechinger, 1951) are *Trifolium clypeatum* (Strid & Kit Tan, 1996), *Trigonella cariensis* (Carlström, 1987), and members of the *Inula candida* group (Rechinger, 1951).

Additional specimens. TURKEY. C1 Aydın: 5km W of Davutlar, 13 iv 1972, *Runemark & Wendelbo* 9* (GB). Muğla: Bodrum area, NW of Türkbükü, schist, 100m, 4 v 1983, *Runemark** (GB); 14km from Datça to Knidos, 35m, 2 x 1976, *T. Baytop & Leep* ISTE 36236 (ISTE); Marmaris to Datça, 14km from Datça, 100m, 9 xi 1984, *T. Baytop* ISTE 55081 (ISTE); *ibid.*,

57km from Marmaris, 110m, 24 iii 1981, *T. Baytop & Atilla* ISTE 46123 (ISTE). C2 Muğla: Marmaris to Datça, 27km from Marmaris, 100m, 3 v 1980, *A. & T. Baytop* ISTE 44120 (ISTE); Muğla–Sakar geçidi, Kızılağaç, 3 vi 1979, *Sütlüpınar* ISTE 43571 (ISTE); Sakar geçidi, 670m, *A. & T. Baytop* ISTE 39077 (ISTE); *ibid.*, 650m, 21 iv 1978, *A. & T. Baytop* ISTE 39012 (ISTE); Muğla to Marmaris, Akçapınar 33km from Muğla, 10 x 1975, *T. Baytop, Leep & Sütlüpinar* ISTE 33909 (ISTE); Near Akçapınar, 100m, 25 iii 1975, *Brickell & Mathew* 8299 (K); Bayırköy to Bozburun, *Pinus* forest, 300m, 1 x 1976, *T. Baytop & Leep* ISTE 36230 (ISTE); 21km from Bozburun to Marmaris, 250m, 25 iii 1975, *T. Baytop, Mathew & Brickell* ISTE 31363 (ISTE); Marmaris to Bozburun, 24 x 1983, *Sütlüpınar* et al. ISTE 52487 (ISTE); Fethiye to Köyceğiz, under *Pinus* trees, 50m, 4 x 1975, *T. Baytop & Leep* ISTE 33907 (ISTE). Burdur: 10km from Sögüt to Fethiye, calcareous slope, 1400m, 18 iv 1991, *K. Persson obs.* Antalya: Kaş, 27 iii 1975, *T. Baytop, Brickell & Mathew* ISTE 31374 (ISTE); Kaş to Demre, 15km from Demre, 550m, 26 iv 1977, *T. Baytop* ISTE 36677 (ISTE); 20km from Kasaba to Elmalı, *Quercus-Pinus* forest, 1050m, 22 iv 1987, *K. Persson* (GB); Elmalu, dans les ravins, 26 v 1860, *Bourgeau* 640 (G-Boiss, P); Elmalı, Ak Dağ, Yeşilgöl road, 1600m, 29 ix 1976, *T. Baytop & Leep* ISTE 36225 (ISTE); *ibid.*, 1700m, 28 v 1982, *Sütlüpınar* ISTE 48862 (ISTE). C3 Antalya: 45km from Gencek to Aydınkent, limestone slopes under *Juniperus excelsa*, meadows, roadsides, 1350m, 17 iv 1991, *K. Persson* 506* (GB); Manavgat to Akseki, near Murtici, 880m, 27 iv 1977, *T. Baytop* ISTE 36680 (ISTE); 20km from Akseki to Cevizli, dry stony sloping meadows, 1230m, 28 iv 1987, *K. Persson* (GB). C4 Içel: 9km from Gülnar to Aydıncık, 8 v 1977, *Leep & Sütlüpınar* ISTE 36696 (ISTE); *ibid.*, stony clayey slope in open pine forest, 800m, 24 iv 1987, *K. Persson* (GB); 14km from Gülnar to Silifke, stony slope with pines, 1275m, 24 iv 1987, *K. Persson obs.*; Above Mut towards Gülnar, stony turf in depression on limestone slope, 800m, 2 v 1985, *J. & J. Archibald* 6099 *obs.*; 2km from Uzuncaburç (village) to Silifke, *Quercus coccifera* scrub, 1200m, 26 iv 1987, *K. Persson* (GB). C5 Içel: 2km from Fındıkpınar to Kuzucubelen, pine forest, moist slope, 1150m, 25 iv 1987, *K. Persson* (GB); Mersin to Aslanköy, above Yeniköy, edges of gully on limestone slope, 1000m, 3 v 1985, *J. & J. Archibald* 6134** (GB); Gülek Boğazı, 2000m, 21 ix 1975, *T. Baytop* ISTE 33848 (ISTE). Içel/Adana: Bei Fundukbunar, Cilicien, 1000m; bei Solakly in Cappadocien, 1400m; obere Waldregion, Sept., *Siehe* Fl. orient. 90 (JE, LE).

