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Contribution to the knowledge of the vascular flora of NE Greece: Floristic composition of the beech (*Fagus sylvatica* L.) forests in the Greek Rodopi

Abstract

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The first floristic inventory of the beech forests in the Greek Rodopi is presented. The investigation included pure beech (*Fagus sylvatica* L. s.l.) stands as well as mixed stands of beech with *Pinus sylvestris*, *P. nigra*, *Picea abies*, *Abies xborisii-regis*, *Quercus petraea* subsp. *medwediewii* and *Q. frainetto*. The floristic catalogue is based on the floristic data of 584 phytosociological beech forests relevés and on a supplementary floristic inventory. Published information of records from inside beech forests has also been taken into account. For each taxon information is given about its spatial and altitudinal distribution and constancy in the Greek Rodopi as well as about its ecological preferences. The floristic catalogue is divided in two parts. The first part includes the taxa that constitute the beech forest community. The second part includes taxa that appear randomly in the beech forests. Three species, *Hieracium praecurrens*, *Pyrola media* and *Verbascum lanatum*, are recorded for the first time from Greece.

1. Introduction

The Rodopi mountain range is located in NE Greece and extends in a west to east direction along the Greek-Bulgarian border. The Greek part of the Rodopi mountain range is bounded to the west and south by the Nestos river, while eastwards it gradually declines in elevation to the Evros plains.

To date only a small part of the Greek Rodopi has been studied floristically. Extensive floristic inventories have been conducted in the cold broad-leaved and coniferous forests and in the zone above the timberline in the Elatia area (Eleftheriadou 1992) and the Frakto Virgin Forest (Eleftheriadou & Raus 1996), Drama prefecture. Records for the flora of the Greek Rodopi are documented in various publications and come mainly from botanical excursions, phytosociological and stathmological investigations, and studies of the distribution of rare taxa

