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The flora and vegetation of Bakırlı Dağı (Western Taurus Mts, Turkey), including annotations on critical taxa of the Taurus range

Abstract

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A monograph of Bakırlı Dağı, the northern summit range of the eastern Beydağları in the Western Taurus Mts, Turkey, is given. It includes an annotated floristic catalogue of 539 taxa and a survey of the high mountain vegetation. For eight taxa considerable distribution range extensions are reported. Seventeen taxa are new records for the Flora of Turkey grid C3. Distribution maps are presented for *Helichrysum plicatum* subsp. *isauricum* and *Poa akmanii*. *Minuartia dianthifolia* s.l. is revised; its subsp. *cataonica* and subsp. *kurdica* are sunk in synonymy of the 'type' subspecies. Two taxa, *M. dianthifolia* var. *longipetala* and *M.* ×*antalyensis* are described as new to science. The diagnosis of the recently described *Arabis lycia* is amended for carpological characters. The flora in general is characterised as rich in endemics (28.2 %) of chiefly E Mediterranean (montane) origin and enhanced proportions of E Mediterranean and Irano-Anatolian chorotypes as mono- or biregionals, reflecting the position of the study area at the coastal face of the Taurus, which is situated at the intersection of Mediterranean and Irano-Turanian territories. In spite of increasing human impact by skiing and cattle-breeding, the zonation of the subalpine vegetation belts remained chiefly intact, whereas the oreal forests have been largely replaced by xerophytic secondary dwarf shrub communities. A total of 13 asylvatic plant communities (in phytosociological terms) are distinguished in altitudes between 1800-2547 m, each briefly treated in site-ecological and symmorphological respects and classified syntaxonomically. Due to a taxonomically necessary correction, the combination Aethionemo lycii-Laserpitietum petrophili subass. arabidetosum lyciae is made. A vegetation profile of Bakırlı Daği has been established, showing additionally the distribution of the different chorotypes within the communities along an altitudinal transect.

Introduction

Bakırlı Dağı (Turkish "Daği" = Mountain, in the following abbreviated by "D.") forms the northernmost and highest summit of the mountain chain steeply rising along the west shores of the Gulf of Antalya (Antalya Körfezi) and extending some 20 km inland. As a part of the Western Taurus (Batı Toroslar, Lycian Taurus), these mountains constitute the eastern portion of the Beydağları, a massif long-famed for its rich flora, with a high proportion of endemics (Davis 1971, Hartvig & Strid 1987, Quézel 1973, Quézel & al. 1970). In particular the coastal eastern

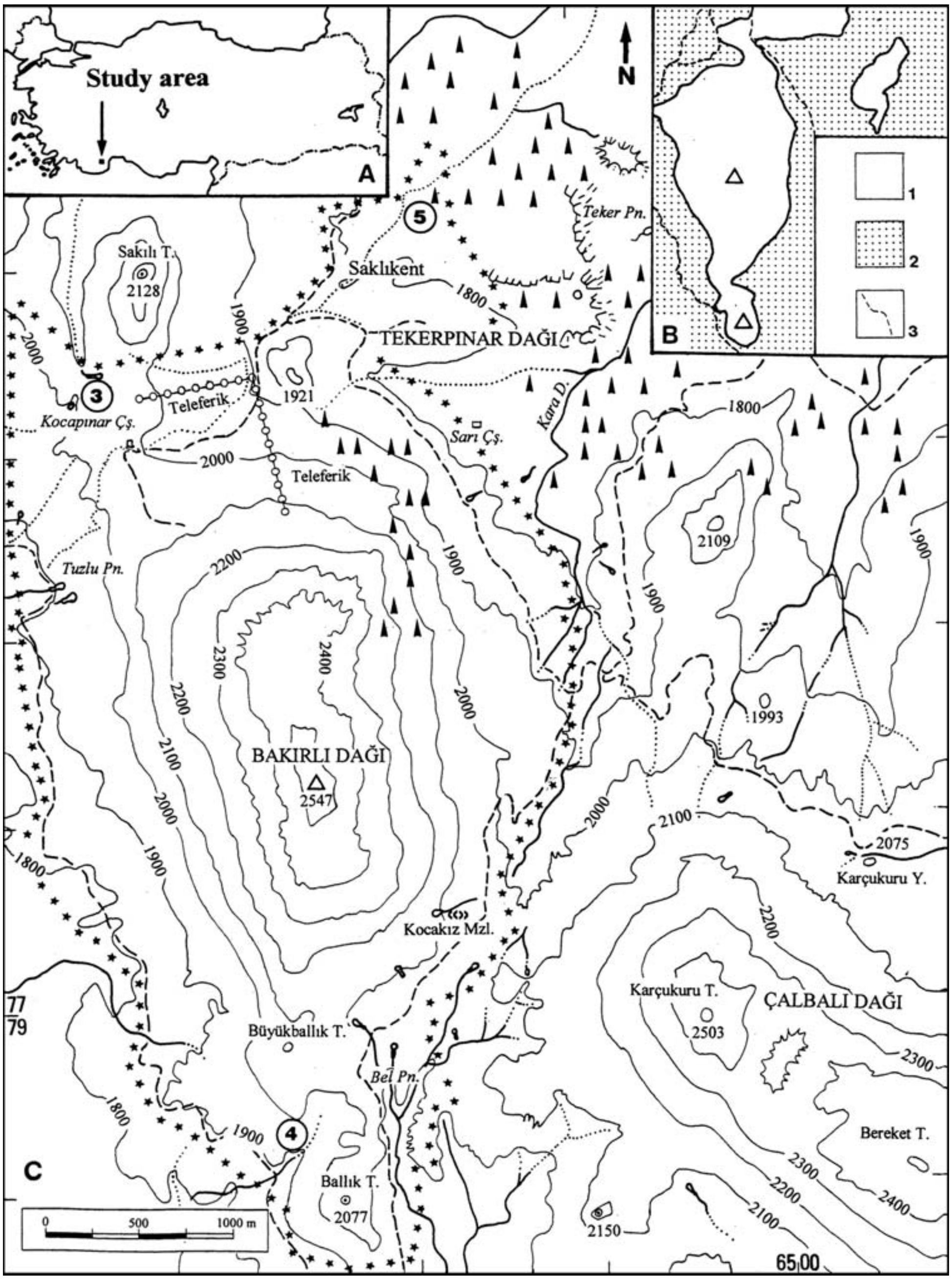

Fig. 1. Situation (A), geology (B) and topography (C) of the study area. – Abbreviations: Ç = Çeşme (fountain); Pn = Pınarı (spring); Mzl. = mezarliği (cemetery); T = Tepe (hill); Y = Yayla (summer pasture area). Circled numbers 3-5 refer to collecting sites, see the introduction to the annotated floristic catalogue. Delimitation of the closer study area indicated by star symbols, needle-leaved mountain forest by tree symbols. Geological map: 1: limestone; 2: ophiolite; 3: road (as in C). – Basis map: Harita Genel Komutanlığı 1995: Türkiye 1 : 25 000, series K-816, sheet Antalya 24-b 4, ed. 3, Harita Genel Komutanlığı, Ankara; geological map based on Karaman & Türker (1996).

Beydağları are outstanding in these respects, harbouring a great many narrow endemics such as *Asyneuma pulvinatum* P. H. Davis, *Carum rupicola* Hartvig & Strid, *Paronychia davisii* Chaudri and *Ricotia davisiana* B. L. Burtt.

Compared to the "classic" neighbouring peaks Tahtalı D., Teke D. and Çalbalı D. with a long botanising history, Bakırlı D. above the ski resort Saklıkent did not come earlier into the focus of interest than with the beginning of the last decade. Peter Davis and his co-workers concentrated on nearby Çalbalı D. proper in 1949 (Fig. 1; for itineraries, see Davis 1955). The highly successful trip of Per Hartvig and Arne Strid (with Güven Görk) in July 1984 yielded the first traceable gatherings from the slopes of Bakırlı D. (Hartvig & Strid 1987). In June 1992, the third author (GP) visited Saklıkent together with Peter Hein and Eckhard von Raab-Straube for one week for phytosociological field-work (Hein & al. 1998, Kürschner & al. 1998, Parolly 1995a). Bakırlı D. became the type locality of three associations and a number of subunits. Without then being aware of it, these authors made the first substantial floristic collections, comprising about 200 species. Some of the phytogeographically more important records were published later (Parolly 1995b), including a new species, *Arabis lycia* (Parolly & Hein 2000).

Seven years later, GP, with Markus Döring and Darko Tolimir, had the opportunity to continue his studies in the Taurus mountains and to revisit Bakırlı D. (e.g. Parolly & Nordt 2001). In the meantime, the TÜBITAK National Observatory had been constructed on the main ridge of the mountain; the supporting road cut into its slopes (Fig. 2) now greatly facilitates field-work. Independently, between April 1998 and September 1999 the first author (ÖE) made extensive studies on the mountain within the scope of his MSc thesis (see unpubl. sources, Eren 2000), entitled (in translation) "The flora and vegetation of Bakırlı Dağı (Antalya/Turkey)", prepared at the Akdeniz University Antalya under the supervision of Mustafa Gökçeoğlu (Eren & al. 2002). Besides the core collections made up by the Antalya and Berlin teams, only a few additional records are available, viz. c. 125 gatherings by Rodney M. Burton (Eynsford, Kent, U.K.) made on two day-trips in 1995 and 2000, 41 records made by Gertrud and Robert Ulrich (Tübingen) on short visits in 1995 and 1996, and 30 species named in a paper dealing with the flora of the transect Sarısu to Saklıkent by Düşen & Sümbül (2001).

One may be surprised to learn that there is neither a "Beydağları florula" nor the expected number of floristic lists of the particular oreal to subalpine summit areas. Even the "grey" literature (for references see Göktürk & Sümbül 2002) covers chiefly the flora of lower elevations of National Parks such as the Olimpos-Beydağları Milli Parkı and Termessos Milli Parkı. As far as high mountain vegetation studies in the same area are concerned, one still has to refer to Quézel (1973) and the phytosociological papers mentioned earlier.

The present paper puts together the information available to comprise an annotated inventory of 539 taxa and points out the phytogeographic position of Bakırlı D. It fills the local gap and lays at the same time a fundament for a future florula of the Western Taurus. Moreover, a detailed sketch of the vegetation is given, which can exemplify the composition and structure of the asylvatic oreal and subalpine vegetation of the Western Taurus. Although local, the inventory gains importance since Bakırlı D. is a perfect place for future monitoring the increasing impact on the flora and vegetation of skiing and of the new road and other construction activities related to the observatory. Already an invasion of ruderals and weedy species is clearly visible along the road. Although these species at present affect the (natural) plant communities only to a minor extent, there is an opportunity to survey further changes. R. M. Burton (in lit.) reports that it can also work the other way: *Verbascum pestalozzae,* taken as the character species of a cliff association, occurs on ground levelled to make a road with the observatory compound.

Study area

Situation and delimitation. – Bakırlı D. is among the most important peaks of Western Taurus. It is situated at 36°49'30"N, 30°20'00"E in Antalya province some 50 km WSW of the city centre. The ski resort Saklıkent (1800-1850 m) lies at the foot of the main summit (Bakır Tepe, 2547 m)

Fig. 2. View of the limestone cone of Bakırlı Daği with the observatory seen from the ophiolitic foothills. – Photograph by G. Parolly.

and is one of the few ski centres in Turkey. It allows skiing from November to April. The borders of the study area are indicated in Fig. 1; it includes the surroundings of Saklıkent and Bakırlı D. in total and thus a considerable portion of the oreal and the entire subalpine belt of that area.

Climate. – In spite of the observatory constructed on the summit, no meteorological data are available from the higher elevations of Bakırlı D. and the Taurus in general. A single 3-day measurement (Parolly 1995a) gives a first idea of the drastic day-night oscillation of the temperature. At a larger scale, García Lopez (2001, see here also for related studies working with the indices of Emberger, De Martonne & Thornwaite) provides an useful overview of the Mediterranean phytoclimates of Turkey based on the numeric diagnostic Allué-Andrade model. According to this method, Boreo-Mediterranean phytoclimatic subtypes may be indicated for the study area.

Geology. – Several geological studies cover Bakırlı D. and its surroundings (Brunn & al. 1971, Güldalı 1979, Hayward & Robertson 1982, Marcoux 1979, Özgül 1976, Şenel 1997a, b). The higher parts of Bakırlı D. are largely composed of Mesozoic sedimentary rocks. The rock is predominantly limestone, but at lower elevations ophiolitic outcrops cover substantial areas. In the course of the construction of the observatory, Karaman & al. (see unpubl. sources, 1996) did some geological surveying in the study area and mapped the distribution of sedimentary and metamorphic rocks (Fig. 1).

In this section of the western Taurids, the so-called Antalya nappes are exposed. On the basis of structural and stratigraphic features two subunits are distinguished in the study area proper (for further subunits see Şenel 1997a, b). A Middle Cambrian-Upper Cretaceous limestone unit (Tahtalıdağ nappe, Şenel 1997a) overlies an ophiolitic complex and makes up all of the summit region (Fig. 2). It consists of white, light cream to beige-coloured re-crystallised, cracky limestone, which is subjected to an intense mechanical weathering. Screes are found nearly everywhere on Bakırlı D., but predominate at its western part. The ophiolitic complex (Tekirova ophiolite nappe), moved in Upper Cretaceous-Paleocene times into its present position, forms parts of the lower ground around the compact limestone block of the mountain. It displays a sequence of light to dark grey, reddish, dark yellow and brown ultramafic rocks such as serpentinite, peridotite, gabbro, diabase and harzburgite, which after weathering leave smooth erosion forms. Although "Bakırlı D." means "Coppery Mountain" there is no hint of mining activities and the name may well refer to the metallic shine of some of the ultramafic rocks.

Material and methods

The taxonomic and nomenclatural basis adopted is a hybrid with "Flora of Turkey and the East Aegean Islands" (Davis 1965-1985, Davis & al. 1988, Güner & al. 2000) as the major reference. As far as available, the nomenclature of "Med-Checklist" (Greuter & al. 1984-89) has largely been taken into consideration. The first two volumes of "Flora hellenica" (Strid & Tan 1997, 2002) have guided us in a certain number of families, as did the floras of the neighbouring countries and large islands (Jahn & Schönfelder 1995, Meikle 1977, 1985, Mouterde 1966, 1970) and a great many monographs (e.g., Bolliger 1996, Carlström 1984, 1985, Tan & Yıldız 1988, Zohary & Heller 1984).

The floristic catalogue is mainly based on the authors' collections and the additional results of the field parties named in the introduction (for collecting dates, abbreviations of collectors and herbaria, see below). We have not seen any of the specimens of R. M. Burton. To save space, we have cited for all taxa only a selection of up to five collections to reflect their altitudinal and site ecological range of occurrences. However, single habitat indications should not be over-emphasised, because many of the collections of the Berlin group come from relevés sampling one community type. These relevés include many transgressive species from other formations and thus a single citation of a specimen without its context does not tell much about its habitat.

We have only indicated synonyms (mostly) not included in Davis & al. (1988), Güner & al. (2000) and Greuter & al. (1984-89), if we considered them to be significant for the Turkish reader at least. For convenience, the family concepts are in accordance with the "Flora of Turkey".

The phytogeographic elements were chiefly attributed according to the "Flora of Turkey" (l.c.), the "Conspectus florae orientalis" (Zohary & al. 1980, 1983, Heller & Heyn 1986-94), Hein & al. (1998), Kürschner (1982, 1984), Kürschner & al. (1998), Parolly (1995a), Jahn & Schönfelder (1995) and Zohary (1973).

For the phytosociological study of the vegetation units, we have followed the conventions of the Braun-Blanquet approach (Braun-Blanquet 1964), with the modifications introduced since that time (Dierschke 1994; see also Parolly 2003). We have applied a deductive syntaxonomy in the sense of Kopecky & Hejny (1978) in classifying communities without particular character species as basis communities, fragmentary communities or derivative communities of a superordinate unit. A total of some 180 relevés have been established between 1800 and 2547 m. The community tables have been condensed into a synoptic table (Table 1). The naming of some of the still unpublished communities is tentative and all are given without rank in order to prevent synnomenclatural problems. The syntaxonomic classification (Table 2) is adopted from Parolly (2004).

For selected communities chorotype and life form spectra are given. Their calculation follows Reichelt & Wilmanns (1973). The life form spectra are presented weighted, i.e. based on the mean percentage cover of the taxa within the communities. By contrast, chorotype spectra consider the species frequency in calculating an un-weighted group percentage.

1. Annotated floristic catalogue

1.1. Symbols and abbreviations used in the catalogue

Collectors, collection dates and herbaria

D: Markus Döring, with Gerald Parolly & Darko Tolimir: 10.-13.7.1999 [B; dupl. ISTE, herb. Parolly].

E: Özkan Eren: 1.4.1998-15.9.1999 [AKDU; dupl. B, GAZI, herb. Parolly].
H: Peter Hein, with Gerald Parolly & Eckhard von Raab-Straube: 18.6.-24.6.1992 [B, BSB-VO, herb. Hein (Berlin); dupl. ISTE, herb. Parolly, herb. Raab-Straube (Berlin)].
HS: Per Hartvig & Arne Strid, with Güven Görk: 18.7.1984 (no. 23659-23704) [C or herb. Strid; dupl. B, E, G, IZM, LD, RSA, UPA, WU].
OD: Olcay Dinç Düşen: 6/1995-9/1996 [AKDU]; cf. Düşen & Sümbül (2001).
P: Gerald Parolly, with Peter Hein & Eckhard von Raab-Straube: 18.6.-24.6.1992 (no. 92-..., A .... [B, BSB-VO; dupl. herb. Parolly, herb. Hein (Berlin), herb. Raab-Straube (Berlin)]); with Markus Döring & Darko Tolimir: 10.-13.7.1999 (no. 6492-6605 [B; dupl. ISTE, herb. Parolly]).
R: Eckhard von Raab-Straube, with Peter Hein & Gerald Parolly: 18.6.-24.6.1992 [B, BSB-VO; dupl. herb. Hein (Berlin), herb. Parolly, herb. Raab-Straube (Berlin)].
RB: Rodney Burton: 11.6.1995 (no. An. 1511-1528); 11.7.2000 (no. An. 2205-2310) [herb. Burton (Sparepenny Cottage, Eynsford, Kent, GB), herb. Eric Clement (Alverstoke, Gosport, Hants, GB)].
T: Darko Tolimir, with Markus Döring & Gerald Parolly: 10.-13.7.1999 [B; dupl. ISTE, herb. Parolly].
U: Gertrud and Robert Ulrich: 30.8. and 2.9.1995, 26.7.1996 [B, C *(Asyneuma lycium, Seseli hartvigii),* E *(Sideritis),* GOET *(Centaurea),* M, MB, STU].

Herbarium abbreviations after Holmgren & al. (1990); AKDU = Herbarium of the Akdeniz University Antalya, Turkey.

Collecting sites

1: Bakırlı D. above Saklıkent 1850-2200 m, limestone
  1a: on rocks
  1b: screes
  1c: thorn-cushion, dwarf shrub communities
  1d: dolines
2: Bakırlı D. above Saklıkent, 2200-2550 m, limestone
  2a: on rocks
  2b: screes
  2c: thorn-cushion, dwarf shrub communities
  2d: dolines
  2e: wind-swept cushion communities
  2f: disturbed places, roadsides, ruderal
3: Bakırlı D., area W of Saklıkent, between Sakılı Tepe and Kocapınar, 1900-2000 m, barren serpentine rock
4: Bel Pınarı, area S of Bakırlı D., 1900-2050 m, rocky, barren ophiolitic slopes with thorn-cushion and dwarf scrub communities
5: Damp place below Saklıkent, 1750 m, flushes and sedge fens, limestone
6: Bakırlı D. above Saklıkent, habitats not indicated, *RB*.
7: Bakırlı D. above Saklıkent, habitats not indicated, *RB*.
8: Bakırlı D. above Saklıkent, 1900-2200 m, habitats not clearly indicated ("step"), *OD* (cf. Düşen & Sümbül 2001).
9: Bakırlı D. above Saklıkent, 2300-2500 m, habitats not clearly indicated ("step"), *OD* (cf. Düşen & Sümbül 2001).

Chorology. – Cos: Cosmopolitan; Subcos: Subcosmopolitan; EMed: East Mediterranean; Med: Mediterranean; IA: Irano-Anatolian; IT: Irano-Turanian; ES: Euro-Siberian; Eux: Euxine; End_a: Anatolian endemic, End_t: Taurus endemic; End_{wt}: Western Taurus endemic; End_{loc}: local endemic.

Life forms. – C: Chamaephyte; Cs: Succulent chamaephyte; G: Geophyte; H: Hemicryptophyte; Np: Nanophanerophyte; Pa: Parasite; P: Phanerophyte; T: Therophyte.

IUCN Red List Categories (2001). – CR: Critically endangered; EN: Endangered; LR (cd): Conservation dependent; LR (lc): Least concern; LR (nt): Near threatened; VU: Vulnerable.

Asterisks. – An asterisk * preceding a taxon indicates a new record for the Flora of Turkey grid C3. An asterisk in brackets (*) refers to new grid records from the vegetation studies by Hein & al. (1998), Kürschner & al. (1998) and Parolly (1995a), which were not explicitly given as such and mostly overlooked.

1.2. List of the taxa

Pteridophyta

Aspleniaceae

Asplenium ceterach L. s.l. – 1a: 24.7.1998, *E 6410*. – H / Med-IT-ES.

Athyriaceae

Cystopteris cf. *dickieana* Sim – 2a: *P 6537*. – H / ES.
Cystopteris fragilis (L.) Bernh. – 1a: 1.8.1998, *E 6462;* 2a: 27.6.1998, *E 6025; P s.n*. – H / Cos.