For distribution on East Aegean Islands: see Fig. 3, and Carlström, 1987 (map 1325); add Samos, sea level, autumn 1989, *Hooper* (colour slide sent to the author by Brian Mathew).

12. **Colchicum macrophyllum** B.L. Burtt, Kew Bull. 5: 433 (1951). Ill.: **Fig. 5F**; Mathew & Baytop, 1984: Fig. 76.

Type: [Greece] Crete, sine loc., *H.C. Baker*, cult. *E.A. Bowles* (holo. K).

Syn.: *C. latifolium* var. *longistylum* Pampanini, Nuovo Gior. Bot. Ital. ser. 2, 33: 24 (1926). Type: [Greece, Dodekanisos] Castelrosso [=Kastellorizo], ix 1922, *Desio* (holo. FI).

[*C. latifolium* auct., non Sibth. & Sm. (1823).]

Description of Turkish and East Aegean plants (for Crete, see Brickell, 1980: 24): *Corm* ovoid to subglobose, 4–6(–7.5) × 3.5–6cm; tunics ±coriaceous, dull brown to dark brown (to blackish brown), often in many layers, produced into a robust, somewhat fine-fibrous neck c.9–20(–25)cm long, wholly covering or up to a few cm shorter than cataphyll. *Cataphyll* yellowish white to white, often greenish or purplish flammeous in upper part, c.9–22(–25)cm long above corm, stout. *Leaves* 3–4, hysteranthous, somewhat spread on a stem projecting from c.5cm to as much as 20 or

30cm above ground, 25–35 × 7.5–14cm, erecto-patent to erecto-patent-arcuate, oblong-elliptic to elliptic-ovate or ovate (inner ones often broadly lanceolate), subacute to obtuse, sometimes bluntly acuminate, strongly plicate, sometimes slightly twisted, bright glossy green, margins indistinctly or very narrowly cartilaginous, glabrous. *Flowers* 1–4; perianth tube entire, exceeding the cataphyll by 2.5–8.5cm, stout (up to 6mm wide), whitish occasionally streaked in purplish lilac; limb straight-sided, widely infundibular, segments patulous to recurved in full sun, 4.5–6(–7)cm long, outer and inner subequal or only slightly differing in length (to c.5mm), (1–)1.5–2.5cm wide, narrowly oblong-elliptic to elliptic, sometimes lanceolate, often ± long-tapering and slightly acuminate with an acute to obtuse tip, sometimes slightly twisted in uppermost part, with narrow keels on the back at least basally, ground colour nearly white or very pale lilac with rather faintly to distinctly marked tessellations in purplish lilac to deep violet-purple or purplish violet (HCC 733 'Violet Purple' or 34/35 'Bishop's Violet/Amethyst Violet'), paler on keels and with a mostly short whitish median stripe on upper side; veins numerous, outer ones often divergent; filament channels wide, glabrous to puberulous. *Stamens* ½–¾(–⅘) of perianth limb in length, outer 2.5–3.5(–4)cm, inner 2.7–4 (–4.5)cm, the two series inserted at two levels, 5–10mm apart; filaments rather narrow, mostly somewhat curved (i.e. diverging inwards/upwards from ± the patulous tepals), white, hardly widened base pale yellow to yellow; anthers versatile, often curved, 7–13 × 1–1.5(–2)mm, yellow- or purple-brown to greyish purple or deep purple, without a hyaline median wall; pollen usually greyish yellow, occasionally greenish or different shades of purple. *Styles* overtopping stamens, reaching tepal tips or at least ¼ from these, slender, white but often purplish apically, straight or barely hooked at scarcely thickened apex, stigmatic region decurrent for (1–)1.5–2.5mm. *Capsules* often much elevated from ground on prolonged stem, 4–5 × 1.5–2.5cm, narrowly ellipsoid to ovoid, pointed; seeds numerous, ± globose, c.3–4mm diam., dark brown, with a rather large, yellowish white appendage around raphe at least near micropyle. Flowering without leaves late September–early November; leaves and fruits (March–)April–May.
Chromosome number: 2n = 54.