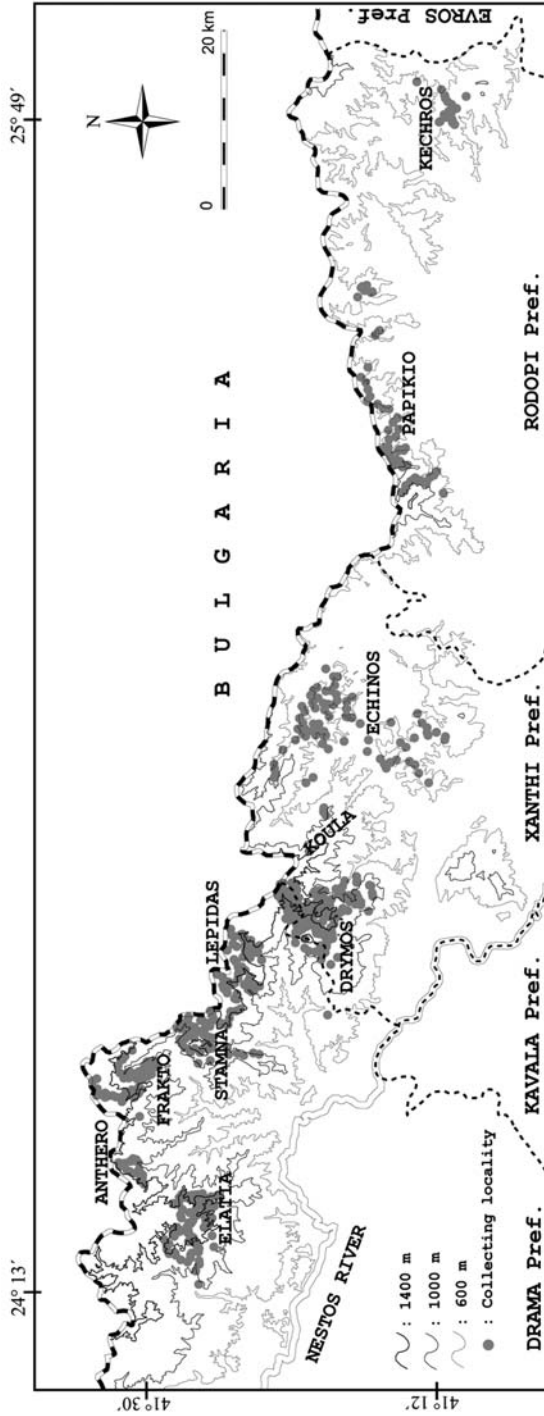


Fig. 1. Topographic map of the Greek Rodopi with the collecting localities in beech forests and the nine subareas distinguished and named (compare Table 1).

(Rechinger 1939, Zaganiaris 1938, 1939, 1940, Zoller & al. 1977, Athanasiadis & Gerasimidis 1978, Strid & Papanikolaou 1981, Dafis & Smiris 1981, Gamisans & Hebrard 1980, Strid & Franzén 1982 & 1983, Smiris 1985, Sfikas 1985, 1998a-b, Volpers 1989, Zagas 1990, Athanasiadis & al. 1992 & 2000, Eleftheriadou & al. 1992, 1998 & 2001, Petermann 1999, Theodoropoulos & al. 2001). In addition, many records for the Rodopi flora can be found in the Mountain Flora of Greece (Strid 1986, Strid & Tan 1991).

Up to date, only a few floristic inventories have been conducted exclusively in forest habitats in Greece. Most of the floristic inventories concern areas rather than certain habitats. The objective of this study is to combine data from a phytosociological research and a floristic inventory and to give a comprehensive catalogue for the flora of the beech forests in the Greek Rodopi.

2. Investigated area

The investigated area of the Greek Rodopi comprises pure *Fagus sylvatica* forest and mixed forest, mainly with *Pinus sylvestris*, *P. nigra*, *Picea abies*, *Abies xborisii-regis*, *Quercus petraea* subsp. *medwediewii* and *Q. frainetto*. The floristic inventory has been conducted inside the beech forests and not in the wider area of the beech zone. In the mixed stands the floristic inventory has been conducted only in those in which beech is the dominant tree species. Our collecting localities are situated inside the area confined by the coordinates 41°10'12" to 41°33'26"N and 24°13'39" to 25°52'05"E.

In the Greek Rodopi a western and an eastern part can be distinguished. The ridge of Koula in the Xanthi prefecture can be considered as the border between both parts, according to the differentiation of the vegetation. The investigated area was divided in nine subareas (Fig. 1, Table 1), of which six are in the western and three in the eastern Rodopi. The collecting localities of the taxa reported from beech forests in Rodopi in the literature are inside these subareas, except for one of Gamisans & Hebrard (1980), which is situated about 3 km southwest from our southwestern locality in subarea 7 = Exinos and has a very low altitude (180-210 m).

The collecting localities and subareas as shown in Fig. 1, in fact represent the beech forests in Rodopi. In the western Rodopi beech forms an almost continuous zone. Also forests of *Pinus sylvestris*, *P. nigra* and *Picea abies* appear in this zone. In warmer and drier sites, forests of *Quercus petraea* subsp. *medwediewii* replace beech forests. In the eastern Rodopi, beech forests are usually extrazonal and restricted to the moister sites (north exposures and depressions) in areas in which forests of *Quercus petraea* subsp. *medwediewii* and *Q. frainetto* dominate. As an exception, a zone of beech forest occurs in the higher altitudes of Mt Papikio. In the eastern Rodopi coniferous forests do not exist.

Four meteorological stations exist in the investigated area (Livaditis, Echinis, Thermes, Monastiraki). Only one is situated in the western Rodopi, at an altitude above 1000 m. Three further stations (Sidironero, Skaloti, Kerasea) are close to the beech zone. Based on the data of these seven stations the bioclimate (according to Mavrommatis 1980) in the beech forests is humid with harsh winters. Exceptionally, in some areas at low altitude, the bioclimate is between humid and subhumid and the winters are cold and not harsh.