Sinopteridaceae

Cheilanthes maderensis Lowe [*C. fragrans* (L.f.) Sw.] – 1a: 24.7.1998, *E 6411*. – H / ES-Med.

Gymnospermae

Cupressaceae

Juniperus excelsa M. Bieb. – 1c: 24.7.1998, *E 6412; P s.n*. – Np-P / Med-IT.
Juniperus foetidissima Willd. – 1c: 28.6.1999, *E 6724*. – Np-P / Med-ES.

Dicotyledoneae

Acanthaceae

Acanthus hirsutus Boiss. – 1f: 24.7.1998, *E 6128;* 8.8.1998, *E 6240*. – H / End_a, LR (lc).

Amaranthaceae

Amaranthus viridis L. – 1f: 24.7.1998, *E 6129;* 2f: 30.8.1999, *E 6876*. – H / Subcos.

Apiaceae

Bunium microcarpum (Boiss.) Freyn subsp. *microcarpum* – 1c: 25.7.1998, *E 6114;* 1f: *P 92-12-4;* 2b: 25.7.1998, *E 6157;* 2b: *P A20-19*, *A40-2;* 2c: 5.5.1999, *E 6757* (conf. Pimenov). – G / EMed-IA.
Bupleurum falcatum subsp. *persicum* (Boiss.) Koso-Pol. – 2c: 27.6.1998, *E 6017;* 2e: 8.7.1998, *E 6001; P 6527*. – H / EMed-IA.
Caucalis platycarpos L. – 1f: 6.6.1998, *E 6104; P 92-12-36*. – T / Med-IA.
**Crenosciadium siifolium* Boiss. & Heldr. – 1f: 16.7.1998, *E 6043* (conf. Pimenov); 8.8.1999, *E 6396;* 5: *R s.n.* – H / End_a, EN.
Eryngium bourgatii subsp. *heldreichii* (Boiss.) P. H. Davis – 1c: 4.7.1998, *E 6005; U 16;* 1f: 30.8.1998, *E 6827;* 8: *OD 1125*. – H / ES-Med-IT.
Falcaria vulgaris Bernh. – 1f: 24.7.1998, *E 6583;* 6: *HS 23683;* 9: *OD 1951*. – H / Med-ES-IT.
**Ferula lycia* Boiss. – 2b: 8.7.1998, *E 6006* (conf. Pimenov); 16.8.1998, *E 6206* (conf. Pimenov); 7: *RB 211999, 2284*. – H / End_{wt}, LR (nt).
Ferulago asparagifolia Boiss. – 1c: 8.7.1998, *E 6864* (det. Pimenov). – C / EMed.
Johrenia dichotoma DC. subsp. *dichotoma* – 1c: 8.7.1998, *E 6865* (det. Pimenov). – C / IA.
Laserpitium petrophilum Boiss. & Heldr. – 1a: *U 21;* 2a: 6.6.1998, *E 6165* (conf. Pimenov); *P A3-9;* 2b: *P A1-5*, *A3-4;* 7: *RB 2206*. – H / End_{wt}, LR (nt).
Opoponax hispidus (Friv.) Griseb. – 1a: 6.6.1998, *E 6202* (conf. Pimenov). – H / Med-IT.
Ormosolenia alpina (Sieber ex Schult.) Pimenov [*Peucedanum alpinum* (Sieber ex Schult.) B. L. Burtt & P. H. Davis] – 2b: 8.7.1998, *E 6023* (conf. Pimenov); *P A42-9*. – H (G) / EMed. – For the generic concept and taxonomy, see Pimenov (1992).
Pimpinella tragium subsp. *lithophila* (Schischk.) Tutin – 1a: *U 28;* 2b: 6.6.1998, *E 6408;* 2c: 8.8.1998, *E 6427* (conf. Pimenov); 4: *P 6574*. – H / EMed.
Scandix pecten-veneris L. – 1c: 9.6.1998, *E 6044*. – T / ES-Med-IT.
Scandix stellata Banks & Sol. – 1f: *P 6603*. – T / Med.
Seseli hartvigii Parolly & B. Nordt – 1a: 30.8.1998, *E 6448;* U 37 (det. Hartvig); 2e: 16.8.1998, *E 6003; P 6494*. – H / End_{wt}, EN.
Smyrnium perfoliatum L. – 1c: 8.7.1998, *E 6618*. – C / ES-Med.

Torilis leptophylla (L.) Rchb. – 1f: 27.6.1998, *E 6244; P 92-12-49;* 5: *R s.n.* – T / Med.
Turgenia latifolia (L.) Hoffm. – 1f: *P 12-27;* 6: *HS 23693*. – T / ES-Med-IT.

Apocynaceae
Vinca herbacea Waldst. & Kit. – 1f: 8.7.1998, *E 6151*. – H / Med-IT-ES.

Asclepediaceae
Vincetoxicum tmoleum Boiss. – *1c: 28.6.1999, E 6324*. – H / IT.

Asteraceae
Achillea falcata L. – 2c: 24.7.1998, *E 6066;* 2d: 16.8.1998, *E 6325;* 6: *HS 23690*. – C / IT.
Achillea teretifolia Willd. – 3: 4.7.1998, *E 6028;* 6: *HS 23659*. – C / End_a, LR (lc).
Anthemis cretica subsp. *albida* (Boiss.) Grierson – 2c: *T 506; P 92-10-7;* 4: *T 546a*, *T 578*. – C / End_t. – Radiate variants predominate. The following gatherings are intermediates to subsp. *anatolica* with involucres only 8-11 (not 12-15) mm broad, pale (not dark brown) phyllary margins and mature leaves hardly more than 2 cm (more typical plants assigned to subsp. *albida* from Bakırlı D. have leaves 3.5-4.5 cm long), but distinct from subsp. *anatolica* on account of their 2-pinnatisect leaves: 2c: *T 440* (discoid), *T 513* (radiant). For other characters to separate the two subspecies, see Grierson & Yavin (1975). However, the height of the plants, as indicated there, is too dependent on habitat to be of any diagnostic value.
Anthemis cretica subsp. *anatolica* (Boiss.) Grierson – 1b: 8.7.1998, *E 6181; P A11-4;* 2c: *P 6580c*. – C / EMed.
(*)*Anthemis kotschyana* var. *discoidea* (Bornm.) Grierson – 2c: 16.6.1998, *E 6242;* 4: *P 6599c*. – C / Med-IT.
Anthemis rosea subsp. *carnea* (Boiss.) Grierson – 1c: 23.6.1998, *E 6788.* – T / End_t, LR (cd).
Artemisia absinthium L. – 1c: 24.7.1998, *E 6315;* 2f: 16.8.1998, *E 6376*. – H / ES-Med-IT.
Bellis perennis L. – 1f: 25.4.1998, *E 6138;* 5: *R s.n*. – H / ES-Med.
Carduus nutans L. – 1c: 9.6.1998, *E 6147*. – H / ES.
Centaurea cariensis subsp. *maculiceps* (O. Schwarz) Wagenitz – 1c: 4.7.1998, *E 6257;* 2c: 7.7.1999, *E 6830;* 4: *P 6590;* 6: *HS 23687*. – C / End_t, LR (cd).
Centaurea drabifolia subsp. *austro-occidentalis* Wagenitz – 2e: 16.7.1998, *E 6144; P 6512*, *6559;* 7: *RB 1518*, *2203;* 8: *OD 1127*. – C / End_t, LR (lc).
Centaurea drabifolia subsp. *cappadocica* (DC.) Wagenitz – 1c: 16.6.1998, *E 6048;* 2e: 9.6.1998, *E 6045;* 4: *P 6567*. – C / End_t, LR (lc).
**Centaurea inexpectata* Wagenitz – 1f: 6.6.1998, *E 6316;* 5: *P 6610; R s.n*. – C / End_a, LR (lc).
Centaurea luschaniana Heimerl – 1c: 4.7.1998, *E 6205; U 11* (det. Wagenitz); 2c: *P 6500;* 2e: 18.7.1999, *E 6707*. – C / End_{wt}, LR (cd).
Centaurea lycia Boiss. – 1c: 27.6.1998, *E 6207;* 2c: *P 6500a*. – C / End_{wt}, LR (cd).
Centaurea urvillei subsp. *stepposa* Wagenitz – 1c: 24.7.1998, *E 6542;* 1f: 16.6.1998, *E 6292;* 6: *HS 23685*. – H / IA.
Centaurea urvillei DC. subsp. *urvillei* – 1c: 16.6.1998, *E 6140*. – H / EMed.
Centaurea virgata Lam. – 1f: 9.6.1998, *E 6658; U 12* (det. Wagenitz); 2c: 27.6.1998, *E 6486*. – C / IA.
Chondrilla juncea L. var. *juncea* – 4: 25.7.1998, *E 6360*. – H / IA-Med.
Cichorium intybus L. – 1f: 25.7.1998, *E 6364;* 5: *R s.n*. – H / ES-IT.
Cirsium arvense subsp. *vestitum* (Wimm. & Grab.) Petr. – 1f: 27.6.1998, *E 6365;* 9.6.1998, *E 6053;* 5: *P 6608*. – G / ES-Med.
Cirsium creticum (Lam.) d'Urv. subsp. *creticum* – 1f: 4.7.1998, *E 6379*. – H / EMed.
Cirsium lappaceum subsp. *anatolicum* var. *ferox* Boiss. – 1c: 16.6.1998, *E 6208* (det. Duman); 4: 24.7.1998, E 6452. – H / IA.
Crepis foetida subsp. *rhoeadifolia* (M. Bieb.) Čelak. – 1c: 27.6.1998, *E 6214*. – H / Med-IA.
Crepis sancta (L.) Babc. – 1c: 5.5.1998, *E 6274;* 2c: 23.5.1998, *E 6136*. – T / Med-IT.
Crupina crupinastrum (Moris) Vis. – 1f: 8.8.1998, *E 6352*. – T / Med-IT.

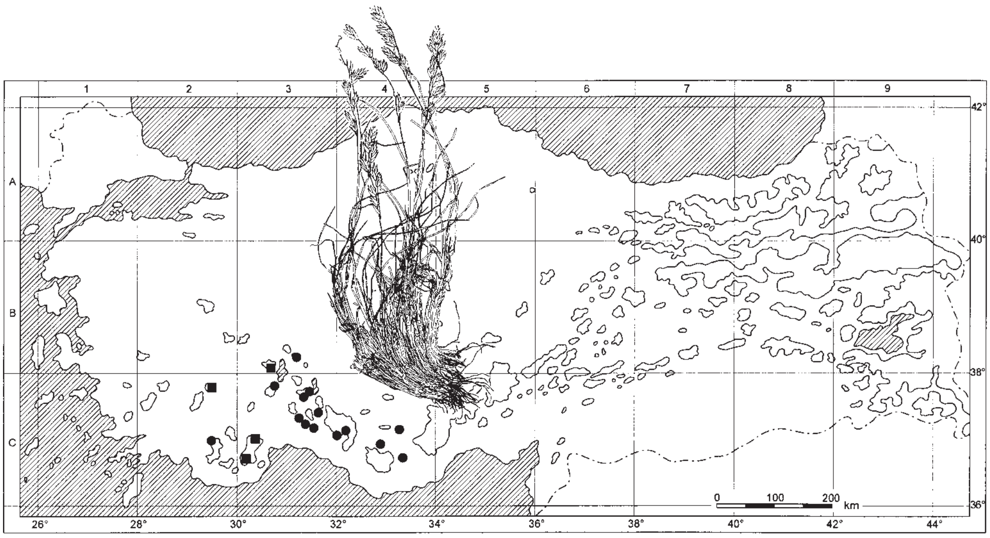

Fig. 3. Distribution of *Helichrysum plicatum* subsp. *isauricum* (●) [based on the new gatherings kept at B (see specimens cited), Ekim (1999), Koçak & Özhatay (2000) and Parolly (1995b)] and *Poa akmanii* (■) [based on the new gatherings and Soreng & al. (1997)].

Cyanus bourgaei (Boiss.) Wagenitz & Greuter – 2b: 6.6.1998, *E 6052; P A10-3; A17-4*, *A19-6;* 2c: 8.6.1998, *E 6126*. – C / End_{wt}, LR (lc). – For the segregation of *Cyanus* Mill. from *Centaurea* L., see Greuter (2003).

Cyanus depressus (M. Bieb.) Soják – 1f: 27.6.1998, *E 6254*. – T / IA.

Cyanus pichleri subsp. *extrarosularis* (Hayek & Siehe) Wagenitz & Greuter – 1c: 23.5.1998, *E 6101;* 2e: *P 92-16-3*. – *H / End_{t}*, LR (lc).

Cyanus pichleri (Boiss.) Holub subsp. *pichleri* – 2c: 27.6.1998, *E 6211*. – H / EMed.

Cyanus triumfettii (All.) Dostál ex A. & D. Löve – 1c: 6.6.1998, *E 6178;* 2c: *R A-104*. – H / ES-IT.

Echinops emiliae O. Schwarz ex P. H. Davis – 1c: 16.6.1998, *E 6346*. – H / End_{wt}, LR (cd).

Erigeron cilicicus Boiss. ex Vierh. – 1a: 25.5.1998, *E 6064;* 2a: 5.5.1998, *E 6355;* 7: *RB 2213*. – H / End_{t}, LR (lc).

Evax anatolica Boiss. – 1c: 6.6.1998, *E 6647*. – T / IA.

Hedypnois cretica (L.) Dum. Cours. – 1f: 30.8.1998, *E 6414*. – T / Med.

Helichrysum plicatum subsp. *isauricum* Parolly – 2c: *D 470;* 16.6.1998, *E 6404; T 476;* 2d: *P 6517*. – C / End_{t}, EN. – The material accumulated since its first description (Parolly 1995b), justifies presentation of a preliminary distribution map (Fig. 3). Two remarkable records extend the range considerably from the Pisidian-Isaurian Taurus to the west. The gatherings cited above document its occurrence in the Beydağları. They represent a rather low-growing (10-15(-20) cm), high subalpine form with a rather pale involucrum. The westernmost record comes from Eren D. *(Eren 5149)*. There is now ample evidence that subsp. *isauricum* replaces the more eastern subsp. *polyphyllum* (Ledeb.) P. H. Davis in the western half of the Taurus. However, many of the older specimens in the herbaria named as "*polyphyllum*" are inappropriate gatherings without rootstocks and basal leaves, making a distinction between the subspecies uncertain, if not impossible. *Parolly 6737* from Dedegöl D. obviously grades into subsp. *polyphyllum,* with extraordinary lush plants up to 45 cm tall, more than 40 capitula and some basal leaves with only one nerve; the majority of the plants, however, have the typically 3-nerved leaves of subsp. *isauricum.*

Specimens. – C2 MUĞLA: Eren D., Seki, above Ceylanköy, 1900 m, thorn-cushion and dwarf shrub communities, limestone, 17.6.2002, *E 5149* (AKDU, herb. Parolly). – C3 ISPARTA/ KONYA: Dedegöl Dağları, Dipoyraz (Dedegöl) D., along the road between the fire-watch tower and Yenişarbademli village, c. 1700 m, rocky slopes, small clearings in mixed needle-leaved forest *(Pinus nigra* var. *caramanica, Abies cilicica* subsp. *isaurica, Cedrus libani),* limestone and schist, 16.7.191999, *P 6737* (B, ISTE, herb. Parolly).

**Helichrysum pallasii* (Spreng.) Ledeb. – 2c: 16.6.1998, *E 6398;* 4: *P 6599a*. – C / IA.

Hieracium ×auriculoides (F. A. Lang) P. D. Sell & C. West – 3: 16.7.1998, *E 6375;* 4: *P 6579*. – H / IA-ES.

Hieracium hoppeanum subsp. *troicum* Zahn – 4: *P 6580*. – H / ES-Med.

Hieracium pannosum Boiss. – 1a: 16.7.1998, *E 6008; U 19;* 2a: *P 6573a;* 2e: 8.8.1998, *E 6258.* – H / EMed.

Hieracium phrygiense P. D. Sell & C. West – 1c: 8.7.1998, *E 6353* – H / End_t, LR (lc).

Inula heterolepis Boiss. – 1a: 27.6.1998, *E 6313*. – C / EMed.

Inula montbretiana DC. – 4: 4.7.1998, *E 6046; P 6598*. – C / IA.

Inula oculus-christi L. – 1c: 8.7.1998, *E 6035;* 2c: 16.8.1998, *E 6371;* 6: *HS 23672*. – H / Med-ES-IA.

Iranecio cariensis (Boiss.) C. Jeffrey [*Senecio cariensis* Boiss.] – 2b: 8.8.1998, *E 6037;* 7: *RB 2210*. – H / End_t, LR (lc).

Lactuca intricata Boiss. – 1c: 7.7.1998, *E 6251;* 1f: 24.7.1998, *E 6309;* 4: *P 6591*. – C / EMed.

Leontodon asperrimus (Willd.) Ball – 3: 29.6.1998, *E 6307;* 6: *HS 23660*. – H / IA.

Leontodon oxylepis Boiss. & Heldr. var. *oxylepis* – 1c: 16.6.1998, *E 6018;* 2c: 8.7.1999, *E 6644*. – H / IA.

Onopordum boissieri Willk. – 1f: 16.8.1998, *E 6559* (conf. P. Hein). – H / End_t, LR (nt).

Onopordum sibthorpianum Boiss. & Heldr. – 1c: 8.8.1999, *E 6644* (conf. Hein); 4: 16.8.1998, *E 6416*. – H / EMed.

Picnomon acarna (L.) Cass. – 1f: 24.7.1998, *E 6047.* – H / Med-IA.

Ptilostemon afer subsp. *eburneus* Greuter – 1f: 24.7.1999, *E 6558.* – C / End_a, LR (lc).

Scariola viminea (L.) A. F. W. Schmidt – 1c: 16.7.1998, *E 6272;* 8: *OD 1952.* – C / Med-IT-ES.

**Scorzonera cana* var. *jacquiniana* (W. Koch) D. F. Chamb. – 1c: 25.4.1998, *E 6300;* 2c: *T 464*. – C / IA.

Scorzonera cana var. *radicosa* (Boiss.) D. F. Chamb. – 1c: 7.6.1998, *E 6265;* 2c: 6.6.1998, *E 6246;* 2c: *D 274;* 2e: *P 6528;* 4: *P 6576*. – C / IA.

**Scorzonera judaica* Eig [*S. pseudolanata* Grossh.] – 1c: 16.6.1998, *E 6142*. – G / IA.

Senecio vernalis Waldst. & Kit. – 2c: *P A24;* 2f: 9.6.1998, *E 6149*. – T / ES.

Sonchus asper subsp. *glaucescens* (Jord.) Ball – 1f: 16.8.1998, *E 6425*. – H / Med-IA.

Tanacetum cadmeum (Boiss.) Heywood subsp. *cadmeum* – 1c: *T 567;* 2d: 24.7.1998, *E 6260;* 4: 8.8.1998, *E 6063*. – C / End_a, LR (lc).

Tanacetum praeteritum (Horw.) Heywood subsp. *praeteritum* – 1c: *U 38;* 2c: 16.6.1998, *E 6000;* 2c: *P 92-16-2; 6553;* 2d: *R B1-3;* 6: *HS 23674*. – C / End_{wt}, LR (cd). – *T. praeteritum* includes two geographically distinct subspecies. Subsp. *praeteritum* occurs predominantly in the coastal mountain ranges of Lycia (Baba D., eastern Beydağları) and on Eldirek D. S of Dirmil, while subsp. *massicyticum* Heywood is confined to the inland mountain ranges of the Akdağları massif (Heywood 1952, Grierson 1975). Düşen & Sümbül (2001) published a doubtful new grid record for C3 Antalya of subsp. *massicyticum* from Bakırlı D. The characters conventionally used to separate the subspecies (a subcorymbose synflorescence with (1-)2-4 capitula and ligules about 9 mm long in the latter subspecies versus generally unbranched flowering stems with 1(-2) capitula and shorter ligules (3-6 mm) are less distinguishing than expected. The populations of the two subspecies surveyed in the Beydağları and Akdağları showed considerable overlap in the branching pattern, while the ligule length turned out to be completely irrelevant. Individual plants often cannot be identified with the help of these characters. The Düşen & Sümbül record is very likely based on such plants (specimen not traced at AKDU). A more reliable character (not given by Grierson 1975: 273) is the dense, white-tomentose indumentum of the involucrum of all our gatherings from the Akdağları. Subsp. *massicyticum* also has in its overall appearance a much denser indumentum than subsp. *praeteritum.*

Taraxacum bithynicum DC. – 1c: 30.8.1998, *E 6436*. – H / EMed.

Taraxacum buttleri Soest – 1c: 6.6.1998, *E 6034*. – H / IA-EMed.

Taraxacum hellenicum Dahlst. – 1b: *P A9-7*. – H / Med.

Tragopogon balcanicus Velen. – 2f: *P 6544*. – H / EMed.

Tragopogon buphthalmoides (DC.) Boiss. var. *buphthalmoides* – 1c: *T 580;* 2c: *P 6551*. – H / IA.

Tragopogon latifolius var. *angustifolius* Boiss. – 1c: 8.6.1998, *E 6143;* 1f: 14.4.1999, *E 6523;* 2c: *T 508;* 7: *RB 2220*. – H / IT.

Tragopogon olympicus Boiss. – 2c: *D 450*, *477;* 27.6.1998, *E 6184;* 16.6.1998, *E 6253;* 2d: *R T1-6*. – H / End_a, LR (lc).

Tripleurospermum decipiens (Fisch. & C. A. Mey.) Bornm. – 1f: 8.8.1998, *E 6263;* 2c: 16.8.1998, *E 6369;* 5: *P 6607;* 6: *HS 23675*. – H / IA.