Similar species. The flowers of *C. macrophyllum* are reminiscent in general type of those in *C. variegatum* L. In both, the perianth limb is ± tessellated in much the same colour shades, and ± rotate, with mostly narrowly elliptic or lanceolate segments often long-tapering, slightly acuminate and somewhat twisted in distal part. Stamens and styles are narrow and long in both (in *C. variegatum* the stamens are proportionally even longer, usually from ⅘ to nearly equal to segment length), and in both the stamens tend to be directed vertically, away from the tepals, on account of the inward-curving filaments (more arching than in most other species of the genus). The anthers are also frequently curved, and fuscous in both species. In fruit *C. macrophyllum* is unmistakable on account of the elliptic to ovate, almost corrugated leaves spread along a high stem (Fig. 5F).

Corms and vegetative reproduction. Reserve buds sometimes develop resulting in some slight lobation of the corms.

Distribution and habitat. SW Turkey, East Aegean Islands from Kastellorizo north to Kos (Fig. 6), Crete, S Evvia; rocky slopes, gorges, cliffs by the sea, stony soil in *Pinus brutia* or *Liquidambar* woods, macchie; often in ±N-exposed or shady situations; on limestone or serpentine; near sea level–600(–1400)m. East Mediterranean element.

In Turkey *C. macrophyllum* is confined to the outermost parts of SW Anatolia, a region indented by gulfs and promontories and characterized by an Aegean vegetation including *Tulipa saxatilis*, *Allium bourgeaui*, *Biarum micaceum*, *Erysimum rhodium*, *Teucrium microphyllum*, *Achillea cretica*, non-weedy *Centaurea cyanus*, etc. The relict *Liquidambar orientalis* also occurs here.

The distribution of *C. macrophyllum* along the southern band of islands in the Aegean from Crete to Rodhos and also reaching SW Turkey, is similar to e.g., *Tulipa saxatilis*, *Linum arboreum* and *Aster creticus*, indicating the extension of the former land-bridge (Carlström, 1986). The more unusual link to eastern Greece (in this case Evvia) is reminiscent of the distributions of *Trifolium clypeatum* (W Anatolia, East Aegean islands, Andros and NE Peloponnese; Strid & Kit Tan, 1997) and *Ebenus sibthorpii* (Rodhos, SE Greece; Carlström, 1987). Both distributional links are shown by *Orchis sancta* (SW Anatolia to Israel, Cyprus, East Aegean islands, Saria–Kasos-Crete, and Evvia; Turland *et al.*, 1993; Künkele & Paysan, 1991).

Additional specimens: C1 Muğla: Datça peninsula, Knidos, cliffs by the sea, 20m, 19 iv 1972, *Runemark & Wendelbo* 144* (GB); 16km from Knidos to Datça, 350m, 2 x 1976, *T. Baytop & Leep* ISTE 36235; 20km from Datça to Marmaris, *Liquidambar* forest, serpentine stony soil in gully, 100m, 22 iv 1991, *K. Persson obs.* C2 Muğla: Bozburun peninsula, Taşlica, 200–250m, 1 x 1976, *T. Baytop & Leep* ISTE 36231 (ISTE); Bozburun, 21 iv 1972, *Runemark & Wendelbo* cult. 30* (GB); Pass NE of Bozburun, 1400m, 21 iv 1991, *K. Persson obs.* (colour slide); Kuma T., 4km SW of Bayirköy, in *Pinus brutia* wood, 600m, 4 v 1984, *Carlström* 11855b (LD); Bayirköy, limestone, 400m, 1 v 1984, *Carlström* 11484 (LD); *ibid.*, 2 v 1980, *T. Baytop* ISTE 44248 (ISTE); Marmaris to Bozburun, rocky limestone slopes, 200m, 15 iv 1965, *Davis* 41152 (GB); Marmaris, Içmeler, 6 v 1983, *A. & T. Baytop* ISTE 50246 (ISTE); *ibid.*, Eren Dağı, 3km S of Hisarönü, limestone, 600m, 19 v 1983, *Carlström* 10765 (LD); Yildiz Ad., 6km S of Marmaris, serpentine, macchie, 6 v 1984, *Carlström* 12076b (LD).