The substrate of the majority of beech forests consists of acid igneous and metamorphic rocks, though a small part has calcareous bedrocks. Specifically, the beech forests in Elatia stock on granodiorite and gneiss and in the southern part of the area on marble. In Anthero they occur on granodiorite and gneiss and rarely on marble. In the northern part of Frakto, they are found on granodiorite and in the southern part of the same area on granodiorite and marble. In Stamma, they occur, mainly, on marble and only in a few places on granodiorite. In Lepidas and Drymos the substrates are gneiss and granodiorite, while in Echinis, Papikio and Kechros are mainly gneiss.

It proved rather difficult to determine the subspecies of beech (*Fagus sylvatica*) in the investigated area. The determination was based mainly on the length of the fruiting peduncle and the

Table 1. Coordinates and altitudes of our collecting localities in the nine subareas of the Greek Rodopi.

	Name of subarea	Latitude (N)		Longitude (E)		Altitude (m)	
		minimum	maximum	minimum	maximum	min	max
western Rodopi	1 Elatia	41°25'36"	41°32'16"	24°13'39"	24°21'06"	810	1770
	2 Anthero	41°30'07"	41°31'43"	24°21'51"	24°23'57"	1030	1330
	3 Frakto	41°29'17"	41°33'26"	24°27'24"	24°32'50"	1040	1780
	4 Stamna	41°23'01"	41°28'05"	24°31'45"	24°36'13"	950	1460
	5 Lepidas	41°22'52"	41°25'37"	24°37'00"	24°42'43"	950	1580
	6 Drymos	41°15'58"	41°21'53"	24°35'42"	24°49'06"	680	1670
eastern Rodopi	7 Exinos	41°11'29"	41°22'05"	24°52'01"	25°04'02"	370	1170
	8 Papikio	41°11'37"	41°16'55"	25°18'26"	25°35'26"	410	1080
	9 Kechros	41°10'12"	41°13'15"	25°48'35"	25°52'05"	660	930

shape and the width of the cupule scales. A systematic sampling of beech leaves was not carried out, since their morphological characteristics vary according to the available light and other environmental conditions (Denk 1999). Our observations can be summarized as follows.

Beech of the western Rodopi has cupules that notably differ from those in the eastern Rodopi. In contrast to what Alden (1986) mentions, we observed cupules in areas 7, 8 and 9 with 2-5 mm wide spatulate scales and in many of them a median vein was easily visible. It seems that the distribution of the different forms of cupule scales is related with the altitude. Cupules with spatulate scales were observed at low altitudes in the western Rodopi, while cupules with linear scales were found at higher altitudes of the eastern Rodopi. Regarding the length of the peduncle, both cupules with spatulate scales and a peduncle shorter than 15 mm as well as cupules with linear scales and peduncle longer than 15 mm were found. Generally, in the western Rodopi the cupules have linear and subulate scales and very rarely spatulate ones.

Therefore, in western Rodopi *Fagus sylvatica* subsp. *sylvatica* and *F. sylvatica* subsp. *moesiaca* dominate, whereas forms closely resembling *F. sylvatica* subsp. *orientalis* are rare. In eastern Rodopi and in the area of Echinus cupules with spatulate or linear scales occur with the same frequency. In the area of Papikio cupules with linear scales appear less often and in Kechros area these are rare. Beech of eastern Rodopi can thus be regarded as *F. sylvatica* subsp. *moesiaca*, although *F. sylvatica* subsp. *orientalis* also occurs, especially eastwards. It remains unclear whether true *F. sylvatica* subsp. *sylvatica* grows in this part of the Rodopi.