Tussilago farfara L. – 1f: 10.4.1998, *E 6109*. – H / ES-IT.

Xeranthemum annuum L. – 1f: 25.7.1999, *E 6319; P 92-12-23*. – T / Med-IA.

**Xeranthemum inapertum* (L.) Mill. – 1c: 23.5.1998, *E 6201;* 1f: *P 92-12-25*. – T / Med-IT.

Berberidaceae

Leontice leontopetalum L. subsp. *leontopetalum* – 3: 16.8.1998, *E 6413* (det. Duman). – H / EMed-IT.

Boraginaceae

Alkanna areolata Boiss. var. *areolata* – 1a: 9.6.1998, *E 6087;* 2d: *P A1-11, P A11-7;* 7: *RB 2221*. – C / End_t, LR (lc).

Alkanna attilae P. H. Davis – 1b: *P 6579a;* 2c: 16.6.1998, *E 6261;* 2e: 4.7.1998, *E 6515*. – C / End_{wt}, LR (cd).

Alkanna pamphylica Hub.-Mor. & Reese – 1a: 8.7.1998, *E 6435*. – C / End_{wt}, LR (cd).

Anchusa hybrida Ten. – 1f: 23.5.1998, *E 6139; P 6605*. – H / Med.

Arnebia densiflora (Ledeb.) Ledeb. – 2c: 27.6.1998, *E 6236*. – H / IT.

Asperugo procumbens L. – 5: 27.6.1998, *E 6606*. – T / ES-Med-IT.

Buglossoides arvensis (L.) Johnst. – 1c: 23.5.1998, *E 6152*. – T / ES-Med-IT.

Buglossoides incrassata (Guss.) Johnst. – 1c: 23.5.1998, *E 6219*. – T / Med-IT.

Cerinthe minor subsp. *auriculata* (Ten.) Domac – 1c: 23.5.1998, *E 6141; P 92-13-24;* 2f: 9.6.1998, *E 6124*. – H / EMed.

Cynoglossum lithospermifolium subsp. *cariense* (Boiss.) Greuter & Burdet – 1e: *P A3-6*; 2b: *P A49-3*; 2e: 18.7.1998, *E 6039*. – H / EMed.

Cynoglossum montanum L. – 1c: 27.6.1998, *E 6772*. – H / ES-IA.

Heliotropium hirsutissimum Grauer – 1f: 4.7.1998, *E 6106;* 2f: 16.8.1998, *E 6406*. – T / EMed.

Myosotis alpestris F. W. Schmidt subsp. *alpestris* – 1d: *P 6532;* 2b: 16.7.1998, *E 6100;* 2c: 9.6.1998, *E 6013;* 7: *RB 1505; R t 1-11*. – H / ES.

Myosotis minutiflora Boiss. & Reut. – 1b: *P A10-14;* 2b: *P A42*. – T / Med.

Myosotis speluncicola (Boiss.) Rouy – 1a: 23.5.1998, *E 6134*. – T / Med-IA.

Nonea macrosperma Boiss. & Heldr. – 1f: 6.6.1998, *E 6240*. – H / End_a, LR (lc).

Nonea pulla subsp. *scabrisquamata* A. Baytop – 2d: 9.6.1998, *E 6278* (det. Duman). – H / IT-Med-ES.

Onosma aucheranum DC. – 1c: 27.6.1998, *E 6598;* 8.7.1998, *E 6240*. – C / EMed.

Onosma isauricum Boiss. & Heldr. – 6: *HS 23686;* 7: *RB 2214*. – C / End_a, LR (lc).

Onosma roussaei DC. – 2c: 6.6.1998, *E 6090*. – C / IA.

Rochelia disperma (L. f.) C. Koch var. *disperma – 1b: P A1-4;* 2c: 8.6.1998, *E 6275*. – T / Med-IA.

Solenanthus stamineus (Desf.) Wettst. – 1c: 5.5.1998, *E 6137;* 1e: 5.5.1998, *E 6131;* 1f: *P 92-7*. – H / IT-Med.

Symphytum brachycalyx Boiss. – 1f: 7.6.1998, *E 6115*. – C / EMed.

Brassicaceae

Aethionema arabicum (L.) Andrz. ex DC. – 2c: 5.5.1998, *E 6146*. – T / IA-EMed.

Aethionema cordatum (Desf.) Boiss. – 1b: *U 2;* 2b: *P A29, A 49, A38;* 2c: 16.8.1998, *E 6123*. – H / IT.

Aethionema lycium I. A. Andersson & al. – 2a: 6.6.1998, *E 6154;* 2a: *PH A2-7;* 7: *RB 2219*. – C / End_t, EN.

**Aethionema saxatile* subsp. cf. *graecum* (Boiss. & Spruner) Hayek – 2e: *P 6550*. – C / EMed. – We follow here the Flora Hellenica account (Tan & Suda 2002) rather than Flora of Turkey 10 (Davis & al. 1998), which excluded that subspecies from the Turkish flora. Fairly matching plants with small floral plants have been named subsp. *oreophilum* I. A. Andersson & al. and are in accordance with those that Tan & Suda (2002) merged in subsp. *graecum*.

Alyssum argyrophyllum Schott & Kotschy – 1b: *P A1-10-9;* 2b: 9.6.1998, *E 6299;* 2c: 16.6.1998, *E 6159;* 7.6.1998, *E 6497*. – C / End_t, LR (nt).

Alyssum aurantiacum Boiss. – 1c: 27.6.1998, *E 6357;* 2b: 16.6.1998, *E 6164;* 2c: *R E3-4;* 7: *RB 2300*. – C / End_t, LR (cd).

Alyssum baumgartnerianum Bornm. – 1c: 6.6.1998, *E 6061* (det. Duman); 2b: *P A20-4;* 7: *RB 1523, 2217*. – C / EMed.

Alyssum dasycarpum Willd. – 2c: 8.7.1998, *E 6320*. – T / IA.

Alyssum erosulum Clementi – 2c: 16.7.1998, *E 6323* (det. Duman); *P A20-9; T 463*, *547a;* 2e: 24.7.1998, *E 6421*. – C / End_t, LR (lc).

Alyssum huber-morathii T. R. Dudley – 1c: *T 542-576;* 4: 23.5.1998, *E 6059; P 6568*. – C / End_{wt}, LR (nt).

Alyssum macropodum Boiss. & Bal. var. *macropodum – 1c: E 6377*. – C / End_a, LR (nt).

Alyssum minus (L.) Rothm. [*A. simplex* Rudolphi] – 1c: 23.5.1998, *E 6162;* 9: *OD 1118*. – T / Med-ES.

Alyssum murale Waldst. & Kit. var. *murale* – 4: 25.7.1998, *E 6428;* 6: *HS 23684*. – C / Med-IA-ES.

Alyssum pateri Nyár. subsp. *pateri* – 1c: 16.6.1998, *E 6360;* 2c: 8.7.1998, *E 6060* (det. Duman); *D 466; P 6552;* 2f: *P 6545*. – C / End_a, LR (lc).

Alyssum samium T. R. Dudley & Christod. [*A. condensatum* subsp. *flexibile* (Nyár.) T. R. Dudley] – 2c: 23.5.1998, *E 6256; T 436*, *447*. – C / IT.

Alyssum sibiricum Willd. – 7: *RB 2219*, *2272*. – C / IT.

Alyssum strigosum subsp. *cedrorum* (Schott & Kotschy) T. R. Dudley – 1c: 8.6.1998, *E 6220;* 1f: *P 6604*. – T / IA.

Arabis alpina subsp. *brevifolia* (DC.) Greuter & Burdet – 1a: 24.4.1999, *E 6652;* 1b: *P A3-4;* 2a: 7.6.1998, *E 6170; P 92-12;* 2b: 24.8.1998, *E 6308*. – C / EMed.

Arabis auriculata Lam. [*A. nova* sensu Fl. Turk. 1, non. Vill.] – 2c: *D 424;* 23.5.1998, *E 6014*. – T / Med-IT-ES.

Arabis deflexa Boiss. – 1a: *U 3*. – C / End_t.

Arabis lycia Parolly & P. Hein – 2a: 24.8.1998, *E 6308a; PH A17-1; P 6540*. – C / End_{loc}, CR. – *Eren 6308a* is the third record of this steno-endemic from its only locality (Parolly & Hein 2000). A search for it on Çalbalı D. and Tahtalı D. did not reveal further localities. Ripe fruits are now available and allow to emend the description: *Siliquae* 15-18(-20) × 1.5 mm, valves pale brown, yellowish green to straw-coloured, somewhat shining and weakly keeled. *Seeds* uniseriately arranged, 7-10 per loculus, pale brown, ovoid, smooth to weakly foveolate, strongly flattened, narrowly winged, c. 1.2-1.5 × 0.7-0.9 mm.

Aubrieta deltoidea (L.) DC. – 2a: 23.5.1998, *E 6196;* 2b: *P 92-17-5, A 47-1*. – C / EMed.

Barbarea intermedia Bor. – 1c: 23.5.1998, *E 6173*. – H / Med-ES.

Barbarea minor C. Koch var. *minor* (vs. var. *eriopoda* Busch) – 2c: *E 6110*. – H / IA.

Barbarea vulgaris R. Br. – 1f: 8.6.1998, *E 6167*. – H / ES-Med.

Camelina hispida var. *grandiflora* (Boiss.) Hedge – 3: 23.5.1998, *E 6103*. – T / End_a, LR (lc).

Camelina rumelica Velen. – 1c: 7.6.1998, *E 6050*. – T / ES-Med-IT.

Capsella bursa-pastoris (L.) Medik. – 1f: 23.5.1998, *E 6339.* – T / Cos.
Cardamine graeca L. – 1c: 9.6.1998, *E 6348.* – T (H) / EMed.
Cardaria draba (L.) Desv. subsp. *draba* – 1f: *E 6342.* – T / Med-IT-ES.
Clypeola ciliata Boiss. – 1c: 23.5.1998, *E 6399.* – T / End_{wt}, EN.
Descurainia sophia (L.) Prantl – 1c: 23.5.1998, *E 6176.* – T / ES-Med-IT.
Draba heterocoma Fenzl subsp. *heterocoma* [*D. bruniifolia* subsp. *heterocoma* (Fenzl) Coode & Cullen; *D. nana* Stapf] – 1c: *23.5.1998, E 6291;* 2c: 23.5.1998, *E 6195;* 2e: 6.6.1998, *E 6289; P 6493*. – C / IA.
Erysimum kotschyanum Gay – 1e: 6.6.1998, *E 6108;* 2e: 24.7.1998, *E 6183; P 92-11d*. – C / End_{a}, LR (nt).
Erysimum leptocarpum Gay [*E. aciphyllum* Boiss.; *E. pusillum* sensu Fl. Turk. 1. 1965, non Bory & Chaub.] – 2c: *D 433*, *439; P 6548; T 449*. – C / End_{wt}.
(*)*Erysimum pallidum* Boiss. – 2c: 9.6.1998, *E 6065;* 2e: 16.6.1998, *E 6332; P 6547*. – C / End_{wt}, EN.
Erysimum pulchellum (Willd.) Gay – 2c: 27.6.1998, *E 6282;* 10.7.1999, *T 478*, *482*. – C / Pont-IA.
Erysimum repandum L. – 1c: 6.6.1998, *E 6168.* – T / IT-Med-ES.
Heldreichia bourgaei Boiss. – 2b: 9.6.1998, *E 6203*. – H / End_{wt}, VU.
**Hesperis balansae* Fourn. subsp. *balansae* – 1f: 5.5.1999, *E 6581* (det. Duran). – H / End_{a}, EN.
**Hesperis pisidica* Hub.-Mor. [*H. pseudoarmena* Dvořák] – 1a: 23.5.1998, *E 6088* (det. Duran); 1c: *P 92-12-46.* – H / End_{wt}, EN.
Iberis simplex DC. – 3: 16.7.1998, *E 6020.* – C / ES.
Matthiola montana Boiss. – 1c: 16.6.1998, *E 6222;* 7: *RB 1513*. – H / End_{a}, LR (nt).
Raphanus raphanistrum L. – 1f: 4.7.1998, *E 6394*. – T / Med-ES.
Sisymbrium altissimum L. – 1f: 6.6.1998, *E 6230*. – H / ES-Med-IT.
Sisymbrium officinale (L.) Scop. – 2f: 6.6.1998, *E 6297.* – H / ES-Med-IT.
Sobolewskia clavata (Boiss.) Fenzl – 1f: 23.5.1998, *E 6093;* 7: *RB 1524*. – H / IA.
Thlaspi papillosum Boiss. – 1c: 5.5.1999, *E 6699;* 1d: 23.5.1998, *E 6092;* 2c: *D 471;* 2d: *R A10-5;* 4: *P 6565*. – H / End_{t}, CR. – Our recent field-work clearly revealed a more optimistic picture than given for this easily overlooked species in the Red Data List (Ekim & al. 2000). Actually it has healthy populations on Honaz D., Sandras D., in the Akdağları, the Beydağları and the Geyik Dağları. For its total range and ecology see Kürschner & al. (1998). We consequently suggest its deletion from the list.
Thlaspi perfoliatum L. – 1c: 1.4.1998, *E 6179*. – T / Med-IT-ES.

Campanulaceae

Asyneuma limonifolium (L.) Janch. subsp. *limonifolium* – 1b: *P A9-7;* 1c: 7.6.1998, *E 6239;* 5: *R s.n*. – H / Med.
Asyneuma linifolium (Boiss. & Heldr.) Bornm. subsp. *linifolium* – 1a: 4.7.1998, *E 6773; U 5;* 2a: 7.6.1998, *E 6301;* 6: *HS 23692*. – C / End_{t}, LR (lc).
Asyneuma lobelioides (Willd.) Hand.-Mazz. – 2c: 16.7.1998, *E 6358;* 2e: *P 6518*. – H / IA.
Asyneuma lycium (Boiss.) Bornm. – 1a: *U 6* (det. Kit Tan); 2a: 7.6.1998, *E 6361; PH A7-12*. – C / End_{wt},VU.
Asyneuma rigidum (Willd.) Grossh. subsp. *rigidum* – 1c: 16.7.1998, *E 6720;* 9: *OD 1141*. – H / IA.
Asyneuma virgatum subsp. *cichoriiforme* (Boiss.) Damboldt – 1c: 8.7.1998, *E 6561;* 2c: 16.6.1998, *E 6012;* 2e: *P 6511;* 4: *P 6584*. – H / End_{a}, LR (lc).
Campanula cymbalaria Sm. – 1a: *U 8;* 2a: 8.6.1998, *E 6306;* 9: *OD 1115*. – H / EMed.
Campanula involucrata A. DC. – 2c: *PH 13*. – H / IA.
Campanula stricta var. *libanotica* (A. DC.) Boiss. – 1a: *U 9;* 2c: 16.8.1998, *E 6094;* 2e: 16.6.1998, *E 6696.* – H / EMed.

Capparaceae

Cleome iberica DC. – 3: 16.6.1998, *E 6403;* 4: *P 6587*. – T / Med-IA.

Caprifoliaceae

Lonicera nummulariifolia subsp. *glandulifera* (Hub.-Mor.) D. F. Chamb. – 1c: 4.7.1998, *E 6337*. – Np / End_t, LR (lc).

Caryophyllaceae

Arenaria acerosa Boiss. – 1c: 16.6.1998, *E 6233; P 92-12-2;* 2c: 27.6.1998, *E 6038;* 4: 25.7. 1999, *E 6314*. – C / End_a, LR (lc).

Arenaria deflexa subsp. *microsepala* McNeill – 1a: 16.6.1998, *E 6177*. – C / End_t, LR (nt).

Arenaria tmolea Boiss. – 1a: 28.6.1999, *E 6568; U 4;* 2a: 16.6.1998, *E 6210; P 6509*. – C / End_t, LR (lc).

Arenaria serpyllifolia L. – 1c: 23.5.1998, *E 6209*. – T / Med-ES-IT.

Bolanthus minuartoides (Jaub. & Spach) Hub.-Mor. – 1c: 7.6.1998, *E 6218;* 3: 27.6.1998, *E 6728;* 4: *P 6594;* 6: *HS 23681*. – C / End_a,LR (lc).

Cerastium brachypetalum subsp. *roeseri* (Boiss. & Heldr.) Nyman – 2c: 6.6.1998, *E 6213*. – T / Med.

Cerastium inflatum Gren. [*C. dichotomum* subsp. *inflatum* (Link) Cullen] – 1b: *P A42;* 1c: 9.6.1998, *E 6322*. – T / IA.

Cerastium fragillimum Boiss. – 2c: 8.6.1998, *E 6262*. – T / EMed-IA.

Cyathophylla chlorifolia (Poir.) Bocquet & A. Strid [*Saponaria chlorifolia* (Poir.) Kunze] – 1b: *U 14;* 1f: 5.5.1998, *E 6522; P 92-12;* 2b: *P A47*. – T / EMed, LR (lc).

Dianthus acrochlorus Stapf – 1c: 16.7.1998, *E 6383;* 6: *HS 23676*. – H / End_{wt}, LR (cd).

Dianthus anatolicus Boiss. – 1c: 9.6.1998, *E 6024;* 2c: *P 6504;* 3: 18.7.1999, *E 6609;* 4: *P 6590*. – C / EMed, LR (lc).

Dianthus calocephalus Boiss. – 1c: 6.6.1998, *E 6252*. – H / ES-IA.

Dianthus elegans var. *actinopetalus* (Fenzl) Reeve – 1a: 23.5.1998, *E 6091; U 15;* 7: *RB 2202*. – C / End_t, LR (lc).

Gypsophila laricina Schreb. [*G. sphaerocephala* Fenzl ex Tchich. var. *sphaerocephala*] – 1c: 16.7.1998, *E 6431;* U 18. – C / IA.

Holosteum umbellatum L. subsp. *umbellatum* – 1f: 25.4.1998, *E 6419*. – T / Med-IT.

Minuartia anatolica var. *polymorpha* McNeill – 2c: 27.6.1998, *E 6303*. – C / EMed.

Minuartia dianthifolia (Boiss.) Hand.-Mazz. (*M.* subsp. *cataonica* McNeill, **syn. nov.**, *M.* subsp. *kurdica* McNeill, **syn. nov.**) – 1c: 27.6.1998, *E 6216;* 2c: *T 465;* 2e: *P 6533;* 9: *OD 1135*. – C / End_t, LR (cd). – In its traditional circumscription (McNeill 1967, Greuter & al. 1984) *M. dianthifolia* comprises three geographically separated subspecies, viz. subsp. *dianthifolia* in the Batı Toroslar (Western Taurus), subsp. *cataonica* McNeill in the western Orta Toroslar (Cilician Taurus) and the western Güney Doğu Toroslar (Eastern Taurus) and subsp. *kurdica* McNeill in the Van area. They are said to be distinct on account of their different sepal size (8.5-12 mm in subsp. *cataonica*; 6-8(-9) mm in the other two subspecies), leaf and sepal indumentum (glabrous to minutely ciliate leaves and glabrous or sparsely glandular-pubescent sepals in the type subspecies; usually densely glandular-pubescent leaves and usually glabrous sepals in subsp. *cataonica;* both densely glandular-pubescent in subsp. *kurdica*), habit (loosely versus densely tufted) and the lack or presence (only in subsp. *kurdica*) of a short petal claw up to 0.5 mm. Using McNeill (1967) for identifying the material from Bakırlı D., most specimens surprisingly key out as subsp. *cataonica* and only very few as subsp. *dianthifolia.* Before accepting such a considerable range extension of subsp. *cataonica* to the west, we surveyed the variability of the species represented by the vouchers kept at B and E, and the most recent collections made within the framework of the PONTAURUS project, from the Akdağları above Gömbe, Tahtalı D. and Bakırlı D. and from the Aladağları. A closer look reveals that the key characters are only weakly or not at all correlated. Even the original collections studied and annotated by McNeill (E) show more overlap than expected. One of these deviating gatherings from subsp. *cataonica* was already commented by McNeill himself (1967). It is evident that plants on mobile slopes or within a thorn-cushion are tall, loosely tufted and can even develop trailing shoots, while those on rocks and in wind-swept places are nearly cushion-forming clumps. The indumentum both of leaves and sepals is, as in many *Minuartia* and *Arenaria* species, an unreliable feature. The populations include plants with all combinations, although an increasing degree of overall pubescence can be observed from west to east. Plants with clawed petals are present in all collections studied, partly even varying within a single flower. Sepal length may be the only character with some relevance. The plants from Akdağları in the west of the range (the type locality of subsp. *dianthifolia*) tend to have the smallest flowers, with 6-7(-9) mm long sepals. The two eastern subspecies have larger flowers with (8-)9-11(-12) mm long sepals but with a considerable overlap in size between them. Perhaps two subspecies will be acceptable, subsp. *dianthifolia* restricted to the Akdağları massif with small flowers and a tendency towards a sparse indumentum and subsp. *cataonica* from the Beydağları to the east. However, considering the general variability within this species, we presently suggest relegating all these subspecific taxa into synonymy.

Most recently (Aytaç & Duman 2004), after submission of our manuscript, subsp. *elmalia* Aytaç was added to the *Minuartia dianthifolia* complex, a 20-30 cm tall plant from montane steppe and segetal vegetation transitions in the Elmalı-Korkutelı area. In the light of our material and concept, the discriminating measures of subsp. *elmalia* (plant size, leaves length, etc.) merge into the range of parts of the upland plants, but the usually falcate leaves and the particular stem indumentum (glandular-hirsute nodes, glabrous internodes) seem to tell it clearly apart. More material is needed, before its status can be assessed.