For distribution on East Aegean Islands: see Fig. 6. See also Greuter, 1979: 599; and Carlström, 1987: map 1328; add Kos ('Cos'), 1836, *Aucher-Eloy* 412 p. p. (G); *ibid.*, 1837, *Aucher-Eloy* 2160 p. p. (P).

For distribution on Crete: see Turland *et al.*, 1993: map 1628. From S Evvia there are two collections from one site (not reported before): Eparchia Karistia, 1.5km NW of Platanistos, steep NE-facing side of narrow shady ravine, under *Platanus*, *Erica arborea*, *Myrtus*, and *Quercus coccifera*, schist, 250m, 11 iv 1971, *Snogerup & Gustafsson* 42266* (LD, GB); 5 v 1994, *K. Persson* 551* (GB).

KEY TO SPECIES

Flowering material

1a Flowers distinctly tessellated ——— 2
1b Flowers not or obscurely tessellated ——— 4

2a Flowers rotate; anthers fuscous ——— **12. C. macrophyllum**

2b Flowers funnel-shaped or narrowly campanulate; anthers yellow ——— 3

3a Stamens long (more than ½ to ⅘ of perianth limb); anthers thin, mobile, ⅕–⅓ as long as filaments; styles filiform, straight or very slightly bent at tip, stigmas punctiform or decurrent for not more than 1mm ——— **7. C. cilicicum**

3b Stamens ⅓–½ as long as perianth limb; anthers thick, ±fixed, ½–⅔ as long as filaments; styles stout, swollen and curved at apex, stigmas decurrent for 2.5–5mm ——— **8. C. davisii**

4a Anthers fuscous ——— **6. C. speciosum**

4b Anthers yellow ——— 5

5a Cataphyll crimson-purple; corm ±irregular in shape; filament channels surrounded by broad, toothed lamellae (Fig. 1D) ——— **5. C. sanguicolle**

5b Cataphyll whitish or only faintly flushed purple in apical part; corm symmetrically ovoid–globose; filament channels with no or narrow untoothed lamellae ——— 6

6a Perianth segments rather deep rose-purple to violet-purple, usually elliptic to oblanceolate or obovate, mostly more (often much more) than 1.2cm wide 7

6b Perianth segments pale (nearly white or pale pinkish purple to pinkish lilac), ±oblong, usually less than 1.2cm wide ——— 8

7a Perianth limb ±widely funnel-shaped (segments often reflexed), distinctly sharp-keeled at least in basal part; filaments and styles filiform, whitish; anthers very mobile, ⅕–⅓ as long as filaments, 1–1.2mm wide ——— **7. C. cilicicum**

7b Perianth limb ±campanulate without distinct keels; filaments and styles stout and stiff, yellowish or greenish; anthers more fixed, ⅓–½ as long as filaments, 1.5–2mm wide ——— **6. C. speciosum**

8a Tunic necks more than 20cm long, coriaceous, strongly fibrous (thickly felted inside) ——— **11. C. balansae**

8b Tunic necks less than 15cm long, membranous to subcoriaceous, not or thinly fibrous ——— 9

9a Anthers usually less than half as long as filaments ——— 10

9b Anthers at least half as long as filaments ——— 11

10a Inner tunics membranous, glossy yellowish brown; flowers 1–2; filament channels glabrous or nearly so ——— **2. C. paschei**

10b Inner tunics submembranous, light brown to reddish brown; flowers 3–6(–13); filament channels usually puberulous at least on margins ——— **3. C. decaisnei**

11a Tunics tough; anthers equalling to distinctly longer than filaments ——— ***9. C. dolichantherum***

11b Tunics mostly ±fragile (membranous to papery); anthers shorter than to subequalling filaments ——— 12

12a Perianth segments dense and opaque, white to yellowish white, occasionally tinged pale purplish in upper part; anthers yellow ——— **1. C. kotschyi**