Our observations are in accordance with the description of the morphological differentiation of beech in Rodopi given by Mouloupoulos (1965). If his classification is applied, in western Rodopi occur '*Fagus sylvatica*', '*F. moesiaca* forma *taeniolepis*' and rarely '*F. moesiaca* forma *spatulolepis*'. In eastern Rodopi occur '*F. moesiaca*' ('forma *taeniolepis*' and 'forma *spatulolepis*') and '*F. orientalis*'. There is also an obvious decrease of '*F. moesiaca* forma *taeniolepis*' eastwards and simultaneously an increase of the other two taxa.

Eleftheriadou & Raus (1996) report from the Frakto Virgin Forest *Fagus sylvatica* subsp. *sylvatica* and *moesiaca*. Gamisans & Hebrard (1980) report from the Drymos area the subspecies *sylvatica*, *moesiaca* and *orientalis* and from the southern part of the Echinus area the subspecies *moesiaca* and *orientalis*. Our observed spatial-morphological differentiation of the beech population in the Greek Rodopi does not support, in contrast, the view of Gömöry & al (1999) that in the Rodopi and the Balkans in general only a single, separate subspecies of *Fagus sylvatica* occurs.

3. Material and methods

The majority of the specimens were collected during a phytosociological study conducted by the first author in the beech forests of the Rodopi. In total, 584 own phytosociological relevés were floristically evaluated. Specimens outside the relevés were collected simultaneously. Additional collections were done in spring and autumn. The specimens were all collected inside beech forests, whereas forest edges and clearings were avoided. The floristic recording was performed in July and August 1995, in June, July and August 1996 and in May, June, July and October 1997. Few additional collections were made during the summer of 1998 and 1999. Voucher specimens are deposited in the herbarium of the Institute of Forest Botany / Geobotany (Department of Forestry, Aristotle University of Thessaloniki) as well as in the personal collection of the first author. Duplicates of *Hieracium* specimens are in the personal herbarium of G. Gottschlich.

In addition, the floristic data from 30 relevés investigated by Zoller & al. (1977), Gamisans & Hebrard (1980), Smiris (1985) and Volpers (1989) were included. Further records were taken from Strid & Papanicolaou (1981), Eleftheriadou (1992) and Eleftheriadou & Raus (1996). In these publications the habitat of the collections is clearly recorded. The beech forest specimens reported in the last two publications have all been seen by us.

The taxa found by us and those taken from the literature were divided into two sections. The first section includes the taxa that belong to the flora of beech forests of Rodopi. These are taxa that occur, even rarely, in beech forests under certain ecological conditions, even extreme ones (e.g. xerothermic forests, wet places in beech forests). Additionally, in this section taxa were included that enter beech forests from adjacent habitats relatively often or occasionally, due to certain ecological conditions (e.g. mixed forests). All these taxa are understood as those that constitute the Rodopi beech forest community. The second section comprises taxa that appear accidentally in beech forests. These are taxa that have been found by us in one or two (in few cases up to four) localities with very few individuals (usually one) or taxa recorded in the literature but do, after our experience, not belong to the beech forest flora.

Our 584 and the 30 published relevés were also evaluated ecologically. Based on the phytosociological tables, the relevés were classified in four ecological groups: mesophilous, acidophilous, calciphilous and thermophilous beech forests (Tsiripidis & Athanasiadis 2002). On this basis, for each taxon its constancy in the subareas of Rodopi and in the ecological groups is given. The constancy was estimated mainly on the basis of the occurrence of the taxa in the relevés, which can be considered as sampling plots. For the constancy per subarea the characterizations 'rare', 'scattered' and 'common' are used, when the taxon was present up to 10 %, from 10 to 20 % and in more than 20 % of the relevés per subarea, respectively. For the constancy per ecological group the characterizations 'very rare', 'rare', 'scattered', 'common' and 'very common' are used, when the taxon is present up to 5 %, from 5 to 10 %, from 10 to 20 %, from 20 to 40 % and in more than 40 % of the relevés per ecological group, respectively.

Additionally, the minimum and maximum altitudes for each taxon are reported. For those taxa with many localities (usually more than 30) the altitudinal extremes as well as the altitudinal range in which more than 70 % of the localities of a taxon occur, are reported (the extremes in brackets). When the above values differ less than 150 m, only the extremes are reported (without brackets).