Minuartia dianthifolia var. *longipetala* Parolly & Ö. Eren, **var. nova**

Holotype: Turkey, C3 Antalya, Beydağları, Bakırlı Dağı above Saklıkent, summit region, 36°49'60''N, 30°20'22''E, c. 2510 m, wind-swept cushion community on rocky flats and along ridges, open thorn-cushion communities and scree-rich limestone swards, 10.7.1999, *Döring, Parolly & Tolimir* (B; isotypes: E, GAZI, herb. Parolly). – Deviating from the description in Flora of Turkey, the inflorescence of *M. dianthifolia* subsp. *dianthifolia* s.l. can have up to 8(-10) flowers (not 1-6). Rarely, individual plants occur with petals longer than given by McNeill (1967: $^1/_2$-<1× as long as the sepals). They are described here as a new variety. – Petalibus quam sepalis 1.2-1.5× longioribus distinguitur. – Petals up to 1.5× longer than sepals; often stout, multi-flowered plants with a densely glandular indumentum. – Along the exposed summit ridge.

Minuartia ×*antalyensis* Parolly & Ö. Eren, **nothosp. nova**

Holotype: Turkey, C3 Antalya, Beydağları, Bakırlı Daği above Saklıkent, summit region, 36°49'60''N, 30°20'22''E, c. 2480 m, transition wind-swept cushion community / open thorn-cushion community, 10.7.191999, *Döring*, *Parolly 6507 & Tolimir* (B; isotypes: E, GAZI, herb. Kürschner, herb. Parolly). – Hybrida inter parentes crescens, a *M. pestalozzae* floribus minoribus (12-14 versus 15-20 mm) foliis aequinervatis subpungentibus et a *M. dianthifolia* floribus majoribus (non 6-10(-12) mm) et foliis 0.5-1 mm mucronulatis differt.

An obvious hybrid between *Minuartia dianthifolia* and its close ally, *M. pestalozzae,* makes the local situation more intricate. In its overall appearance and dimensions, *M.* ×*antalyensis* clearly stands between its parents, forming dense, lush green tufts. By contrast, *M. pestalozzae* forms 10-15 cm tall, flat and pungent, yellowish green thorn-cushions overtopped by short, stout stems bearing hardly more than 3 flowers. The size of its flowers is intermediate, with sepals (11-)12-13(-14) mm long (in *M. pestalozzae* (14-)15-20 mm). In leaf shape and texture the hybrid is closer to *M. dianthifolia* (basal leaves narrowly lanceolate with lateral and median nerves weakly differentiated, stem leaves narrowly lanceolate to linear, all unarmed, acute to minutely and extremely thinly apiculate to mucronulate (0.1-0.2 mm), all leaves uniformly green), but the 0.5(-1) mm long subpungent, weak leaf mucro and the lanceolate stem leaves point toward *M. pestalozzae.* The latter differs in its often longer, always pungent leaves with the much extended median and lateral nerves fused at the leaf-tip into a percurrent, 1-2 mm long, hard spinule, and in the ovate-lanceolate stem leaves; the nerves of the leaves are distinctly paler, often straw-coloured. In its floral characters, *M.* ×*antalyensis* approaches *M. pestalozzae* in having petals and capsules only ½ as long as the sepals and a 2-3(-4)-flowered inflorescence. Seeds are regularly produced, light brown, 1.2-1.5 mm, strongly tuberculate as typical of the section, providing no character to separate it from the parent species. Germination rate and viability unknown. Very local, but at the collecting site more frequent than the parents.

Minuartia erythrosepala (Boiss.) Hand.-Mazz. var. *erythrosepala* – 1c: 16.6.1998, *E 6545;* 2e: 6.6.1998, *E 6271; P s.n.* – C / End_a, LR (nt).

Minuartia hamata (Hausskn. & Bornm.) Mattf. – 2c: 23.5.1998, *E 6516; T 525.* – T / Med-IA.

Minuartia juniperina (L.) Maire & Petitm. – 1c: *U 23;* 2b: *P A38-4;* 2c: *P 6534;* 2e: 27.6.1998, *E 6401;* 4: *P 6589.* – C / EMed-IT.

Minuartia leucocephala (Boiss.) Mattf. – 2e: 7.6.1998, *E 6576.* – C / End_t, LR (lc).

Minuartia leucocephaloides (Bornm.) Bornm. – 1c: 27.6.1998, *E 6536;* 1f: *P 6612;* 2e: 6.6.1998, *E 6471.* – C / End_a, LR (lc).

Minuartia multinervis (Boiss.) Bornm. – 1c: 6.5.1998, *E 6341.* – T / IA.

Minuartia pestalozzae (Boiss.) Bornm. – 1c: *U 24;* 2c: 16.6.1998, *E 6481; P 6535;* 2e: *P 6507;* 7: *RB 2273.* – C / End_t, LR (cd).

Minuartia umbellulifera (Boiss. & Bal.) McNeil var. *umbellulifera* – 1c: 28.6.1999, *E 6590;* 2c: 7.6.1998, *E 6566;* 2e: *P 6510;* 7: *RB 2207.* – C / End_a, LR (lc).

**Minuartia verna* subsp. *brevipetala* P. Hartvig & A. Strid – 3: 16.7.1998, *E 6636* (det. Duman). – C / End_{wt}, EN. – Hitherto known only from Sandras D. (Hartvig & Strid 1987). The second locality of this obvious serpentinophyte.

Petrorhagia alpina (Hablitz) P. W. Ball & Heywood subsp. *olympica* (Boiss.) P. W. Ball & Heywood – 3: 24.7.1998, *E 6456;* 4: *P 6572.* – T / ES-Med.

Saponaria mesogitana Boiss. – 1f: 5.5.1998, *E 6533;* 23.5.1998, *E 6133; P 6601.* – T / EMed.

Saponaria pumilio Boiss. – 1c: *U 31;* 2a: 27.6.1998, *E 6118;* 2c: 4.7.1998, *E 6493; R BT 1;* 2e: *P 6536.* – C / EMed.

Silene armena var. *serrulata* (Boiss.) Coode & Cullen – 1c: 6.6.1998, *E 6036;* 7: *RB 2291.* – C / End_{wt}, LR (cd).

Silene bupleuroides L. – *6: HS 23670.* – H / ES.

Silene capitellata Boiss. – 1c: 16.8.1998, *E 6042.* – C / End_a, LR (lc).

Silene caryophylloides subsp. *eglandulosa* (Chowdh.) Coode & Cullen – 1a: *U 35;* 2e: 16.7.1998, *E 6305*, *E 6474; P 6491;* 7: *RB 2276.* – C / End_t, LR (nt). – Records of subsp. *masmenaea* (Boiss.) Coode & Cullen from the Western Taurus (Düşen & Sümbül 2001, Quézel 1973, Quézel & Pamukçuoğlu 1970) refer in all probability to subsp. *eglandulosa*. The questionable plants (such as *E 6305*) may key out in Fl. Turk. 2 (Coode & Cullen 1967) as subsp. *masmenaea* on account of their rather small and densely glandular calyces of c. 25 mm, but do not otherwise match the material of that subspecies kept at E. The first lead of the key unconvincingly separates two groups on the basis of the calyx length (20-25 versus 25-35 mm; subsp. *eglandulosa* is indicated with "calyx c. 26 mm"). In the light of the plentiful material of all subspecies now at hand from all of the range it is evident that less stress must be placed on the density of the calyx indumentum. Densely glandular calyces do also occur within subsp. *echinus* (Boiss. & Heldr.) Coode & Cullen from the Cilician Taurus (cf. the material in B and E; det. V. Melzheimer). The calyx length of subsp. *eglandulosa* in fact ranges from (20-)22-28(-30) mm.

Silene ispartensis Ghaz. – 4: *P 6569.* – C / End_t, EN. – The second locality of this obviously very rare species, hitherto only known from C3 Isparta, Kura Tepe / Anemas D. (Davis & al. 1988).

Silene italica (L.) Pers. – 1f: 8.8.1998, *E 6651;* 8: *OD 1801.* – H / Med-ES-IT.

Silene leptoclada Boiss. – 2c: 27.6.1998, *E 6596.* – C / End_{wt}, LR (nt).

Silene odontopetala Fenzl – 1a: *U 36;* 2a: 27.6.1998, *E 6596;* 2b: *P A42.* – C / EMed-IA.

Silene oreades Boiss. & Heldr. – 2a: 16.6.1998, *E 6135; P 6530.* – C / End_t, LR (nt).

Silene rhynchocarpa Boiss. – 1c: 9.6.1998, *E 6461;* 2c: 23.5.1998, *E 6122; P 6522;* 7: *RB 1504.* – C / IA.

Silene spergulifolia (Willd.) M. Bieb. – 1c: 6.6.1998, *E 6089;* 2c: 27.6.1998, *E 6027*. – C / IA.
Silene subconica Friv. – 1c: 23.5.1998, *E 6197*. – T / Med-IA.
Silene supina subsp. *pruinosa* (Boiss.) Chowdh. – 1c: 16.7.1998, *E 6426;* 6: *HS 23682*. – C / IT-ES.
Silene vulgaris (Moench) Garcke var. *vulgaris* – 1f: 6.6.1998, *E 6519*. – H / ES (-Med).
Spergularia rubra (L.) J. Presl & C. Presl – 1c: 5.5.1998, *E 6610;* 9: *OD 1122*. – T / Med-ES.
Telephium imperati subsp. *orientale* (Boiss.) Nymán – 1f: 7.6.1998, *E 6409*. – C / Med-IT.

Chenopodiaceae
Chenopodium foliosum (Moench) Asch. [*C. virgatum* L.] – 2f: 16.8.1998, *E 6447;* 6: *HS 23701;* 7: *RB 1512*. – T / Med-ES-IT.
Noaea mucronata (Forssk.) Asch. & Schweinf. subsp. *mucronata* – 1c: 16.6.1998, *E 6608;* 2e: *P 6558;* 4: 24.7.1998, *E 6508*. – C / IT.

Convolvulaceae
Convolvulus arvensis L. – 1f: 4.7.1998, *E 6121*. – G / Subcos.
Convolvulus galaticus Choisy – 1f: 8.7.1998, *E 6120*. – H / End_a, LR (lc).

Crassulaceae
Prometheum sempervivoides (Fisch. ex M. Bieb.) H. Ohba – 1c: *U 33;* 2c: 24.7.1998, *E 6489*. – Cs / EMed-IA.
Rosularia sempervivum subsp. *pestalozzae* (Boiss.) Eggli – 2a: 9.6.1998, *E 6029* (det. Duman); *P s.n.* – Cs / End_t, LR (nt).
Sedum album L – 2c: 23.5.1998, *E 6113*. – Cs / ES-Med.
Sedum amplexicaule subsp. *tenuifolium* (Sm.) Greuter & Burdet – 1f: 25.4.1998, *E 6634*. – Cs / EMed.
Sedum dasyphyllum L. – 2a: 23.5.1998, *E 6111;* 1b: *P A 3-6;* 2e: *P 6525*. – Cs / ES-Med.
Sedum eriocarpum subsp. *caricum* (A. Carlström) 't Hart – 4: *P 6597*. – T / End_{wt}, EN.
Sedum hispanicum L. var. *hispanicum* – 2c: *D 373a*; 6.6.1998, *E 6528;* 2d: *P 6501;* 6: *HS 23695*. – T / EMed.
Sedum magellense Ten. – 1a: 7.6.1998, *E 6611;* 2a: 6.6.1998, *E 6601; P s.n.* – Cs / Med.
Sedum pallidum M. Bieb. var. *pallidum* – 3: 7.7.1998, *E 6639*. – Cs / ES-IT-Med.
**Sedum subulatum* (C. A. Mey.) Boiss. – 1c: 16.7.1998, *E 6440* (conf. Aytaç). – Cs / Eux.
Sedum ursi 't Hart – 1c: 8.7.9, *E 6538*. – Cs / End_a.
Umbilicus erectus DC. – 1a: 9.6.1998, *E 6667*. – Cs / Med.

Cuscutaceae
Cuscuta approximata Bab. var. *approximata* – 2c: 4.7.1998, *E 6560;* 6: *HS 23662*. – Pa / Med-IA.

Dipsacaceae
Cephalaria lycica Matthews – 1c: 16.7.1999, *E 6664;* 3: 8.7.1998, *E 6019;* 4: *P 6563*. – C / End_{wt}, LR (nt).
Dipsacus laciniatus L. – 1f: 25.7.1999, *E 6572*. – H / ES-Med-IT.
Lomelosia micrantha (Desf.) Greuter & Burdet – 1c: *T 594. – T / ES.*
Lomelosia rotata (M. Bieb.) Greuter & Burdet – 1c: *T 593;* 1f: 16.8.1998, *E 6525*. – T / IA.
Pterocephalus pinardii Boiss. – 3: 27.6.1998, *E 6007*. – C / End_a, LR (lc).
Pterocephalus plumosus (L.) Coult. – 1c: *T 596;* 1f: 16.8.1998, *E 6573*. – H / EMed-IA.

Euphorbiaceae
Euphorbia anacampseros Boiss. var. *anacampseros* – 1c: 16.6.1998, *E 6056;* 4: *P 6566*. – C / End_a, LR (lc).
Euphorbia herniariifolia var. *glaberrima* Hal. – 1b: 1.8.1998, *E 6712;* 1b: *P A1-3;* 2b: 9.6.1998, *E 6467*. – H / EMed-IA.
Euphorbia herniariifolia Willd. var. *herniariifolia* – 2a: 25.7.1999, *E 6599*. – H / EMed-IA.
Euphorbia kotschyana Fenzl – 1c: 16.8.1998, *E 6631; P A50*. – C / Pont-EMed.

Euphorbia pestalozzae Boiss. – 2b: 16.6.1998, *E 6057;* 2c: *P 6554;* 9: *OD 1130*. – C / End_{wt}, LR (cd).

Euphorbia stricta L. – 1f: 8.8.1998, *E 6642;* 5: *R s.n.* – T / ES.

Fabaceae

Anthyllis vulneraria subsp. *pulchella* (Vis.) Bornm. – 1c: 7.8.1999, *E 6601;* 2e: *P 6523b*. – C / ES-Med.

Astragalus angustifolius Lam. var. *angustifolius* – 1c: 16.6.1998, *E 6512*. – C / EMed(-IA).

Astragalus angustifolius var. *violaceus* Boiss. – 2c: 7.7.1999, *E 6624*. – C / EMed.

Astragalus cadmicus Boiss. – 1a: 4.7.1998, *E 6055*. – C / End_{a}, LR (lc).

Astragalus creticus Lam. – 4: 24.7.1998, *E 6130* (det. Duman)*; T 523*. – C / EMed.

Astragalus depressus L. – 1c: 7.6.1998, *E 6378*. – C / ES-EMed.

Astragalus gymnolobus Fisch. – 1f: 16.6.1998, *E 6548*. – C / End_{a}, LR (lc).

Astragalus hirsutus Vahl (incl. *A. alindanus* Boiss.) – 2e: 16.7.1998, *E 6310;* 2e: *P A1-10, 6524*. – C / End_{t}, LR (lc).

Astragalus lycius Boiss. – 1c: 23.5.1998, *E 6054;* 1f: *92-12-38c*. – H (C) / End_{a}, LR (lc).

Astragalus macrourus Fisch. & C. A. Mey. – 1c: 23.5,1998, *E 6125;* 2c: 7.6.1998, *E 6367;* 7: *RB 1528*. – C / IA.

Astragalus microcephalus Willd. – 2c: 24.7.1998, *E 6588;* 1c: 16.6.1998, *E 6469;* 4: *P 6586*. – C / IA.

Astragalus microrchis Barbey – 1c: 23.5.1998, *E 6192;* 9.6.1998, *E 6684;* 2c: 6.6.1998, *E 6423;* 2d: *P 92-13-17*. – C / End_{wt}, LR (cd). – Obviously more variable than previously assumed: flowers yellow (as given by Chamberlain & Matthews 1970) or pink *(E 6192, P 92-13-17)* within one population.

Astragalus odoratus Lam. – 1f: 8.6.1998, *E 6188;* 5: *R s.n.*; 6: *HS 23671*. – H / IA.

Astragalus oxytropifolius Boiss. – 1c: 23.5.1998, *E 6174* (det. Duman). – C / End_{a}, LR (nt).

Astragalus parnasii subsp. *cylleneus* (Boiss. & Heldr.) Hayek – 2c: 27.6.1998, *E 6681*. – C / EMed.

Astragalus pinetorum Boiss. – 1e: *P A1-10;* 2e: 8.6.1998, *E 6190*. – C / End_{a} (EMed ?), LR (lc).

Astragalus tmoleus var. *bounacanthus* (Boiss.) D. F. Chamb. – 2c: 24.7.1998, *E 6460;* 6: *HS 23677*. – C / EMed.

Coronilla varia L. subsp. *varia* – 4: 16.8.1998, *E 6673*. – H / IA-ES.

Genista albida Willd. – 1c: 6.6.1998, *E 6443*. – C / EMed.

Lathyrus digitatus (M. Bieb.) Fiori – 1c: 16.7.1998, *E 6359*. – H / EMed.

Lotus alpinus (DC.) Ramond – 1c: *T 571;* 2c: *T 535;* 2f: 8.7.1998, *E 6579;* 5: *R s.n.* – C / ES(-IA-Med).

Medicago lupulina L. var. *perennans* Hal. – 1d: *D 494;* 2d: 5.5.1998, *E 6691;* 5: *R s.n.* – H / ES-IA-Med.

Medicago rigidula (L.) All. var. *rigidula* – 1c: *T 602*. – T / Med-IT.

Medicago sativa L. subsp. *sativa* – 1f: 16.6.1998, E *6475*. – H / ES-IT-Med.

Melilotus officinalis (L.) Lam. – 1f: 23.5.1998, *E 6385*. – H / ES-IT.

Onobrychis cornuta (L.) Desv. – 1c: 8.7.1998, *E 6602;* 2d: *P s.n.; R A103;* 2e: 16.6.1998, *E 6269*. – C / IA.

Onobrychis montana subsp. *cadmea* (Boiss.) P. W. Ball – 1c: 27.6.1998, *E 6453;* 1f: 16.6.1998, *E 643*. – C / IA.

Ononis spinosa subsp. *leiosperma* (Boiss.) Širj. – 1c: 4.7.1998, *E 6459;* 1f: 16.8.1998, *E 6629*. – C / EMed.

(*)*Trifolium hybridum* subsp. *anatolicum* (Boiss.) M. Hossain – 1d: 6.6.1998, *E 6543*. – H / ES-Med.

Trifolium nigrescens subsp. *petrisavii* (Clem.) Holmboe – 1f: 16.7.1998, *E 6544*. – H / Med.

Trifolium ochroleucum Huds. – 7: *RB 1509*. – H / ES-Med.

Trifolium pratense L. var. *pratense* – 1d: 16.6.1998, *E 6654;* 5: *R s.n.* – H / Subcos.

Trifolium repens L. var. *repens* – 1d: 9.6.1998, *E 6483;* 5: *R s.n.* – H / Med-ES-IT.
Trigonella spruneriana Boiss. var. *spruneriana* – 1f: 27.6.1998, *E 6463.* – H / IA.
Vavilovia formosa (Steven) Federov – 1b: 8.6.1998, *E 6227; U 39;* 2b: *P A48-1;* 7: *RB 2297.* – H / EMed-IA.
Vicia anatolica Turrill – 1c: *T 604*. – T / IA.
Vicia hybrida L. – 1c: 5.5.1998, *E 6266*. – T / Med.
Vicia villosa subsp. *eriocarpa* (Hausskn.) P. W. Ball – 1f: 9.6.1999, *E 6620.* – T / EMed.

Gentianaceae

Centaurium erythraea Raf. subsp. *erythraea* – 1d: 6.6.1998, *E 6473.* – H / ES.
Centaurium erythraea subsp. *turcicum* (Velen.) Melderis – 4: *P 6596*. – H / EMed-IA.
Centaurium pulchellum (Sw.) Druce – 2f: 8.7.1998, *E 6441*. – T / ES-Med-IT.

Geraniaceae

Erodium ciconium (L.) L'Hér. – 1c: 23.5.1998, *E 6166* . – T / Med-IT.
Geranium molle L. subsp. *molle* – 1f: 23.5.1998, *E 6180* . – T / Med-IA.
Geranium tuberosum L. subsp. *tuberosum* – 1c: 8.6.1998, *E 6502;* 1f: *P 92-12-17; R t 1-9*, *A11-2;* 2b: *P A17.* – G / ES-Med-IT.

Hypericaceae

Hypericum aviculariifolium subsp. *depilatum* (Freyn & Bornm.) Robson var. *depilatum* – 1f: *P 92-12-34;* 2e: 24.7.1998, *E 6070;* 4: *P 6595;* 6: *HS 23696;* 7: *RB 1516.* – C / End_{a}, LR (lc).
Hypericum aviculariifolium subsp. *depilatum* var. *bourgaei* (Boiss.) Robson – 2c: 30.8.1998, *E 6285;* 2e: P 6514. – C / End_{wt}, LR (lc).

Illecebraceae

Herniaria glabra L. – 1c: 30.8.1998, *E 6551.* – C / ES-Med-IT.
Herniaria hirsuta L. – 1c: *T 561.* – C / ES-Med-IT.
Herniaria incana Lam. – 1c: *E 6284;* 3: 16.7.1998, *E 6424*. – C / ES-Med-IT.
Paronychia argyroloba Stapf – 1c: 7.6.1998, *E 6344;* 1f: *P 92-12-10;* 4: *P 6578a;* 8: *OD 1068*. – C / End_{t}, LR (nt).
Paronychia chionaea Boiss. – 2c: *P 6557, 6580;* 3: 17.6.1998, *E 6678;* 4: *P 6578*. – C / Pont-EMed.
Paronychia lycica Chaudh. – 2e: 16.8.1998, *E 6369; P 6508-6526;* 7: *RB 2278, 1517*. – C / End_{wt}, VU.