12b Perianth segments thin and delicate, pale lilac to purplish lilac ——— 13

13a Flowers 5–10(–15); anthers straw-yellow ——— **10. C. imperatoris-friderici**

13b Flowers 1–3; anthers yellow to golden-yellow ——— **4. C. inundatum**

Material in leaf and fruit

1a Leaves matte glaucous green, very thick ——— 2

1b Leaves yellowish to mid-green or somewhat dark green, not particularly thick ——— 3

2a Tunic necks more than 20cm long, coriaceous, strongly fibrous (thickly felted inside) ——— **11. C. balansae**

2b Tunic necks less than 15cm long, rather fragile, not thickly fibrous ——— **10. C. imperatoris-friderici**

3a Leaves crowded near ground, ±erecto-patent-arcuate to procumbent, lanceolate-linear to narrowly oblong, keeled or channelled at least along lower half ——— 4

3b Leaves spread on stem or crowded at some distance above ground, suberect to erecto-patent (more rarely erecto-patent-arcuate but then spread on stem, not crowded near ground), oblong to oblong-elliptic or elliptic-ovate to ovate, not or only basally shallowly channelled ——— 6

4a Leaves 3(–4), narrowly oblong, hardly undulate-twisted, mid-green (often glossy), not distinctly grooved above, glabrous; tunics membranous, glossy yellow-brown to mid-brown; plant of mountain steppes ——— **2. C. paschei**

4b Leaves ±lanceolate, ±undulate-twisted, mid-green to glaucescent, distinctly grooved above along mid-vein, margins often scabrous to short-ciliate ——— 5

5a Leaves 4–12, glabrous dorsally; tunics membranous to submembranous, light brown, neck stout, c.1.5–2.5cm thick; plant of alluvial plains **4. C. inundatum**

5b Leaves 3–5(–6), sometimes dorsally pubescent; tunics submembranous to subcoriaceous, light brown or usually reddish brown to dark brown, neck ±slender, usually c.0.5–1.5cm thick; plant of woods and macchie ——— **3. C. decaisnei**

6a Corms flattened, narrowly ovoid to oblong-ovoid, sometimes asymmetric; leaves not or only slightly plicate ——— 7
6b Corms thick, rounded; leaves distinctly pleated ——— 10

7a Cataphyll crimson-purple; leaves 3(–4), often flaccid in upper part, rather glossy pale green often flushed brownish purple, sheaths split ——— **5. C. sanguicolle**
7b Cataphyll yellowish white to greenish yellow; leaves stiff ——— 8

8a Leaves 3–5 (most commonly 4), spread on tall stem, mid-to somewhat dark green, blade with attenuate base above partly open sheath; tunics submembranous to subcoriaceous, firm, red-brown to mid-brown; capsules usually long-rostrate ——— **6. C. speciosum**
8b Leaves crowded, glossy yellowish green, blade abruptly converging at base above entire sheath; capsules short-pointed or short-rostrate ——— 9

9a Leaves 3–4(–6), c.2–9cm above ground, rarely more than 22cm long, flattish but often undulate-twisted; corms bisymmetric, tunics membranous to subcoriaceous, at least inner ones ±lustrous red-brown ——— **1. C. kotschyi**
9b Leaves 3, c.4–6cm above ground, mostly more than 20cm long (to 35cm), shallowly channelled at base, only slightly twisted; corms often irregular in shape, tunics ±membranous, loose-fitting, often ±split, rather matte light-brown to brown ——— **8. C. davisii**

10a Tunics tough, somewhat fibrous internally; leaves bright glossy green, strongly pleated ——— 11
10b Tunics ±papery, frequently split and torn, mostly with rather glossy insides; leaves 3–4(–5), somewhat matte green, moderately pleated, oblong-lanceolate to narrowly elliptic-ovate (to narrowly oblong-elliptic), 17–30(–40) × 4–7(–10)cm ——— **7. C. cilicicum**

11a Tunics subcoriaceous, somewhat rufous brown to mid-brown; leaves 4–5(–6), mostly ±oblong, 25–50 (or more) × 5–10cm ——— **9. C. dolichantherum**
11b Tunics coriaceous, dull brown to blackish brown; leaves 3–4, elliptic to ovate, 25–35 × 7.5–14cm ——— **12. C. macrophyllum**

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