Certain specimens could not be identified with certainty. For instance plants of *Senecio nemorensis* agg. have been collected or observed in some localities. In the specimens with flowers two taxa have been distinguished. In this case the above information is reported for these two taxa on the basis of the adequate specimens, but additionally for the whole group on the basis of all specimens (adequate and not) and on our observations.

Families, genera and species are arranged alphabetically within the four major groups of vascular plants, viz. *Pteridophyta*, *Gymnospermae*, *Dicotyledoneae* and *Monocotyledoneae*. The nomenclature follows Strid & Tan (1997, 2002), Greuter & al. (1984-1989), Strid 1986, Strid & Tan 1991, Tutin & al. 1968-1993 and selected taxonomic literature (in the last case the sources are cited). For *Hieracium* the nomenclature follows the determinations by G. Gottschlich.

In the floristic catalogue the following abbreviations are used:

Z: Zoller & al. (1977)

G: Gamisans & Hebrard (1980)

P: Strid & Papanicolaou (1981)

S: Smiris (1985)

V: Volpers (1989)

E: Eleftheriadou (1992)

R: Eleftheriadou & Raus (1996)

[1, 2, 3,...]: taxon found by us in subareas 1, 2, 3, etc. (for the correspondence of the numbers with subarea names see Table 1)

[1 (Z, E), ...]: taxon found by us in subarea 1 and also by Zoller & al. (1977) and Eleftheriadou (1992)

[(1: E)...]: taxon found in subarea 1 by Eleftheriadou (1992), but not by us

A, B, C, D: mesophilous, acidophilous, calciphilous and thermophilous beech forests.

vr, r, s, c, vc: taxon very rare, rare, scattered, common and very common in an ecological group.

!: the exclamation mark indicates the preference of a taxon for a certain ecological group, when this cannot be derived from its constancy in the ecological groups.

4. Floristic catalogue

4.1. Taxa constituting the Rodopi beech forest community

Pteridophyta

Equisetaceae

Equisetum arvense L. [1, 3]. Rare, in wet places. 1190-1350 m

E. hyemale L. [3]. Rare, in wet places. 1190 m

Polypodiaceae

Asplenium adiantum-nigrum L. [3, 5, 6, 7, 8, 9]. Common in 7 and in the west part of 6, rare elsewhere [B: vr, C: vr, D: c]. 380-1000 (1280) m

A. ceterach L. [(1: E), 4]. Rare [C: vr]. 950-1380 m. (E: as *Ceterach officinarum* DC.)

A. onopteris L. [6, 7 (G)]. Rare [B: vr, D: vr!]. 180-900 m

A. trichomanes L. subsp. *trichomanes* [1, 3, 4, 6, 7]. Scattered in 7, rare elsewhere [A: vr, B: vr, C: r, D: r]. 380-1360 m

Athyrium filix-femina (L.) Roth [1 (E), 3 (Z, S, V, R), 4, 5, 6 (Z, G), 7]. Rare, but in the western Rodopi locally scattered [A: c, B, C, D: vr]. (850) 1200-1840 m

Cystopteris fragilis (L.) Bernh. [1 (E), 3, 4, 5, 6, 7, 9]. Rare [A, B, C, D: vr]. 660-1520 m

Dryopteris carthusiana (Vill.) H. P. Fuchs [(1: E)]. 1450 m

D. dilatata (Hoffm.) A. Gray [1, 3 (Z, V, R)]. Rare in 1, scattered in 3 [A: s]. 1450-1780 m. (Z: as *D. austriaca* auct.)