Lamiaceae

Ajuga bombycina Boiss. – 1c: 27.6.1998, *E 6685.* – C / End_{t}, LR (nt)
Ajuga chamaepitys subsp. *glareosa* P. H. Davis – 1b: 4.7.1998, *E 6212;* 1c: 8.6.1998, *E 6540;* 1f: 8.7.1998, *E 6494;* 2b: *P A62-3*. – C / EMed.
Ajuga chamaepitys subsp. *mesogitana* (Boiss.) Bornm. – 2e: *P 6513;* 7: *RB 1511*. – C / EMed.
Cyclotrichium origanifolium (Labill.) Manden. & Scheng. – 2c: 27.6.1998, *E 6311*. – C / EMed.
Dorystoechas hastata Boiss. & Heldr. ex Benth. – 1a: 16.7.1998, *E 6648*. – C / End_{wt},VU.
Lamium cymbalariifolium Boiss. – 1b: 9.6.1998, *E 6458; P A3-1; U 20*. – H / End_{wt}, LR (cd).
Lamium garganicum subsp. *reniforme* (Benth.) R. R. Mill – 1c: 23.5.1998, *E 6626;* 2b: *P A50-2;* 2c: 16.6.1998, *E 6556*. – C / EMed.
Lamium macrodon Boiss. & Huet – 2c: 23.5.1998, *E 6535*. – T / IA.
Marrubium bourgaei Boiss. subsp. *bourgaei* – 1c: 9.6.1998, *E 6546; U 22;* 2b: 27.6.1998, *E 6255;* 2d: *P 6531;* 4: 1.8.1998, *E 6816*. – C / End_{wt}, LR (nt).
Mentha longifolia subsp. *typhoides* (Briq.) Harley – 1f: 5.5.1999, *E 6694;* 5: *P 6609; R s.n*. – H / EMed.
Nepeta nuda subsp. *albiflora* (Boiss.) Gams – 1c: 16.6.1998, *E 6656; R E1-8b;* 2c: 8.7.1998, *E 6194*. – H / ES.
Origanum minutiflorum O. Schwarz & P. H. Davis – 1c: 8.8.1998, *E 6603;* 7: *RB 2200*. – C / End_{wt}, LR (nt).

Phlomis armeniaca Willd. – 1c: *U 27;* 2c: 8.7.1998, *E 6004; T 538;* 4: 1.8.1998, *E 6818.* – C / End_a, LR (lc).
Phlomis pungens var. *laxiflora* Velen. – 1f: 16.6.1998, *E 6328; P 6611*. – H / EMed-IA.
Prunella vulgaris L. – 1f: 7.6.1998, *E 6058*. – H / ES.
Salvia argentea L. – 2c: *T 516;* 3: 16.7.1998, *E 6062;* 4: 1.8.1998, *E 6809.* – C / Med.
Salvia caespitosa Benth. – 1c: 24.7.1998, *E 6675.* – C / End_a, LR (lc).
Salvia dichroantha Stapf – 1c: 30.8.1998, *E 6592;* 6: *HS 23668*. – C / End_a, LR (lc).
Salvia frigida Boiss. – 1c: 23.5.1998, *E 6465;* 7: *RB 1519*. – C / Med-IA.
Salvia pisidica Benth. – 1c: 4.7.1998, *E 6116*; 2c: 7.7.1998, *E 6235; P 6555*. – C / End_a, LR (lc).
Salvia tomentosa Mill. – 1f: 27.6.1998, *E 6402;* 9.6.1998, *E 6051*. – C / Med-ES.
Satureja cuneifolia Ten. – 1a: 16.8.1998, *E 6770;* 2c: 27.6.1998, *E 6097;* 6: *HS 23704;* 2c: *D 452*. – C / Med-IA.
Satureja graveolens (M. Bieb.) Caruel – 1c: 23.5.1998, *E 6514.* – T / Med-IA.
Satureja vulgaris subsp. *arundana* (Boiss.) Greuter & Burdet [*Clinopodium vulgare* subsp. *arundanum* (Boiss.) Nyman] – 1c: 23.5.1998, *E 6268*. – H / ES-Med-IT.
Scutellaria orientalis subsp. *pinnatifida* J. R. Edm. – 1c: 8.6.1998, *E 6199;* 1f: *P 92-12-22;* 2c: 25.7.1999, *E 6354*. – C / EMed-IA.
Sideritis libanotica subsp. *linearis* (Benth.) Bornm. – 1c: 24.7.1998, *E 6229* (det. Duman); *U 34;* 6: *HS 23665*. – C / End_t, LR (lc).
Sideritis pisidica Benth. – 1a: 16.7.1998, *E 6451;* 1c: 27.6.1998, *E 6585* (det. Duman); 7: *RB 2285*. – C / End_a, LR (nt).
Stachys citrina Boiss. & Heldr. subsp. *citrina* – 1b: 9.6.1998, *E 6669*. – C / End_t, LR (nt).
Stachys cretica subsp. *anatolica* Rech.f. – 1c: 16.7.1998, *E 6086;* 1f: 8.8.1998, *E 6509.* – C / End_a, LR (nt).
Stachys lavandulifolia Vahl var. *lavandulifolia* – 1c: 27.6.1998, *E 6415;* 3: 24.7.1998, *E 6478.* – H / IA.
Teucrium chamaedrys subsp. *syspirense* (C. Koch) Rech.f. – 1c: 9.6.1998, *E 6304;* 2b: 8.7.1998, *E 6259;* 2c: 1.8.1998, *E 6821*. – C / EMed-IA.
Teucrium polium L. – 1c: 7.8.1999, *E 6555.* – C / EMed-IA.
Thymus longicaulis subsp. *chaubardii* var. *antalyanus* (Klokov) Jalas – 1c: 16.6.1998, *E 6417* (conf. Yıldız). – C / End_{wt}, LR (nt).
Thymus sipyleus var. *davisianus* Ronniger – 1c: 27.6.1998, *E 6457;* 2c: *P 6523;* 2d: *R A1-20;* 4: 4.7.1998, *E 6107* (conf. Yıldız); *P 6581*. – C / End_t, LR (nt).
Thymus sipyleus Boiss. var. *sipyleus* – 1c: 16.7.1998, *E 6498;* 2b: 29.6.1999, *E 6835* (conf. Yıldız)*;* 4: *P 6581a*. – C / End_a, LR (nt).
Ziziphora capitata L. – 1c: 8.7.1998, *E 6562.* – T / Med-IA.
Ziziphora clinopodioides Lam. – 1c: 4.7.1998, *E 6454;* 4: 16.7.1998, *E 6095;* 4: *D 482;* 7: *RB 2295*. – C / IA.
Ziziphora tenuior L. – 1f: 1.8.1998, *E 6641*. – T / IT.

Linaceae
Linum cartharticum L. – *4: P 6587a*. – T / ES.
Linum usitatissimum L. – 1f: 8.7.1998, *E 6479;* 7: *RB 2223*. – T (H) / Med-ES-IT.

Malvaceae
Malva neglecta Wallr. – 1f: 6.6.1998, *E 6586*. – T / Med-ES-IT.

Morinaceae
Morina persica L. – 1c: 4.7.1998, *E 6085;* 1f: 7.8.1999, *E 6017*. – H / IT.

Onagraceae
Epilobium algidum M. Bieb. – 6: *HS 23698.* – H / Eux.
Epilobium hirsutum L. – 1f: 8.7.1998, *E 6668;* 8: *OD 1950*. – H / ES-Med-IT.

Orobanchaceae

Orobanche anatolica Reut. – 1c: 24.7.1998, *E 6470.* – Pa / IA.

Orobanche fuliginosa Jord. – 1b: *D 472*. – Pa / Med.

Orobanche laevis L. [*O. arenaria* Borkh.] – 1c: 27.6.1998, *E 6368;* 2c: 30.8.1998, *E 6541;* 2e: *P 6505;* 9: *OD 1120*. – Pa / ES-IA.

Orobanche ramosa L. subsp. *mutelii* (F. W. Schultz) Cout. [*O. mutelii* F. W. Schultz] – 1c: 8.7. 1998, *E 6683*. – Pa / Med-IA.

Phelypaea coccinea (M. Bieb.) Poir. – 1c: 25.4.1998, *E 6697*. – Pa / IT.

Papaveraceae

Corydalis erdelii Zucc. [*C. rutifolia* subsp. *erdelii* (Zucc.) Cullen & P. H. Davis] – 1c: 10.4. 1998, *E 6204* (det. Duman). – G / EMed-IT.

Corydalis solida (L.) Clairv. subsp. *solida* – 1c: 5.4.1998, *E 6145*. – G / ES-EMed.

Fumaria parviflora Lam. – 1b: *D 507;* 1c: 23.5.1998, *E 6026; P 6602*. – T / ES-Med-IT.

Glaucium leiocarpum Boiss. – 1f: 16.6.1998, *E 6198;* 8: *OD 1156*. – H / Med-IA.

Papaver pilosum Sm. subsp. *pilosum* – 1c: 27.6.1998, *E 6520;* 2c: *P A53-1; P 6541*. – H / End_a, LR (lc).

Papaver pilosum subsp. *sparsipilosum* (Boiss.) Kadereit – 1c: *U 25* (det. Kadereit). – H / End_{wt}.

Papaver argemone L. – 1f: 23.5.1998, *E 6645*. – T / Med-IT-ES.

Papaver rhoeas L. – 1f: 5.5.1998, *E 6702*. – T / ES-Med-IT.

Plantaginaceae

Plantago lanceolata L. – 1f: 4.7.1998, *E 6577;* 5: *R s.n*. – H / ES-Med-IT

Plantago major subsp. *intermedia* (Gilib.) Lange – 1f: 6.6.1998, *E 6277;* 5: *R s.n*. – H / ES-Med-IT.

Plumbaginaceae

Acantholimon acerosum (Willd.) Boiss. var. *acerosum* – 1c: 16.6.1998, *E 6334;* 1f: *P 6613;* 6: *HS 23678*. – C / IA.

Acantholimon lycaonicum Boiss. & Heldr. – 2c: *D 381; T 459*. – C / EMed.

Acantholimon puberulum Boiss. & Bal. var. *puberulum* – 4: *P 6577*. – C / IA.

Acantholimon ulicinum (Schult.) Boiss. var. *ulicinum* – 1c: 27.6.1998, *E 6389; U 1;* 2b: 30.8. 1998, *E 6777;* 2d: *P 92-10-4;* 7: *RB 2293*. – C / EMed.

Acantholimon ulicinum var. *purpurascens* (Bokhari) Bokhari & J. R. Edm. – 2c: 16.7.1998, *E 6228*. – C / End_a, LR (cd).

Polygalaceae

Polygala pruinosa subsp. *megaptera* Cullen – 1e: *P s.n.;* 2e: 9.6.1998, *E 6033; P 6515*. – C / End_t, LR (lc).

Polygonaceae

Atraphaxis billardierei Jaub. & Spach var. *billardierei* – 2c: 6.6.1998, *E 6391*. – C / IA.

Polygonum cognatum Meissn. – 1f: 16.6.1998, *E 6418.* – H / IT.

**Polygonum karacae* Ziel. & Botratynski – 3: 16.7.1998, *E 6400* (det. Duman); 4: 15.9.1998, *E 6069-6072; P 6585*. – C / End_t, LR (cd).

Rumex patientia L. -1f: 8.8.1998, *E 6250.* – C / Med-ES-IT.

Rumex scutatus L. – 1f: 16.8.1998, *E 6011;* 1f: *P 6000;* 2b: 4.7.1998, *E 6082;* 6: *HS 23691*. – H / ES-IT.

Primulaceae

Anagallis foemina Mill. [*A. arvensis* var. *caerulea* (L.) Gouan] – 1f: 23.5.1998, *E 6098;* 5: *R s.n*. – T / ES-Med-IT.

Androsace maxima L. – 1c: 6.6.1998, *E 6148;* 1f: *P 92-12-27*. – T / Med-IT-ES.

Cyclamen trochopteranthum O. Schwarz – 1c: 14.4.1999, *E 6780.* – G / End_{wt}, LR (lc).

Ranunculaceae

Adonis aestivalis L. subsp. *aestivalis* – 1f: 23.5.1998, *E 6079; P 92-12-4*. – T / ES-Med-IT.

Anemone apennina subsp. *blanda* (Schott & Kotschy) Nyman – 1c: 2.4.1998, *E 6193;* 1e: 24.4. 1999, *E 6511;* 2b: *P A19;* 2d: *R A1-13*. – G / Med-IA.

Ceratocephala falcata (L.) Pers. – 1b: *P A1-5;* 1c: 23.5.1998, *E 6237*. – T / Med-IT-ES.

Nigella arvensis subsp. *glauca* (Boiss.) A. Terracc. – 1f: 27.6.1998, *E 6096;* 6: *HS 23669*. – T / ES-Med-IA.

Ranunculus argyreus Boiss. – 1c: 27.6.1998, *E 6040;* 2c: 8.7.1998, *E 6553;* 2f: *P 6542*. – G / IA.

Ranunculus arvensis L. – 1f: 16.7.1998, *E 6397; P 92-13-1*. – T / ES-Med-IA.

Ranunculus brevifolius Ten. – 2c: 8.6.1998, *E 6298*. – H / EMed.

Ranunculus cadmicus Boiss. var. *cadmicus* – 1b: 9.6.1998, *E 6589; P A3-7;* 2b: 4.7.1998, *E 6234; P A17*. – G / End_t, LR (nt).

Ranunculus constantinopolitanus (DC.) d'Urv. – 1f: 16.7.1998, *E 6175;* 5: *92-13-17; R s.n.* – H / EMed-IA-ES.

Ranunculus demissus var. *major* Boiss. – 1a: 27.6.1998, *E 6506;* 1c: 25.4.1998, *E 6041;* 2a: *P A11-7;* 2d: *R E 1-2*; 7: *RB 2222*. – H / End_t, LR (lc).

Ranunculus repens L. – 1d: 23.5.1998, *E 6387;* 5: *R s.n.;* 7: *RB 1502*. – H / ES-Med-IT.

Resedaceae

Reseda lutea L. subsp. *lutea* – 1f: 7.6.1998, *E 6171*. – H / Med-ES-IT.

Rosaceae

Amelanchier parviflora var. *dentata* Browicz – 1c: 4.7.1998, *E 6407*. – Np / End_a,VU.

Cerasus prostrata (Labill.) Ser. var. *prostrata* – 1b: *P A1-10c;* 2c: 4.7.1998, *E 6432*. – Np / Med.

Cotoneaster nummularia Fisch. & C. A. Mey. – 1c: *P 92-7-8;* 1d: *D 514*. – Np / IT-Med.

Geum heterocarpum Boiss. [*Orthurus heterocarpus* (Boiss.) Juz.] – 1c: 6.6.1998, *E 6245*. – H / Med-IT-ES.

Potentilla recta L. – 1c: 27.6.1998, *E 6293;* 2c: 1.8.1998, *E 6703*. – H / ES-Med-IT.

Potentilla reptans L. – 1c: 16.7.1998, *E 6614;* 5: *R s.n.;* 6: *HS 23688*. – H / ES-Med-IT.

Rosa pulverulenta M. Bieb. – 1c: 25.7.1998, *E 6745; U 29;* 2c: *P A 50-7*. – Np / Med-IA.

Sanguisorba minor subsp. *magnolii* (Spach) Briq. – 1c: 30.8.1998, *E 6798*. – H / EMed.

Sanguisorba minor subsp. *muricata* (Spach) Briq. – 1f: 16.8.1998, *E 6719;* 4: *P 6599b*. – H / Med.

Sorbus umbellata (Desf.) Fritsch var. *umbellata* – 1a: 16.8.1998, *E 6714*. – Np / EMed.

Rubiaceae

Asperula arvensis L. – 1c: 23.5.1998, *E 6605*. – T / Med-IT-ES.

Asperula setosa Jaub. & Spach – 2c: 8.6.1998, *E 6666;* 2d: *T 481*. – T / IA.

Asperula stricta subsp. *monticola* Ehrend. – 1c: *T 586;* 2c: 27.6.1998, *E 6102;* 2e: *P 6529;* 7: *RB 2298*. – C / End_a, LR (lc).

Cruciata taurica (Willd.) Ehrend. – 1c: *P A25;* 2c: 6.6.1998, *E 6127*. – C / EMed.

Galium incanum subsp. *centrale* Ehrend. – 1b: 27.6.1998, *E 6663;* 1c: 16.7.1998, *E 6495;* 2b: *P A47-2;* 2d: *R A 11-9;* 2e: *P 6499*. – C / End_t, LR (lc).

Galium incanum subsp. *elatius* (Boiss.) Ehrend. – 1f: *P 92-12-26;* 2c: *D 376;* 7: *RB 2216*. – C / IA.

Galium verum subsp. *glabrescens* Ehrend. – 1d: *D 484*. – H / IA.

Galium verum subsp. *verum* – 1c: 4.7.1998, *E 6661;* 5: *P 6609a;* 5: *R s.n*. – H / ES-Med-IA.

Santalaceae

Thesium arvense Horv. – 2c: *D 396*. – H / Med-ES.

Thesium billardieri Boiss. – 1c: 8.7.1998, *E 6622*. – C / IA.

Thesium procumbens C. A. Mey. – 2e: 27.6.1998, *E 6105; P 6495*. – C / EMed-Eux.

Saxifragaceae

(*)*Saxifraga corymbosa* Boiss. [*S. luteoviridis* Schott & Kotschy] – 1a: 23.5.1998, *E 6500;* 7: *RB 2294*. – C / Eux.

Scrophulariaceae

Bornmuellerantha aucheri (Boiss.) Rothm. [*Odontites aucheri* Boiss.] – 2e: 4.7.1998, *E 6735; P 6503*. – T / IA.

Chaenorhinum minus subsp. *anatolicum* P. H. Davis – 4: *P 6588*. – T / End_a, LR (lc).

Chaenorhinum minus subsp. *minus* – 2f: 24.7.1998, *E 6612*. – T / Med.

Digitalis cariensis Boiss. ex Jaub. & Spach – 1c: 16.6.1998, *E 6748;* 6: *HS 23667*. – H / End_a, LR (lc).

Digitalis ferruginea L. subsp. *ferruginea* – 1c: 8.7.1998, *E 6010;* 2c: 16.7.1998, *E 6472;* 7: *RB 2201*. – H / EMed.

Euphrasia pectinata Ten. – 4: *P* 6583. – T / ES.

Linaria corifolia Desf. – 1c: 9.6.1998, *E 6112;* 1f: 27.6.1998, *E 6480;* 8: *OD 1804*. – H / End_a, LR (lc).

Linaria genistifolia subsp. *confertiflora* (Boiss.) P. H. Davis – 1f: 4.7.1998, *E 6186;* 6: *HS 23699*. – H / IA.

Linaria genistifolia subsp. *linifolia* (Boiss.) P. H. Davis – 4: 30.8.1998, *E 6679*. – H / IA.

Linaria kurdica subsp. *eriocalyx* (Boiss.) P. H. Davis – 1c: *E 6751*. – H / End_a,VU.

Pedicularis cadmea Boiss. – 1a: *U 26;* 1b: *P A1-10-14;* 2e: 6.6.1998, *E 6505. – H / End*$_t$, LR (lc).

Scrophularia candelabrum Heywood – 2a: 9.6.1998, *E 6442; P 6538;* 9: *OD 1124*. – C / End_{wt}, LR (cd).

Scrophularia depauperata Boiss. – 1b: *P A1-1;* 2b: 27.6.1998, *E 6740*. – C / End_a, LR (lc).

Verbascum cheiranthifolium Boiss. var. *cheiranthifolium* – 1c: 9.8.1999, *E 6721;* 2c: 24.7.1998, *E 6484;* 2f: 24.7.1998, *E 6499*. – H / IA.

Verbascum cheiranthifolium var. *heldreichii* (Boiss. & Heldr.) Murb. – 2e: *P 6516*. – H / End_a, LR (cd).

Verbascum davisianum Hub.-Mor. – 1c: 8.8.1998, *E 6738; U 40*. – H / End_t, LR (cd).

Verbascum orgyale Boiss. & Heldr. – 1c: 16.7.1998, *E 6527;* 2c: *P 6526a;* 6: *HS 23673*. – H / End_{wt}, LR (nt).

Verbascum pestalozzae Boiss. – 1a: *U 41;* 2a: 6.6.1998, *E 6187; P 6539;* 2b: *P A50-7;* 7: *RB 2209*. – C / End_{wt}, EN.

Veronica anagallis-aquatica L. – 1f: 18.7.1999, *E 6755;* 6: *HS 23694*. – H / ES.

Veronica caespitosa Boiss. var. *caespitosa* – 2a: *23.5.1998, E 6466;* 2e: 7.6.1999, *E 6531; P 6502*. – C / End_t, LR (lc).

Veronica camplylopoda Boiss. – 2c: 23.5.1999, *E 6476*. – T / IT.

Veronica cuneifolia s.l. – The species occurs on Bakırlı D. and on all summits of the eastern Beydağları with a puzzling variability. The great majority of the plants are morphologically intermediate between the two subspecies recorded, while subsp. *massicytica* M. A. Fisch. is restricted to the Akdağları and the western portion of the Beydağları (Kızlar sivrisi). Such intermediates have also been reported from Tahtalı D. (Fischer 1976). Subsp. *cuneifolia* apparently dominates at damp places and in the Drabo-Androsacetalia vegetation, while subsp. *isaurica* occurs with only scattered individuals in a variety of Astragalo-Brometalia stands, including those on serpentine. Moreover, there are rarely obvious intermediates between *V. cuneifolia* and *V. elmaliensis.* In Table 1 we have combined all these taxa under *V. cuneifolia* agg. – For a distribution map of *V. cuneifolia* s.l., see Parolly (1995a).

Veronica cuneifolia D. Don subsp. *cuneifolia* – 1c: 23.5.1998, *E 6488, 6464;* 2d: *R t 1-3; A 107*. – C / End_t, LR (lc).

Veronica cuneifolia subsp. *cuneifolia* vs. subsp. *isaurica* – 2c: *D 401; T 477*, *490*, *466;* 2f: *T 512*. – C / End_t.

Veronica cuneifolia subsp. *isaurica* P. H. Davis – 2b: 16.6.1998, *E 6071;* 2e: *P 6556;* 3: *T 559*, *587*. – C / End_t, LR (lc).

Veronica cuneifolia × *V. elmaliensis* – 2c: *D 444*. – C / End_{wt}.

Veronica elmaliensis M. A. Fisch. – 2c: 24.7.1998, *E 6485*. – C / End_{wt}, LR (nt).

Veronica hederifolia L. – 1c: 23.5.1998, *E 6490*. – T / ES-Med-IT.

Veronica lycica E. Lehm. – 1c: 5.5.1999, *E 6698*. – C / End_{wt}, LR (cd).

Thymelaeaceae

Daphne oleoides Schreb. subsp. *oleoides* – 1e: *P s.n.;* 2c: 9.6.1998, *E 6249;* 9: *OD 1114*. – C / EMed.

Urticaceae

Urtica dioica L. – 2f: 16.8.1998, *E 6191*. – H / ES-Med-IT.

Valerianaceae

Centranthus longiflorus Stev. subsp. *longiflorus* – 1f: 8.6.1998, *E 6083*. – H / IA-EMed.
Valerianella carinata (L.) DC. & Lam. – 2b: 7.6.1998, *E 6557; P A47-3*. – T / ES-Med-IA.
Valerianella vesicaria (L.) Moench – 1f: 8.7.1998, *E 6185*. – T / Med-IT.

Violaceae

Viola heldreichiana Boiss. – 1c: 23.5.1998, *E 6182*. – T / EMed.

Monocotyledoneae

Amaryllidaceae

Galanthus elwesii Hook.f. – 2b: 5.4.1998, *E 6591*. – G / EMed.
Sternbergia colchiciflora Waldst. & Kit. – 1c: 30.8.1998, *E 6067*. – G / Med-ES-IT.

Araceae

Arum dioscoridis Sm. var. *dioscoridis* – 1c: 16.7.1998, *E 6296*. – G / EMed.

Cyperaceae

Blysmus compressus (L.) Panz. ex Link – 5: 27.6.1998, *E 6785;* 5: *P 92-13-3;* 5: *R s.n*. – H / ES-IT.
Eleocharis palustris (L.) Roem. & Schult. – 5: 27.6.1998, *E 6750; P 92-13-21; R s.n*. – H / Subcos.
Eleocharis quinqueflora Vill. – 5: *R s.n*. – H / ES.
Carex distans L. – 1f: 16.7.1998, *E 6429;* 5: *P 92-13-1;* 5: *R s.n*. – H / ES-Med-IT.
Carex hordeistichos (Hartmann) Sw. – 5: *P 92-13-9*. – H / ES.
Carex muratica L. – 5: *P 92-13-5*. – H / ES.
Carex otrubae Podp. – 1f: 8.7.1998, *E 6321;* 5: *P 92-13-4; R T3-25*. – H / ES.
Carex tomentosa L. – 5: *P 92-13-6; R T3-26*. – H / ES

Iridaceae

Crocus antalyensis Mathew – 5: 1.4.1998, *E 6513*. – G / End_{a}, LR (lc).
Crocus biflorus subsp. *isauricus* (Siehe ex Bowles) Mathew – 1c: 5.4.1998, *E 6526;* 1d: 2.4.1998, *E 6517*. – G / End_{t}, LR (lc).
Crocus cancellatus subsp. *lycius* Mathew – 5: 14.9.1999, *E 6802*. – G / End_{wt}, LR (nt).
Gladiolus anatolicus (Boiss.) Stapf – 1f: 24.7.1998, *E 6224;* 5: *R T3-24*. – G / End_{a}, LR (lc).

Juncaceae

Juncus compressus Jacq. – 5: 16.7.1998, *E 6340; P 92-13-2; R s.n*. – H / ES-IT-Med (Euras).
Juncus inflexus L. – 5: 16.7.1998, *E 6338; P 92-13-4;* 6: *HS 23689*. – H / ES-IT-Med (Euras).

Liliaceae

Allium atroviolaceum Boiss. – 1c: 24.7.1998, *E 6405;* 6: *HS 23661*. – G / IT-ES.
Allium cupani subsp. *hirtovaginatum* (Kunth) Stearn – 2b: *P A1-10-4;* 2e: 16.6.1998, *E 6009*. – G / EMed.
Allium flavum subsp. *tauricum* var. *tauricum* Besser ex Reichb. – 2c: *D 388;* 8.7.1998, *E 6243;* 7: *RB 2277*. – G / Med.
Allium myrianthum Boiss. – 1f: *P 92-30-1*. – G / IA.
Allium reuterianum Boiss. – 3: 4.7.1998, *E 6021;* 4: *P 6564;* 7: *RB 2296*. – G / End_{t}, LR (lc).
Allium rotundum L. – 1c: 27.6.1998, *E 6172;* 2b: *P A18-11;* 2c: 8.7.1998, *E 6273;* 2d: *R A 10-9;* 7: *RB 1527*. – G / Med.

Asphodeline taurica (Pallas) Kunth – 1c: 27.6.1998, *E 6132;* 1f: *P 92-12-7*. – G / EMed.
Colchicum szovitsii Fisch. & C. A. Mey. – 1c: 1.4.1998, *E 6068*. – G / IA.
Colchicum triphyllum Kunze – 2c: 14.4 1999, *E 6564*. – G / Med.
Eremurus spectabilis M. Bieb. – 1c: 5.5.1999, *E 6503; P 92-12-17*. – G / IT.
Fritillaria crassifolia Boiss. & Huet subsp. *crassifolia* – 2b: 9.6.1998, *E 6420; P A17-1;* 2c: *P 6549*. – G / End_a, LR (lc).
Fritillaria pinardii Boiss. – 1c: 5.5.1998, *E 6161;* 1d: 14.4.1999, *E 6449;* 2d: *P 92-11; R T 1-99*. – G / IA.
Gagea fibrosa (Desf.) Schult. & Schult. f. – 1c: 23.5.1998, *E 6496*. – G / Med.
Gagea fistulosa Ker.-Gawler – 1c: 14.4.1999, *E 6455*. – G / IT-ES.
Gagea granatelli (Parl.) Parl. – 1b: *P A1-8*. – G / Med.
Gagea villosa var. *hermonis* Dafni & Heyn – 1b: *P 92-10-2, P A3-8;* 2b: 5.5.1998, *E 6160;* 2d: *R A115*, *T 1-2*. – G / EMed.
Muscari armeniacum Leichtlin ex Baker – 1c: 24.4.1999, *E 6756;* 2c: *T 470*. – G / ES-IA.
Muscari bourgaei Baker – 1c: 23.5.1998, *E 6763;* 1d: *P A11-1*. – G / End_t, LR (lc).
Muscari comosum (L.) Mill. – 1c: 14.4.1999, *E 6768*. – G / Med-IT-ES.
Muscari muscarimi Medik. – 3: 23.5.1998, *E 6422;* 1c: 5.5.1999, *E 6721;* 4: *P 6571*. – G / End_{wt}, VU.
Muscari neglectum Guss. – 2c: 5.4.1998, *E 6801*. – G / Med-IT-ES.
Ornithogalum armeniacum Baker – 1c: 6.6.1998, *E 6761;* 2c: 5.5.1999, *E 6477*. – G / EMed.
Ornithogalum montanum Cyr. – 2c: 23.5.1998, *E 6759*. – G / EMed-IT.
Ornithogalum nutans L. – 2f: 23.5.1998, *E 6804*. – G / EMed.
Ornithogalum oligophyllum E. D. Clarke – 1c: 24.4.1999, *E 6586;* 1d: 23.5.1998, *E 6807;* 2d: *P 92-10*. – G / IA-ES.
Ornithogalum orthophyllum Ten. – 1d: 5.5.1998, *E 6758;* 1d: *P A16-5;* 2d: *R E1-9*, *T1-1*, *E4-1*. – G / ES-Med.
Ornithogalum platyphyllum Boiss. – 5: *R s.n*. – G / IA.
Scilla pleiophylla Speta – 1c: 2.4.1998, *E 6200;* 2d: *P 92-10; R A110*. – G / End_t, LR (nt).
Tulipa armena var. *lycica* (Baker) Marais – 1c: 5.5.1998, *E 6766;* 14.4.1999, *E 6710;* 1f: *P 92-12-37;* 2c: 23.5.1998, *E 6743*. – G / End_t, LR (lc).

Orchidaceae

Dactylorhiza iberica (M. Bieb. ex Willd.) Soó – 1f: 24.7.1998, *E 6002;* 5: *P 92-13-1; R s.n*. – G / EMed.

Poaceae

Agrostis stolonifera L. – 4: *P 6582*. H / ES.
Aira elegantissima subsp. *ambigua* (Arc.) M. Doğan – 1c: 27.6.98. *E 6291*. – T / Med-IT-ES.
Alopecurus arundinaceus Poir. – 1c: 8.8.1998, *E 6633;* 7: *RB 1526*. – G / ES.
Alopecurus lanatus Sm. – 1a: 7.6.1998, *E 6578;* 2a: 6.6.1998, *E 6574;* 2d: *R E1-14;* 2e: 24.7.1998, *E 6643;* 7: *RB 2275*. – H / End_a, LR (lc).
Alopecurus textilis Boiss. – 4: *P 6573*. – H / IA.
Alopecurus vaginatus (Willd.) Boiss. – 2c: 8.7.1998, *E 6462*. – G / EMed.
Bromopsis cappadocica (Boiss. & Bal.) Holub subsp. *cappadocica* [*Bromus cappadocicus* Boiss. & Bal. subsp. *cappadocicus*] – 1b: *P A9-3;* 1c: 8.7.1998, *E 6524;* 2b: 9.6.1998, *E 6241; P A27-1;* 2c: *P 6543*. – H / IA.
Bromopsis tomentella subsp. *nivalis* (Bornm.) H. Scholz [*Bromus tomentellus* subsp. *nivalis* (Bornm.) H. Scholz & Byfield] – 2e: *P 6519*. – H / IA (EMed). – See Parolly & Scholz (2004).
Bromopsis tomentella (Boiss.) Holub subsp. *tomentella* [*Bromus tomentellus* Boiss. subsp. *tomentellus*] – 2d: *R s.n*. – H / EMed-IA.
Bromus japonicus Thunb. – 1c: 27.6.1998, *E 6594;* 2c: *T 1061;* 7: *RB 1514*, *2205*. – T / ES-Med-IT.
**Bromus lanceolatus* Roth – 4: 27.6.1998, *E 6705*. – T / Med-ES-IT.

Bromus tectorum L. – 1c: 8.8.1998, *E 6659;* 2c: 27.6.1998, *E 6746*. – H / ES.

Dactylis glomerata subsp. *hispanica* (Roth) Nyman – 1c: 8.7.9, *E 6482;* 5: *R T3-26*. – H / Med.

Elytrigia divaricata (Boiss. & Bal.) Nevski [*Elymus lazicus* subsp. *divaricatus* (Boiss. & Bal.) Melderis] – 1b: *P A2-1;* 1c: 4.7.1998, *E 6248;* 2b: 27.6.1998, *E 6329;* 2c: 16.7.1998, *E 6270; P 6546*. – H (G) / End_a, LR (lc).

Elytrigia intermedia (Host) Nevski [*Elymus hispidus* (Opiz) Melderis subsp. *hispidus*] – 1c: *D 511*. – G / Med-ES-IT.

Elytrigia repens (L.) Nevski [*Elymus repens* (L.) Gould subsp. *repens*] – 2c: 27.6.1998, *E 6305a;* 5: *R s.n.* – H / Med-IT.

Elytrigia tauri (Boiss. & Bal.) Tzvelev [*Elymus tauri* (Boiss. & Bal.) Melderis subsp. *tauri*] – 1b: *P A14-1*, *A16b-1;* 1c: 27.6.1998, *E 6363*. – H (G) / IA.

Eremopoa capillaris R. R. Mill – 1c: 27.6. 1998, *E 6363a.* – T / EMed.

Festuca adanensis Markgr.-Dannenb. – 1b: *P A9-4*, *A10-1;* 2b: *P A16-2*. – H / End_t, LR (nt). – Cf. Parolly (1995b).

Festuca arundinacea Schreb. subsp. *arundinacea* – 5: *R s.n.* – H / ES-IA-Med.

Festuca elwendiana Markgr.-Dannenb. – 1c: 4.7.1998, *E 6526;* 2c: 27.6.1998, *E 6356*. – H / IT.

Festuca pinifolia (Hackel ex Boiss.) Bornm. var. *pinifolia* – 1b: *P A9-2;* 2c: 16.8.1998, *E 6349;* 2d: *R A122*. – H / EMed.

Festuca valesiaca Schleich. ex Gaudin – 1c: *T 540*, *556;* 2c: *D 383*, *460*. – H / ES-IT.

Glyceria notata Chevall. – 5: *P 6610a*. – H / ES.

Hordeum bulbosum L. – 1c: 24.7.1998, *E 6695*. – G / Med-IT.

Koeleria brevis Steven – 2c: 25.7.1999, *E 6539*. – H / Med-ES. – See Parolly & Scholz (2004).

Koeleria macrantha (Ledeb.) Schult. [*K. cristata* (L.) Pers.] – 2e: 8.8.1998, *E 6628; P 6521;* 5: *R s.n.* – H / Med-ES-IT.

Koeleria nitidula Velen. – 5: *R T3-24.* – H / ES-Med-IA.

Melica ciliata L. subsp. *ciliata* – 1d: *D 498;* 2c: 27.6.1998, *E 6291.* – H / Med.

Ochlopoa annua (L.) H. Scholz [*Poa annua* L.] – 1c: 8.6.1998, *E 6169.* – T / subcos. – Cf. Böhling & Scholz (2003).

**Poa akmanii* Soreng, P. Hein & H. Scholz – 2e: *P 6498.* – G / End_t, LR (cd). – Hitherto known from only two localities (B3 [not C2 as wrongly indicated in the protologue] Isparta, Barla - dağı and C2 Antalya, Kızlar sivrisi) and two collections, being the basis of the first description (Soreng & al. 1997). Three more localities can be added, viz. Bakırlı D., Çalbalı D. and Honaz D. as the westernmost occurrence, indicating a Lycian-Pisidian distribution, i.e. the mountains of the Western Taurus in its strict phytogeographical sense, plus those forming the Arc of Isparta, which mostly belong in phytogeographically to the Central Taurus (Parolly 2004). The habitat requirements of this subalpine to alpine species given by Soreng & al. (1997) are largely confirmed; in phytosociological terms it inhabits cliffs close to snowfields (Silenetalia odontopetalae) and wind-beaten rocky flats supporting a gappy Drabo-Androsacetalia vegetation. – The ovaries of the specimens from Bakırlı D. are partly infested by nematodes. – A search for more material at the paratype locality Kızlar sivrisi yielded a very few, heavily browsed viviparous specimens. Vivipary had not been recorded for this taxon.

Specimens. – C2 DENIZLI: Honaz D., summit region (main ridge and saddle between the two major peaks). 37°03'18''N, 30°09'45''E, 2460-2490 m, rock crevices and cliffs (Silenetalia odontopetalae), limestone and dolomite, 20.6.2000, *E 3038, P 7505* (AKDU, B, E, GAZI, ISTE, herb. Parolly). — C2 ANTALYA: Beydağları, Kızlar sivrisi, N-facing cirque below Aktepe summit, 2600-2700 m, step crevices, limestone, 4.7.191999, *P 6394* (B, herb. Parolly). — C3 ANTALYA: Beydağları, Çalbalı D., 2100 m, rock crevices and cliffs (Silenetalia odontopetalae), limestone, 3.7.2002, *E 5375* (AKDU).

Poa bulbosa L. – 1b: *P A9-8;* 1c: 7.6.1998, *E 6318;* 2c: 6.6.1998, *E 661;* 2d: *R E1-1*. – G / Med-ES-IT.

Poa densa Troitsky – 2c: 24.7.1998, *E 6507*. – G / Eux-IA. – For this and the other first records for Turkey, see Parolly & al. (2002).

Poa thessala Boiss. & Orphan. [*P. alpina* L. subsp. *fallax* F. Herm.] – 1c: 8.7.1998, *E 6729;* 2e: 6.6.1998, *E 6380; P 6498b;* 7: *RB 2215.* – H / EMed-IA.

Poa trivialis L. – 1f: 16.6.1998, *E 6532;* 5: *R s.n.* – H / Med-IT-ES.

Secale anatolicum Boiss. – 1d: *T 532;* 1f: 8.7.1998, *E 6317;* 2f: *D 475.* – H / IA.

Secale leptorhachis H. Scholz & Parolly – 1c: *T 591.* – H / $\mathrm{End_{loc}}$. – For the description of the second local endemic of the study area see Parolly & Scholz (2004).

Stipa ehrenbergiana Trin. & Rupr. – 2c: 16.7.1998, *E 6676.* – H / IT.

Stipa holosericea Trin. – 1d: *D 504;* 2c: *T 533.* – H / IT.

Taeniatherum caput-medusae subsp. *asper* (Simonk.) Melderis – 1c: 27.6.1998, *E 6571.* – T / Med-IT-ES.

2. Vegetation

2.1. Zonation

The eastern Beydağları show in general a Tauric zonation (Kürschner 1982, 1984) with a high mountain habitat and vegetation inventory as depicted by Parolly (2004; cf. also Ayaşlıgil 1987) and in Fig. 5. The timberline may be assumed to range about 2200 to 2300 m (Louis 1939, Mayer & Aksoy 1986, Parolly 1995a, Quézel 1986). Records of *Juniperus excelsa* shrubs on cliffs up to 2500 m indicate the potential tree-line. Around Saklıkent the tree-line is, as usual in the Taurus, depressed to below 1900 m and very open remnants of the former oreal needle-leaved mountain forests of *Pinus nigra* var. *caramanica* (Loudon) Rehder, *Juniperus excelsa* and *J. foetidissima* clothe parts of the lower slopes of Bakırlı D. (Fig. 1). Above this belt, the subalpine tragacanthic vegetation extends up to the summit ridge, comprising a mosaic of grasslands, dwarf shrub and thorn-cushion communities. This zonal vegetation is interrupted and variously intermingled with azonal and extrazonal occurrences of screes, rock fissure communities, snow-patches, meltwater communities and the outposts of the alpine vegetation, the Drabo-Androsacetalia, along the ridge and other wind-exposed places. It is evident that secondary dwarf shrub and thorn-cushion communities (which replace the former forest vegetation) descend now to approximately 1700 m. The diversity of the oreal and lower subalpine xerophytic vegetation is enhanced because of the geological peculiarities: it is here that ophiolitic outcrops occur that support a partly deviating flora and vegetation.

Table 1 puts all types of asylvatic mountain vegetation together as far as studied by relevés. The ruderal and segetal vegetation in and around Saklıkent was not included in our vegetation studies, but it yielded a rich flora. Also excluded (although documented by relevés, Raab-Straube, unpubl. sources 1994) are the very localised Polygono-Polygonetalia flushes with *Dactylorhiza iberica, Carex otrubae, Juncus compressus* and *J. inflexus* at the entrance of the village due to their exclusive floristic inventory. Such communities occur in the Taurus mostly between c. 1400 and 1800 m.

Table 2 shows the syntaxonomic classification of the communities distinguished below or mentioned in the text.

2.2. Vegetation units

Rock communities (Table 1, columns 1a-c, 2). – The vegetation of the cliffs and rock fissure communities of Bakırlı D. can be grouped into two community types (ecologically differentiated alliances) within the Silenetalia odontopetalae order of southern Anatolia and the adjacent Levant. A fragmentary mesophytic to hygrophytic Campanulion cymbalariae rich in hemicryptophytes has been recorded from some larger shady and damp clefts. The majority of the relevés belongs to the only xerophytic rock fissure association of Bakırlı D., the Aethionemo lycii-Laserpitietum petrophili with three subassociations, all dominated by chamaephytes.

In the light of the new relevés available, it is necessary to unite the subass. typicum and subass. verbascetosum pestalozzae. The more broadly treated unit is the dominating rock community from oreal to subalpine elevations at sun-drenched cliffs. The subass. saxifragetosum

Table 1. Synoptic table of the high mountain vegetation of Bakırlı Dağı (oreal and subalpine communities). Communities and sources. – Columns: 1 = Aethionemo lycii-Laserpitietum petrophili, 1a = subass. typicum, 1b = subass. arabidetosum lyciae, 1c = subass. saxifragetosum luteoviridis, 2 = *Laserpitium petrophilum*-Campanulion cymbalariae basis community [1-2 based on Hein & al. 1998 and unpubl. relevés by ÖE and GP], 3 = Lamietum cymbalariifolii [based on Parolly (1995a)], 4 = Ranunculo cadmici-Fritillarietum crassifoliae [based on Parolly (1995a: table 3, columns 1-21)], 5 = *Polygonum karacae-Astragalus creticus* community, 6 = *Astragalus microrchis* community, 7 = *Salvia pisidica*-Tanacetion praeteriti basis community, 8 = Tanacetion praeteriti basis community, 9 = *Sternbergia colchiciflora-Taraxacum bithynicum* community, 10 = *Helichrysum plicatum* subsp. *isauricum* community [5-10 based on unpubl. relevés by ÖE], 11 = Fritillarietum pinardii, 12 = Muscari bourgaei-Ornithogaletum brevipedicellati [11-12 based on Kürschner & al. 1998], 13 = *Seseli hartvigii* community [5-10 based on unpubl. relevés by GP]; abbreviations: AC: character species of association; CC: character species of community; DA: differential species of association; DC: differential species of community; loc: local; ls: limestone, o: ophiolite.