D. expansa (C. Presl) Fraser-Jenk. & Jermy [1, (3: R)]. Found in one locality in mesophilous forest. 1750 m

D. filix-mas (L.) Schott [1 (E), 2, 3 (Z, S, V, R), 4, 5, 6 (Z, G), 7, 8]. Common in 3, scattered in 1 and 7, rare (but locally scattered) elsewhere. In 8 is rare and restricted to the higher altitudes [A: vc, B, C, D: r]. In all cases found in good quality stands. (540) 900-1850 m

Gymnocarpium dryopteris (L.) Newman [1 (E), 3 (R), 6]. Rare [A: s]. 1140-1700 m

Polystichum aculeatum (L.) Roth [1, 3 (Z, V, R), 6]. Rare [A: r!, B: vr]. 1140-1770 m

P. lonchitis (L.) Roth [(3: V)]. 1640 m

P. setiferum (Forssk.) Woyn. [7 (G), 8]. Scattered in 7, rare in 8. The taxon has also been recorded (as *Dryopteris setifera* (Forssk.) Schinz & Thell.) by Smiris (1985) for the Frakto Virgin Forest. However, its presence there is rather unlikely; it was neither found by us nor by Eleftheriadou & Raus (1996) [C: vr, D: r!]. 200-920 m

Polypodium vulgare L. [2, 3, 4, 5, 6 (G), 7, 8]. Scattered in 3 and 6, rare elsewhere [A: vr, B: s, C, D: r]. (660) 900-1400 (1650)

Pteridium aquilinum (L.) Kuhn subsp. *aquilinum* [1, 2, 3, 4, 5, 6 (G), 7 (G), 8, 9]. Common in all areas [A: s, B: c, C: vc, D: vc!]. (180) 600-1400 (1580) m. (G: as *P. aquilinum* (L.) Kuhn)

Selaginellaceae

Selaginella helvetica (L.) Spring [3, (4: P), 5]. Rare, found mainly at the edges of beech forests. 1200-1500 m

Gymnospermae

Cupressaceae

Juniperus communis L. subsp. *communis* [1, 2, 3, 4, 5, 6 (G), 7, 8]. Scattered in 5 and 6, rare elsewhere. Very rare in the eastern Rodopi [A, D: vr, B, C: s]. (460) 1100-1550 m. (G: as *J. communis* L.)

J. oxycedrus L. subsp. *oxycedrus* [1, 2, 3, 4, 8, 9]. Common in 9, rare elsewhere [B, C: vr, D: r!]. 690-1230 m

Pinaceae

Abies xborisii-regis Mattf. [1(Z, E), 2, 3 (Z, S, V), 4, 5, 6 (G), 8]. Fir does not form pure stands in Rodopi, except in 6 (small thickets in beech forest) but appears mainly in mixed stands with beech and spruce. In the western Rodopi it is common in 3, scattered in 1 and 6 (but locally common), rare elsewhere. In the eastern Rodopi it was found only at the higher altitudes of Mt Papikio [A: vc, B: s, C: r, D: vr]. (900) 1200-1850 m

Picea abies (L.) H. Karst. subsp. *abies* [1, 2, 3 (Z, S, V), 4, 5, 6]. Spruce forms extended stands in 1 and 3. In 5 it forms small thickets in a limited area. In 4 isolated trees of spruce appear. In 6 only two saplings were found (saplings were found in 6 also by Milios (2000a)) [A: vc, B, C: s, D: vr]. 1010-1850 m. (Z, S, V: as *P. abies*)

Pinus nigra subsp. *nigra* var. *caramanica* (Loudon) Rehder [1 (E), 2, 3, 4]. Natural forests of black pine occur in 3 and 4. Their boundaries westwards are the southeastern area of 2. In 1 isolated trees appear, mainly in areas with calcareous substrate [A: vr, B: r, C: s!, D: vr]. 1000-1490 m. (E: as *Pinus nigra* J. F. Arnold subsp. *nigra*)

P. peuce Griseb. [6]. The Balkan pine occurs in Frakto (Eleftheriadou & Raus 1996) and in Gyftokastro, a locality at the boundaries between western and eastern Rodopi, where a young, mixed stand of beech, fir, Balkan pine and Scotch pine occurs. A sapling was also found in 6, southwest and some kilometers distant from Gyftokastro. 1250-1520 m