	Column	1a	1b	1c	2	3	4	5	6	7	8	9	10	11	12	13
	Total number of releves	31	8	2	7	20	21	6	7	4	5	8	11	9	14	27
	Average number of species	12	7	10	8	7	7	26	38	23	23	21	17	14	12	31
	Geological substrate (limestone = ls /Ophiolite = o)	ls	ls	ls	ls	ls	ls	o	ls	ls	ls	ls	ls	ls	ls	ls
	Character and differential species of the communities															
AC	*Aethionema lycium*	V	II	III	.	.	.	.	.	.	.	.	.	.	.	.
AC	*Verbascum pestalozzae*	IV	III	III	.	.	.	.	.	.	.	.	.	.	.	.
AC	*Asyneuma lycium*	IV	III	.	.	.	.	.	.	.	.	.	.	.	.	.
DA	*Arabis lycia*	.	V	.	.	.	.	.	.	.	.	.	.	.	.	.
DA	*Saxifraga corymbosa*	.	.	V	.	.	.	.	.	.	.	.	.	.	.	.
AC	*Lamium cymbalariifolium*	.	.	.	.	V	I	.	.	.	.	.	.	.	.	.
AC	*Ranunculus cadmicus*	.	.	.	.	I	V	.	.	.	.	.	.	.	.	.
AC	*Fritillaria crassifolia* subsp. *crassifolia*	.	.	.	.	II	V	.	.	.	.	.	.	.	.	.
DC (loc.)	*Allium cupani* subsp. *hirtovaginatum*	.	.	.	.	.	III	.	.	.	II	.	.	.	.	.
DC (loc.)	*Astragalus creticus*	.	.	.	.	.	.	V	.	.	.	.	.	.	.	.
DC (loc.)	*Linaria genistifolia* subsp. *linifolia*	.	.	.	.	.	.	V	.	.	.	.	.	.	.	.
DC (loc.)	*Polygonum karacae*	.	.	.	.	.	.	IV	.	.	.	.	.	.	.	.
DC (loc.)	*Noaea mucronata* subsp. *mucronata*	.	.	.	.	.	.	IV	.	.	.	.	.	.	.	.
DC (loc.)	*Salvia tomentosa*	.	.	.	.	.	.	IV	.	.	.	.	.	.	.	.
DC (loc.)	*Alyssum huber-morathii*	.	.	.	.	.	.	III	.	.	.	.	.	.	.	.
CC	*Astragalus microrchis*	.	.	.	.	.	.	.	V	.	.	.	.	.	.	.
DC (loc.)	*Salvia frigida*	.	.	.	.	.	.	.	V	.	.	.	.	.	.	.
DC (loc.)	*Genista albida*	.	.	.	.	.	.	.	IV	.	.	.	.	.	.	.
DC (loc.)	*Asphodelina taurica*	.	.	.	.	.	.	.	IV	.	.	.	.	.	.	.
DC (loc.)	*Eremurus spectabilis*	.	.	.	.	.	.	.	III	.	.	.	.	.	.	.
CC	*Sternbergia colchiciflora*	.	.	.	.	.	.	.	.	.	.	V	.	.	.	.
DC (loc.)	*Taraxacum bithynicum*	.	.	.	.	.	.	.	.	.	.	V	.	.	.	.
CC (loc.)	*Helichrysum plicatum* subsp. *isauricum*	.	.	.	.	.	.	.	.	.	.	.	V	.	.	.
DC (loc.)	*Asperula arvensis*	.	.	.	.	.	.	.	.	.	.	.	III	.	.	.
AC	*Fritillaria pinardii*	.	.	.	.	.	.	II	.	.	I	.	.	IV	.	.
CC	*Seseli hartvigii*	.	I	.	.	.	.	.	.	.	.	.	.	.	.	V
	Silenion odontopetalae / Silenetalia odontopetalae															
	Laserpitium petrophilum	V	III	V	V	IV	II	.	.	.	III	.	.	.	.	+
	Asyneuma linifolium subsp. *linifolium*	V	III	V	.	.	.	.	.	.	.	.	.	.	.	.
	Silene odontopetala	V	III	V	.	.	.	.	.	.	.	.	.	.	.	.
	Silene oreades	IV	IV	III	.	.	.	.	.	.	.	.	.	.	.	+
	Campanula cymbalaria	IV	III	.	V	.	.	.	.	.	.	.	.	.	.	.
	Cystopteris fragilis	III	III	.	V	.	.	.	.	.	.	.	.	.	.	.
	Rosularia sempervivum subsp. *pestalozzae*	IV	III	.	II	.	.	.	.	.	.	.	.	.	.	.
	Arabis alpina subsp. *brevifolia*	IV	IV	.	.	I	I	.	.	.	.	.	.	.	.	I
	Arenaria tmolea	V	II	.	.	.	.	.	.	.	.	.	.	.	.	.
	Sedum magellense	II	.	.	III	.	.	.	.	.	.	.	.	.	.	.
	Scrophularia candelabrum	.	III	.	.	.	.	.	.	.	.	.	.	.	.	.
	Lamietalia cymbalariifolii															
	Scrophularia depauperata	.	.	.	.	V	III	.	.	.	.	.	.	.	.	.
	Fritillaria crassifolia subsp. *crassifolia*	.	.	.	.	II	V	.	.	.	.	.	.	.	.	.
	Lamium cymbalariifolium	.	.	.	.	V	I	.	.	.	.	.	.	.	.	.
	Ranunculus cadmicus	.	.	.	.	I	V	.	.	.	.	.	.	.	.	.
	Euphorbia herniariifolia var. *glaberrima*	.	.	.	.	III	IV	.	.	.	.	.	.	.	.	.
	Ormosolenia alpina	.	.	.	.	III	III	.	.	.	.	.	.	.	.	.
	Vavilovia formosa	.	.	.	.	III	II	.	.	.	.	.	.	.	.	.

Table 1. Continuation from preceding page.

	Tanacetion praeteriti / Astragalo-Brometalia															
	Tanacetum praeteritum subsp. *praeteritum*	.	.	.	.	.	I	.	III	V	V	V	V	V	V	I
	Marrubium bourgaei subsp. *bourgaei*	.	.	.	.	.	.	V	V	V	I	V	V	V	V	.
	Alkanna attiliae	.	.	.	.	.	.	II	I	II	V	.	II	.	.	.
	Tragopogon latifolius var. *angustifolius*	.	.	.	.	.	.	.	III	III	I	V	.	.	.	I
	Centaurea luschaniana	.	.	.	.	.	.	.	IV	III	II	II	I	.	.	.
DAl	*Cyanus bourgaei*	.	.	.	.	.	+	.	II	.	II	.	II	.	.	II
	Asyneuma virgatum subsp. *cichoriiforme*	.	.	.	.	.	.	II	I	III	I	.	.	.	.	+
	Alyssum pateri subsp. *pateri*	.	.	.	.	.	.	III	III	.	+	+	.	.	.	+
	Teucrium chamaedrys subsp. *syspirense*	.	.	.	.	.	.	.	V	V	III	V	.	.	.	.
	Alyssum erosulum	.	.	.	.	.	.	II	.	III	III	.	I	.	.	.
	Erysimum leptocarpum	.	.	.	.	.	.	.	I	III	I	.	I	.	.	.
	Sideritis libanotica subsp. *linearis*	.	.	.	.	.	.	.	IV	.	IV	II	.	.	.	.
	Silene rhynchocarpa	.	.	.	.	.	.	.	III	.	I	.	.	.	.	+
	Salvia pisidica	.	.	.	.	.	.	.	II	III	.	.	.	.	.	.
	Thlaspion papillosi / Trifolio-Polygonetalia															
	Ranunculus demissus var. *major*	I	.	.	III	.	.	.	.	.	.	.	II	IV	V	.
	Thlaspi papillosum	.	.	.	.	.	.	.	III	.	.	.	II	IV	III	II
	Ornithogalum brevipedicellatum	.	.	.	.	.	.	.	.	.	.	.	.	V	V	.
	Veronica cuneifolia subsp. *cuneifolia*	.	.	.	.	.	.	.	.	.	.	.	.	V	III	II
	Astragalus angustifolius var. *violaceus*	.	.	.	.	.	.	.	.	.	.	.	.	II	V	.
	Scilla pleiophylla	.	.	.	.	.	.	.	.	.	.	.	.	II	V	.
	Tragopogon olympicus	.	.	.	.	.	.	.	.	.	.	.	.	V	II	.
	Paronychion lycicae / Drabo-Androsacetalia															
	Alopecurus lanatus	I	III	V	II	.	.	.	.	.	.	.	.	.	.	V
	Pedicularis cadmea	I	II	III	.	.	.	.	.	.	.	.	.	.	.	V
	Festuca pinifolia	.	II	.	.	.	.	.	.	.	.	.	.	.	II	V
	Draba bruniifolia subsp. *bruniifolia*	.	.	.	.	.	.	.	I	.	.	.	.	.	.	V
	Centaurea drabifolia subsp. *cappadocica*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V
	Silene caryophylloides subsp. *eglandulosa*	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V
	Paronychia lycica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V
	Minuartia leucocephala	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V
	Astragalo-Brometea															
	Acantholium ulicinum subsp. *ulicinum*	.	.	.	.	.	.	I	V	V	V	IV	III	II	IV	IV
	Veronica cuneifolia agg.	.	.	.	.	.	.	V	III	V	III	IV	IV	[V]	[III]	[II]
	Thymus sipyleus var. *davisianus*	.	.	.	.	.	.	IV	V	V	IV	II	I	II	.	II
	Verbascum cheiranthifolium var. *cheiranthifolium*	.	.	.	.	.	.	V	IV	III	II	V	V	III	.	+
	Cruciata taurica	.	.	.	.	.	.	II	IV	III	V	V	I	.	.	II
	Thymus sipyleus var. *sipyleus*	II	.	.	.	.	.	IV	V	V	IV	.	II	.	.	III
	Elytrigia lazica subsp. *divaricata*	.	.	.	.	IV	III	.	V	V	V	V	.	.	.	III
	Astragalus angustifolius var. *angustifolius*	.	.	.	.	.	.	.	V	V	V	V	IV	.	.	V
	Minuartia juniperina	II	II	.	.	.	.	II	.	.	I	.	I	.	I	III
	Euphorbia kotschyana	.	.	.	.	.	.	V	V	V	I	V	.	.	.	.
	Minuartia pestalozzae	.	.	.	.	.	.	.	III	V	V	.	II	.	.	IV
	Phlomis armeniaca	.	.	.	.	.	.	V	V	III	.	V	II	.	.	.
	Ziziphora clinopodioides	.	.	.	.	.	.	V	I	V	I	.	.	.	.	.
	Daphne oleoides subsp. *oleoides*	+	.	.	.	.	.	.	I	III	II	II	.	.	.	.
	Bupleurum falcatum subsp. *persicum*	.	.	.	.	I	II	.	.	.	III	.	.	.	.	IV
	Astragalus microcephalus	.	.	.	.	.	.	III	III	.	.	V	II	.	.	.
	Onobrychis cornuta	.	.	.	.	.	.	.	IV	.	I	.	.	.	.	V
	Campanula stricta var. *libanotica*	.	.	.	.	.	.	IV	.	.	II	.	.	.	.	+
	Lamium garganicum subsp. *reniforme*	.	.	.	.	.	.	III	II	.	.	V	.	.	.	.
	Tanacetum cadmeum subsp. *cadmeum*	.	.	.	.	.	.	IV	.	.	.	IV	I	.	.	.
	Saponaria pumilio	.	.	.	.	.	.	.	.	III	.	I	.	.	.	IV
	Arenaria acerosa	.	.	.	.	.	.	.	III	III	.	.	II	.	.	.
	Scutellaria orientalis subsp. *pinnatifida*	.	.	.	.	.	.	I	III	III	.	.	.	.	.	.

luteoviridis characterises moderately shady and humid cliffs with the Euro-Siberian *Saxifraga corymbosa (S. luteoviridis)* as differential species of the Campanulion cymbalariae. The subass. arabidetosum is confined to rocks along the wind-swept ridge, and besides *Arabis lycia,* differentiated by an enhanced number of Drabo-Androsacetalia species.

This subassociation was originally published under the name subass. arabidetosum aubrietiodes Hein & al. 1998. However, the eponymous plant later turned out to be a then undescribed species (Parolly & Hein 2000) and the community must be renamed according to Art. 43 CPN (Weber & al. 2000) as Aethionemo lycii-Laserpitietum petrophili Hein & al. 1998 subass. **arabidetosum lyciae** Parolly, Hein & Kürschner, **corr. hoc loco.**

Scree vegetation (Table 1, columns 3-4). – The scree vegetation of the Western Taurus belongs to a particular Lamietalia cymbalariifolii order within the Heldreichietea class. The scree com-

Table 2. Syntaxonomic classification of the communities recorded from the Bakırlı D., in bold (modified after Parolly 2004; based on Hein & al. 1998, Kürschner & al. 1998, Quézel 1973, Quézel & al. 1992, Parolly 1995a).

Lithophytic vegetation: Scree and rock vegetation	
Class:	Asplenietea trichomanis (Br.-Bl. in Meier & Bl.-Bl. 1934) Oberd. 1977 [Chasmophytic vegetation of rock faces, fissures and ledges]
Subclass:	Potentillenea speciosae Hein, Kürschner & Parolly 1998 [Chasmophytic vegetation of rock faces, fissures and ledges of E Mediterranean mountain ranges]
Order:	Silenetalia odontopetalae Quézel 1973 [Chasmophytic, predominantly basiphytic vegetation of rock faces, fissures and ledges of NW, W and S Anatolian and adjoining Levantine mountains]
Alliance:	Silenion odontopetalae Quézel 1973 [Xerophytic to mesophytic chasmophytic vegetation of the Western Taurus]
Ass.:	**Aethionemo lycii-Laserpitietum petrophili** Hein, Kürschner & Parolly 1998 = Ass. à *Verbascum pestalozzae* et *Polylophium thalictroides* Quézel 1973 p. max. p.
Subass.:	**typicum** (incl. subass. verbascetosum pestalozzae (Quézel) Hein, Kürschner & Parolly 1998)
Subass.:	**saxifragetosum luteoviridis** Hein, Kürschner & Parolly 1998
Subass.:	**arabidetosum lyciae** Parolly, Hein & Kürschner, **corr. hoc loco** (Art. 43 CPN)
Alliance:	Campanulion cymbalariae Hein, Kürschner & Parolly 1998 [Hygrophytic chasmophytic vegetation of rock faces, fissures and ledges of Anatolian and adjoining Levantine mountains]
—	***Laserpitium petrophilum*-Campanulion cymbalariae basis community**
Class group:	Thlaspea rotundifolii Parolly 1998 [Eurasian scree and talus plant communities]
Class:	Heldreichietea Quézel ex Parolly 1995 Syn.: Heldreichietea Quézel 1973 [Art. 3b, 8] [Scree and talus plant communities of S Anatolia and adjacent ranges]
Order:	Lamietalia cymbalariifolii Parolly 1995 [Scree and talus plant communities of the Western Taurus]
Alliance:	Scrophularion depauperatae Parolly 1995 Syn.: Heldreichion bourgaeo-bupleurifolii Quézel 1992 pp. [Art. 8] [Scree and talus plant communities of the Western Taurus]
Ass.:	**Lamietum cymbalariifolii** Parolly 1995
Ass.:	**Ranunculo cadmici-Fritillarietum crassifoliae** Parolly 1995
Oromediterranean high mountain vegetation	
Super-class:	Daphno oleoidis-Festucetales variae Quézel 1972 [E Mediterranean high mountain grasslands, dwarf-shrub and thorn-cushion communities]
Class:	Astragalo microcephali-Brometea tomentelli Quézel 1973 [High mountain grasslands (including basiphytic snow-patch meadows), xerophytic dwarf shrub and thorn-cushion communities of Anatolia, the Levant and NW Iran]
Order:	Astragalo microcephali-Brometalia tomentelli Quézel 1973 [Oreal to subalpine xerophytic grasslands, dwarf shrub and thorn-cushion communities on alkaline, ultramafic or schistose soils of Anatolia, the Levant and NW Iran]
Alliance	Tanacetion praeteriti Quézel 1973 [Oreal to subalpine xerophytic grasslands, dwarf shrub and thorn-cushion communities on chiefly alkaline (and rarely schistose) soils of the Western Taurus]
—	***Astragalus microrchis* community** – ***Salvia pisidica*-Tanacetion praeteriti basis community** – **Tanacetion praeteriti basis community**
—	***Sternbergia colchiciflora-Taraxacum bithynicum* community**
—	***Helichrysum plicatum* subsp. *isauricum* community**

Table 2. Continution from preceding page.

—	***Polygonum karacae-Astragalus creticus* community**
Alliance:	Thuryon capitatae Quézel 1973 [(Montane) oreal to subalpine xerophytic grasslands, dwarf shrub and thorn-cushion communities on ultramafic soils of the Western and Central Taurus]
Order:	Drabo-Androsacetalia Quézel 1973, nom. cons. prop. in Parolly 2004 [Alpine to subnival mat-forming communities, vegetation of windbeaten hilltops and exposed ridges of Anatolia and Lebanon]
Alliance:	Paronychion lycicae Quézel 1973 [Alpine to subnival mat-forming communities, vegetation of windbeaten hilltops and exposed ridges of the Western Taurus]
—	***Seseli hartvigii* community**
Order:	Trifolio anatolici-Polygonetalia arenastri Quézel 1973 [Hygrophytic to mesophytic vegetation of dolines, snow-patch and meltwater communities of the Taurus range and the greater Lebanon]
Alliance:	Thlaspion papillosi Kürschner, Parolly & Raab-Straube 1998 [Snow-patch and meltwater communities of the Western and the Pisidian-Isaurian Taurus]
Ass.:	**Muscari bourgaei-Ornithogaletum brevipedicellati** Quézel 1973
Ass.:	**Fritillarietum pinardii** Kürschner, Parolly & Raab-Straube 1998
Temperate grasslands	
Class:	Molinio-Arrhenatheretea R. Tx. 1937 [Nutrient-rich, mesic (pastures, hay meadows, lawns) and wet anthropogenic grasslands]
Order:	Potentillo-Polygonetalia R. Tx. 1947 [Carpet turfs of wet or periodically flooded sites under more or less temperate conditions]

munities are chiefly composed of creeping hemicryptophytes and rhizome geophytes adapted to burial and an often considerable proportion of bulbous geophytes which move with the unstable substrate. Depending on the mobility and the structure and the contents of fine soil (for definitions of the edaphic parameters see Parolly 1995a, 1998) two associations occur on Bakırlı D.

The Lamietum cymbalariifolii colonises coarse scree poor in fine-soil, either on steep, active slopes with a high mobility or on more moderate slopes with a thick scree/air-layer. By contrast, the Ranunculo cadmici-Fritillarietum crassifoliae dwells on sliding slopes with a fine to medium coarse (debris < 10 cm diam.) scree/air-layer only 3-15 cm thick, overlaying fine-grained soil horizons. Owing to the more favourable site conditions, at places with incipient stabilisation the community rapidly develops towards a limestone sward community (Tanacetion praeteriti). Typically enough, slopes covered by the Fritillarietum crassifoliae have a “striped” appearance (“striped scree slopes”) due to many parallel long and narrow bands (often only a few decimetres broad) of sward initials along the sloping scree.

At present, only the Lamietum cymbalariifolii subass. typicum is documented by relevés from Bakırlı D. The discovery of *Heldreichia bourgaei* indicates that the subass. heldreichietosum Parolly 1995 may also occur.

Xeric oreal and subalpine grasslands, dwarf shrub and thorn-cushion communities (Table 1, columns 5-10). – Gappy limestone swards, dwarf shrub and thorn-cushion communities are the most prominent and abundant formations of SW Asian high mountain vegetation (Barbero & al. 1975, Kürschner 1986a, b) and the dominant vegetation on Bakırlı D., both on limestone and ophiolite. All communities can be grouped into the Tanacetion praeteriti alliance (Astragalo-Brometalia) of the Western Taurus as redefined here. Disregarding the often very different physiognomical appearance of the stands (three different formations), in floristic-phytosociological terms such a differentiation is not reflected at and above association level. This seems to hold true for all of the Batı Toroslar. The *Elytrigia divaricata* limestone swards are nothing but initial dwarf shrub and thorn-cushion communities establishing themselves on stabilised scree slopes or old rock slides. The proportion of tragacanthic species varies greatly with altitude, exposure and pedology (substrate, fine soil content and thus the water capacity).

Based on the relevés of the first author, six often intergrading units may be distinguished. All but one community are only of local value, differentiated by major characteristic species and not apt for a formal syntaxonomic description. The only exception is the *Astragalus microrchis* community, which may well merit association rank. It covers large parts of the xeric slopes of Bakırlı D. with a reasonably good water-supply (fine soil visible at the surface). Among the main edificators is the thorny *Onobrychis cornuta,* which elsewhere in the area preferentially inhabits Drabo-Androsacetalia sites. The *Salvia pisidica*-Tanacetion praeteriti basis community covers more rocky and steep slopes with reduced fine soil accumulation; enhanced fine soil accumulation is a prerequisite for the establishment of *Astragalus microrchis*. These *Elytrigia divaricata* grassland stands can be clearly attached to the *Astragalus microrchis* community. The Tanacetion praeteriti basis community unites different incompletely developed stands of the alliance on limestone, such as initial swards and dwarf shrub communities overgrowing consolidated screes, disturbed stands re-colonising land after construction measures or fragmentary stands after overgrazing. *Marrubium bourgaei* is among the dominant antipastorals of the Western Taurus; it reaches high cover values at places strongly browsed by goats and sheep (*Marrubium* pastures, Yayla lairs) and, at a more natural centre of occurrence, within the doline vegetation. It is not unlikely that the *Sternbergia colchiciflora-Taraxacum bithynicum* community represents a phenological stage of a moderately grazed thorn-cushion community / *Marrubium* pasture transition at lower elevations (oreal), derived from the *Astragalus microrchis* community.

The last limestone community segregated is the *Helichrysum plicatum* subsp. *isauricum* community found in well developed, flat or gently sloping places with plentiful fine soil and a good water supply, in the subalpine region. It is a dwarf shrub community with a reduced set of thorn-cushions. This and the lack of many xerophytes such as *Elytrigia divaricata* places it next to the Thlaspion papillosi.

On ophiolite a *Polygonum karacae-Astragalus creticus* community has been recorded, with *Polygonum karacae* and *Alyssum huber-morathii* as serpentinophytes, many disturbance indicators and higher ranked dominants indifferent to substrate-vague such as *Astragalus creticus* and *A. microcephalus*. It is noteworthy that it comes closer to the basiphytic Tanacetion praeteriti (although it is isolated due to the lack of many characteristic limestone species) than to the western race of the serpentinophytic Thuryion capitatae Quézel 1973 in its revised conception (Parolly 2004).

Hygrophytic to mesophytic vegetation of snow-patches, meltwater runnels, dolines and trampled turf (Table 1, columns 11-12). – Table 1 strongly supports the recently expressed view (Parolly 2004) that Trifolio-Polygonetea, being rich in geophytes and hemicryptophytes, represent the damp extreme of the xeric thorn-cushion and dwarf shrub communities (Astragalo-Brometea) and not an independent vegetation class.

Two associations have been described from Bakırlı D. (Kürschner & al. 1998) as Muscari bourgaei-Ornithogaletum brevipedicellati and Fritillarietum pinardii, both included in Thlaspion papillosi. The first association covers the moist bottoms of dolines, grows close to long-lasting snow-fields or constitutes the vegetation along meltwater runnels. The Fritillarietum pinardii is more mesophytic and has an enhanced proportion of chamaephytes and is, in dolines, interposed between the former association and the xeric thorn-cushion communities.

Kürschner & al. (1998) distinguish a number of edaphic variants and stages within Muscari bourgaei-Ornithogaletum brevipedicellati. The new Bakırlı D. records of pronounced chionophytes such as *Colchicum triphyllum (Merendera triphylla)* and *Crocus biflorus* subsp. *isauricus,* often found in or close to meltwater pools, confirm such a classification. The small-scale occurrences of doline vegetation on Bakırlı D. strongly suffered from the construction of the observatory. The road cuts two dolines, soil movements changed the floristic composition dramatically and the largest doline, the camping ground of the 1992 trip and type locality of Fritillarietum pinardii, is now the oversized parking place of the observatory.

Table 3. Percentage distribution of life forms within the communities. – Abbreviations: B = bryophytes, C = chamaephytes (incl. succulents), H = hemicryptophytes, G = geophytes, N = nanophanerophytes, Pa = parasites, T = therophytes. – Sources as in Table 1.

Community	C	H	G	T	N	Pa	B
Aethionemo lycii-Laserpitietum petrophili typicum	68.8	24.6	–	–	3.2	–	3.4
Aethionemo lycii-Laserpitietum petrophili arabidetosum lyciae	63.6	31.8	–	–	–	–	4.6
Aethionemo lycii-Laserpitietum petrophili saxifragetosum luteoviridis	52.6	26.3	–	–	–	–	21.1
Laserpitium petrophilum-Campanulion cymbalariae basis community	14.8	50.0	11.1	–	–	–	24.1
Lamietum cymbalariifolii	5.9	89.5	3.7	0.9	–	–	–
Ranunculo cadmici-Fritillarietum crassifoliae	14.3	39.9	44.0	1.8	–	–	–
Polygonum karacae-Astragalus creticus community	82.5	15.2	0.3	1.6	0.3	0.1	–
Astragalus microrchis community	80.1	14.7	4.4	0.4	–	0.4	–
Salvia pisidica-Tanacetion praeteriti basis community	55.4	40.9	3.6	0.1	–	–	–
Tanacetion praeteriti basis community	52.1	37.7	8.9	0.9	0.4	–	–
Sternbergia colchiciflora-Taraxacum bithynicum community	69.6	22.1	6.6	1.4	0.3	–	–
Helichrysum plicatum subsp. *isauricum* community	80.6	14.6	2.3	2.3	–	0.3	–
Fritillarietum pinardii	50.0	33.8	16.2	–	–	–	–
Muscari bourgaei-Ornithogaletum brevipedicellati	61.6	24.4	14.0	–	–	–	–
Seseli hartvigii community	72.2	20.5	6.2	1.1	–	–	–

Vegetation of wind-swept mountain habitats, zonal alpine and subnival vegetation (Table 1, column 13). – As there is no real alpine belt on Bakırlı D., a Drabo-Androsacetalia vegetation is developed only along the exposed main ridge and in rather small patches on windbeaten hilltops and flats lower down (extrazonal occurrences). All stands can be grouped into a *Seseli hartvigii* community with different altitudinal forms, also sampled on Tahtalı D., which clearly fits into the Paronychion lycicae Quézel 1973 alliance comprising the high-mountain mat and cushion forming communities of the Western Taurus. The vegetation cover of this gappy unit ranges in average from 30-50 (70) %, but the species diversity is high with 25-45 species in less than 10 m².

3. Life forms of the communities

The life form (Raunkiaer 1934) spectra of the communities (Table 3) show the expected dominance of chamaephytes over hemicryptophytes and geophytes for all Astragalo-Brometea and xerophytic rock communities. Mobile screes are unsuitable for chamaephytes, which cannot compete with the highly successful hemicryptophytes and the rhizomatous and bulbous geophytes in their response to burial and physical damage of parts of the plants (for details see Parolly 1995a). Other habitats with high proportions of hemicryptophytes are shady and damp rock crevices (Campanulion cymbalariae) and meltwater runnels and dolines supporting hygrophytic to mesophytic communities (Trifolio-Polygonetalia). The many hemicryptophytes within the Tanacetion basis communities (often limestone swards) are chiefly due to transgressive scree plants and the prevailing grass cover. Geophytes gain their greatest significance with the Ranunculo cadmici-Fritillarietum crassifoliae scree community and in the Trifolio-Polygonetalia stands. Transgressives of the latter community type are responsible for the enhanced percentage of bulbous geophytes within the Campanulion cymbalariae stands. Therophytes play only a very subordinate role, as generally in the high mountain ecosystems of the Taurus. Screes, rock clefts and dolines often prevent their occurrences (for a discussion of this see Parolly 1995a). Within the xerophytic Astragalo-Brometalia and Drabo-Androsacetalia the annual hemiparasitic *Bornmuellerantha aucheri* is the most important therophyte of the Taurus.

4. Chorotypes

Fig. 4 displays the chorotype spectrum as derived from the species inventory of Bakırlı D.; it clearly reflects the high proportion of endemic species. A total rate of 28 % is among the highest percentages recorded for an Anatolian mountain range (e.g. Bekat 1987, İlarslan & al. 1997). This number becomes all the more impressive because it had been lowered considerably by including the flora of the flushes and the ruderal sites of Saklıkent with their dominating Euro-Siberian or pluriregional and wide-range chorotypes. Comparable studies tend to concentrate on the endemic-rich xerophytic mountain flora proper.

The spectrum mirrors the phytogeographical position of the study area. The Tauric System (Parolly 2004) as a whole stretches along the intersection of two phytochoria, e.g. in the Western Taurus the Mediterranean and Irano-Turanian regions, chiefly represented by E Mediterranean and Irano-Anatolian elements. These chorotypes, partly as biregionals (EMed-IA), predominate both in the flora and the majority of the vegetation units, i.e. in all Mesogean units (Hein & al. 19191998, Kürschner 1982, Quézel 1973). The prevailing Mediterranean influence becomes more distinct if one bears in mind that the bulk of the endemics of the Western Taurus (and of the Central Taurus) is in general of E Mediterranean (montane) origin (cf. Davis 1965-1985, Davis & al. 1988, Güner & al. 2000).

Fig. 5 shows the distribution of the chorotypes within selected communities along the slopes of Bakırlı D. Chorotype spectra of the communities help to characterise the units additionally. Whereas life form spectra reflect the contemporary climatic conditions in displaying one predominant life form, chorotype spectra may provide some indications of ancient climates, migration routes and origin of different elements (Kürschner 1982). The prominent role of the endemic species within the xeric vegetation types and also the snow-patches is evident and ranges between c. 30 and well above 50 %. In the E Mediterranean hygrophytic rock vegetation (Campanulion cymbalariae) the proportion of endemics is lower, around 26 %, which also displays greatly enhanced numbers of

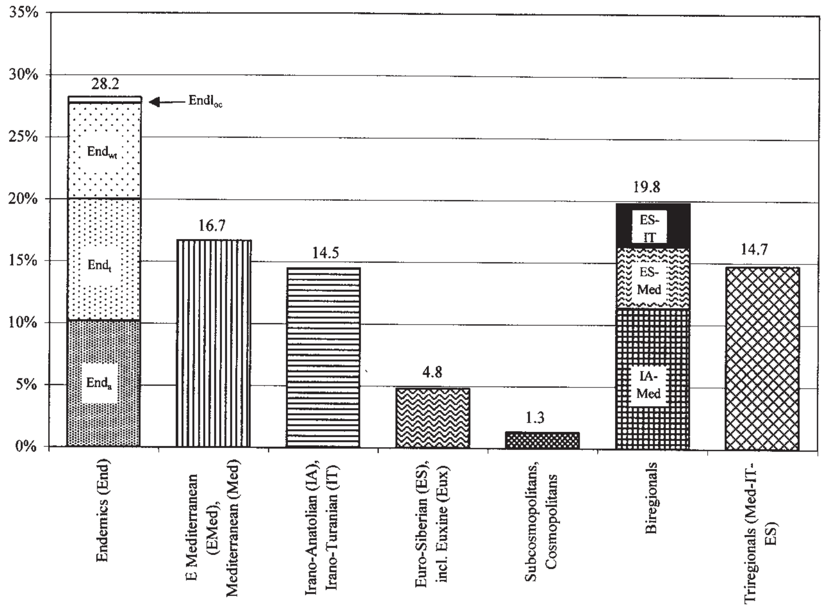

Fig. 4. Chorotype spectrum of the flora of Bakırlı Dağı. Figures are percentages of the total flora. – Subdivision of endemics: End_a = Anatolian endemics, End_t = Taurus endemics, End_{wt} = Western Taurus endemics, End_{loc} = local endemics (= endemics of Bakırlı D.).

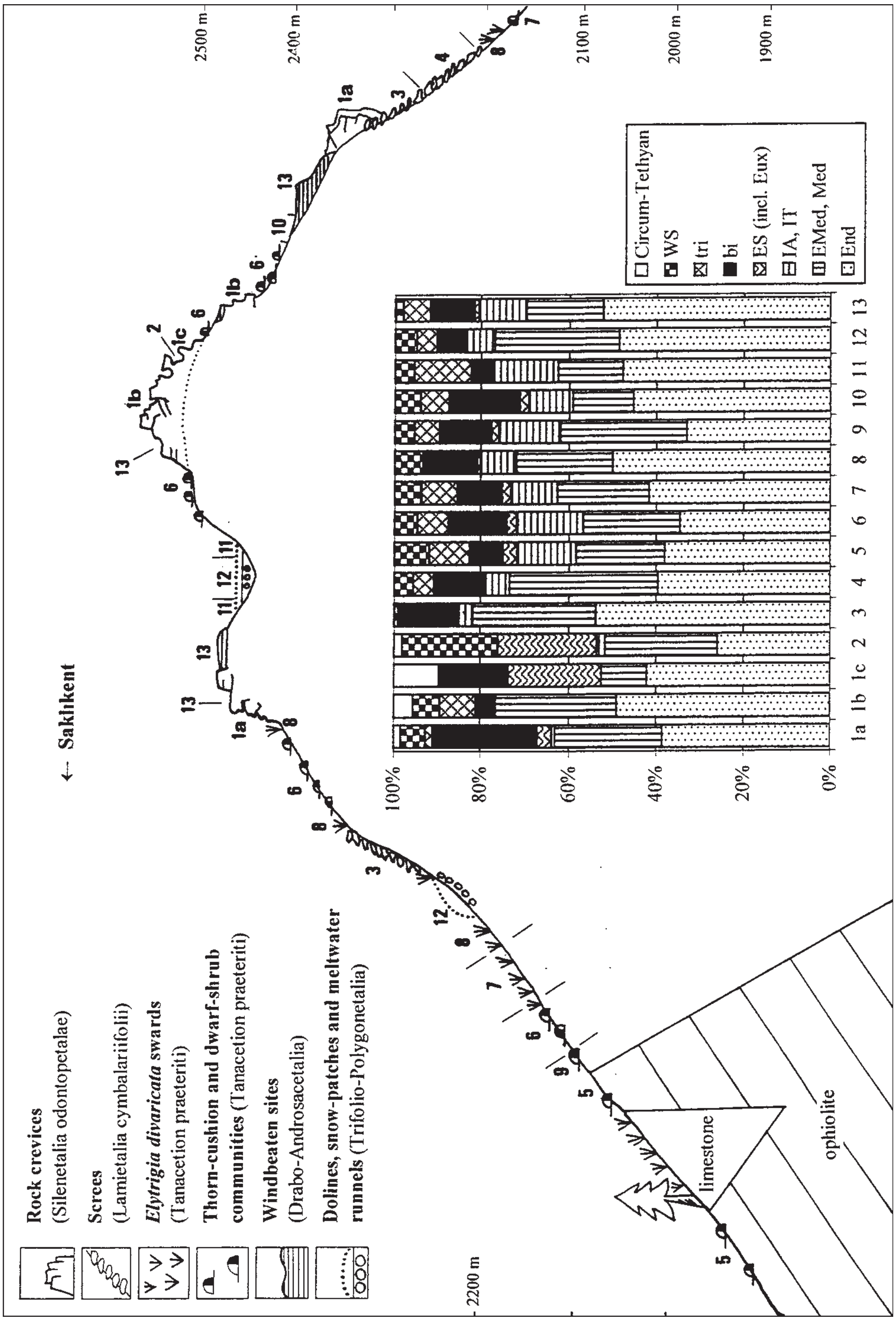

Fig. 5. Altitudinal profile of Bakırlı Dağı and distribution of chorotypes among the communities (weighted spectra). – Numbering of communities as in Table 1, hatched: ophiolite.

Euro-Siberian, northern (bryophytes) and temperate pluriregional elements. The Aethionemo lycii-Laserpitietum petrophili subass. saxifragetosum luteoviridis bridges the Silenion odontopetalae and the Campanulion cymbalariae; both have so similar spectra.

There are no remarkable differences between limestone and ophiolitic sites. By contrast, the serpentine communities on Sandras D. have the highest proportions of (local) endemics ever encountered in the Taurus range with exceptional percentages of local endemics (Quézel 1973 and unpublished relevés of the PONTAURUS project).

Concluding remarks

Bakırlı D. and its close surroundings have a highly diverse, endemic-rich flora with close to 540 subgeneric taxa (species, subspecies and varieties) and thus a considerable portion of the upland flora of the Western Taurus in a comparatively very small area. The flora of the whole Olimpos Beydağları National Park comprises some 900 taxa (865 according to Peşmen, unpubl. sources 1980) and the preliminary inventory of Düşen & Sümbül (2001) along the Sarısu-Antalya transect includes 702 taxa. This phytodiversity is certainly the consequence of its situation within the Beydağları, which is generally rich in species and endemics. Moreover, not many places in the Taurus were botanised so intensively; in many other studies critical groups such as *Poaceae* and *Cyperaceae* seem to be heavily under-recorded. Due to this and the very different areas any statistical comparison between local mountain floras remains inappropriate.

For the present study a reasonable degree of completeness can be assumed. There are surely some undetected species among the groups that are notoriously difficult, such as *Taraxacum, Festuca, Onosma,* the ferns and the early vernal and late autumnal flora. Some five plants (e.g. *Scorzonera* sp., *Rumex* sp.) are only known from sterile gatherings within the relevés. A few doubtful records such as *Helichrysum plicatum* subsp. *plicatum* and *Marrubium heterodon* (Düşen & Sümbül 2001; specimens not traced at AKDU) have been omitted; they require confirmation. Both are not unlikely since they are known to occur in adjacent ranges, but more probably refer to widespread allied taxa frequently recorded on Bakırlı D. The total vascular flora of the study area may be about 560 taxa.

Bakırlı D. harbours not only a large proportion of the endemics or subendemics of the Western Taurus but also healthy populations of some endemics of the eastern Beydağları, such as *Asyneuma lycium, Dorystoechas hastata, Scrophularia candelabrum, Seseli hartvigii* (all Tahtalı D. to Bakırlı D.) or *Verbascum pestalozzae* (Teke D. to Bakırlı D.), all tentatively regarded as paleoendemics in this sheltered part of the range, which was probably never glaciated (Davis 1971, Parolly & Nordt 2001). In contrast to Tahtalı D., only two very rare local endemic species, *Arabis lycia* and *Secale leptorhachis,* are known from Bakırlı D. (Parolly & Hein 2000, Parolly & Scholz 2004).

Seventeen taxa represent grid records not in the Flora of Turkey and related references (Davis 1965-1985, Davis & al. 1988, Güner & al. 2000). The earlier vegetation studies (Hein & al. 1998, Kürschner & al. 1998, Parolly 1995a), often overlooked by local botanists scanning references for grid novelties, have added a few more such records (e.g. *Erysimum pallidum, Saxifraga corymbosa, Trifolium hybridum* subsp. *anatolicum*) without indicating their novelty. Most of these records bridge minor distributional gaps of taxa with often wide ranges (e.g. *Bromus lanceolatus, Helichrysum pallasii, Scorzonera cana* var. *jacquiniana, S. judaica, Xeranthemum inapertum*). Some (e.g. *Centaurea inexpectata, Crenosciadium siifolium, Ferula lycia, Hesperis pisidica, Poa akmanii, Polygonum karacae*) extend or round off the range of endemic or Anatolian-wide rare species. Two taxa *(Minuartia verna* subsp. *brevipetala, Silene ispartensis)* have on Bakırlı D. their first recorded occurrences outside their type localities. These and other interesting records have been annotated briefly in the species list above.

With the exception of the oreal forest vegetation, which has been degraded locally to open stands of single trees or more often completely replaced by secondary dwarf shrub and thorn-cushion communities, the Tauric Zonation of Bakırlı D. is well preserved. It displays all subalpine vegetation types (formations) of the Taurus: screes, rock-fissure communities, thorn-cushion and dwarf shrub communities, gappy limestone swards, the vegetation of wind-exposed ridges and rocky flats as well as the vegetation of snow-patches and meltwater communities (Fig. 5). The importance of Bakırlı D. in understanding and conserving the high mountain vegetation is indicated in phytosociological terms by the fact that five of the eight subalpine associations described from the Lycian Taurus (Hein & al. 1998, Kürschner & al. 1998, Parolly 1995a, Quézel 1973) are found here, and three of them, plus a number of subunits, have their type localities here. Compared to the other ranges in the Akdağları and Beydağları, the grazing pressure on Bakırlı D. is still fairly moderate.

Both in floristic and vegetational respects, the study area clearly belongs phytogeographically to the Lycian Sector of the Tauric Subprovince and S Anatolian Province (Parolly 1995a, 2004; cf. Meusel & al. 1965, Takhtajan 1986). A principal feature of the Tauric System are its mountain forests composed of *Pinus halepensis* subsp. *brutia* (Ten.) Holmboe, *P. nigra* var. *caramanica, Juniperus excelsa* and *J. foetidissima,* and especially the Mediterranean firs, of which *Abies cilicica* (Ant. & Kotschy) Carr. and *A. cephalonica* Loudon are the most important, and *Cedrus libani* A. Rich. These *Cedrus-Abies* forests (Querco-Cedretalia libani) outline perfectly the range of the Astragalo-Brometalia; they mark the core part of the Tauric System and include the Western and Central Taurus s.l., Cyprus, the greater Lebanon, and in all likelihood also Crete. Within the Tauric System, communities of the Daphno-Festucetales super-class make up the zonal vegetation of the land above the trees.

The Lycian Sector is the westernmost phytogeographical unit distinguished along the Taurus axis from a Pisidian-Isaurian, Cilician and an Amanos Sector (Parolly 2004; see Meusel & al. 1965 for synonymy and also Davis 1971, who suggested ranking of the Mediterranean parts of Turkey, W Anatolia, the Taurus and the Amanos, as districts). Between the sectors, the differentiation of the vegetation is mainly at alliance level, while provinces often bear particular orders. On Bakırlı D., the westernmost of a series of geographically differentiated alliances is represented likewise in all vegetation types (Table 1, 2). Within these mountain sections there are portions of mountain ranges and isolated stocks with unique associations and a particular endemism making them reasonably distinct from the neighbouring areas. In the Lycian Sector, the Beydağları and Akdağları bear diverging vegetation below the alliance level. The endemics of the coastal eastern Beydağları plus a great many more widely occurring but scattered endemics mark the units (associations, geographical races) of that range and outline their particular phytogeographical position.

The flora and vegetation of Bakırlı D. overall can be considered to be typical of all of the Western Taurus and so have much more than local importance. Our results may serve as a basis for the planned monitoring projects studying the impact of ski tourism on a subalpine ecosystem in the Taurus.

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