P. sylvestris L. [1, 2, 3, 4, 5, 6, 8]. Scotch pine appears often in the tree layer of beech forests, as it is one of the commonest pioneer species in the western Rodopi, which has occupied the abandoned grazing lands in the last decades. Beech has established later in Scotch pine stands, so as today many high trees of Scotch pine still exist in beech stands (Zagas 1990, Milios 2000a, 2000b). In the eastern Rodopi it does not occur naturally, but a sapling was found in 8 [A: vr, B: c, C: c, D: vr]. (770) 1200-1580 m

Dicotyledoneae

Aceraceae

Acer campestre L. [4, 5, 7 (G)]. Rare [D: vr]. 180-950 m

A. heldreichii Boiss. subsp. *heldreichii* [1, 3, 4, 6, 8]. Rare [A: vr, B: vr]. 910-1710 m

A. hyrcanum subsp. *intermedium* (Pančić) Bornm. [(1: E), 2, 3, 4, 5, 6, 7, 8]. Scattered in 2, 3 and 7, rare in 4, 5 and 6, common in 8 [A: vr, B: r, C, D: s]. (380) 600-1300 (1520) m

A. platanoides L. [1, 3, 4, 5, 6, 7, 8]. Scattered in 8, rare elsewhere [A, B, C: vr, D: r!]. 540-1220 m

A. pseudoplatanus L. [1 (E), 3 (Z, S, V), 4, 5, 6]. Common in 3 and 4, scattered in 1 and rare in 5 and 6 [A, B: r, C: c, D: vr]. 950-1500 (1820) m

Adoxaceae

Adoxa moschatellina L. [1, (3, 6: Z)]. Rare. Found by us in one locality (41°32'04"N, 24°16'44"E) in mesophilous forest. 1400-1770 m

Araliaceae

Hedera helix L. subsp. *helix* [1, 3, 4, 5, 6, 7 (G), 8]. Scattered in 4 and 7, rare elsewhere [C, D: s]. (180) 400-1320 m (G: as *H. helix* L.)

Asclepiadaceae

Vincetoxicum hirundinaria Medik. s.l. [3, 5, 6, 7]. Rare [B, C: vr, D: r]. 970-1520 m. The specimens with flowers belong to *V. hirundinaria* subsp. *nivale* (Boiss. & Heldr.) Markgr.

Balsaminaceae

Impatiens noli-tangere L. [1 (E), (3: Z), 5, 6 (Z)]. Rare [A: r !, B: vr]. Also in wet places in beech forests. 1400-1650 m

Betulaceae

Betula pendula Roth [1 (E), 2, 3, 4, 6]. Rare but locally (3) scattered; declining especially in the Fagetalia zone, as a result of the increase of the area that occupy more competitive woodland species; we observed many dead plants in beech stands [A, B: r, C: s, D: vr]. 1040-1480 m

Carpinus betulus L. [(1: E), 3, 4, 5, 6, 7, 8, 9]. Scattered in 3, 7 and 8, rare elsewhere [A, B, C: vr, D: s]. Forming mixed stands with *Fagus sylvatica* s.l. and *Quercus petraea* subsp. *medwediewii* in relatively warm environments, in depressions and along rivulets. 380-1330 m

C. orientalis Mill. [4, 7 (G), 8]. Rare [C: vr, D: r!]. It occurs mainly in 7, in mixed stands with *Fagus sylvatica* s.l., *Carpinus betulus*, *Quercus petraea* subsp. *medwediewii* and *Fraxinus ornus* along rivulets at low altitudes. 390-780 (1200) m

Corylus avellana L. [1 (E), 2, 3, 4, 5, 6 (G), 7 (G), 8]. Common in 1, 3, 4, 5 and 7, scattered elsewhere [A: s, B, C: c, D: vc]. (180) 600-1400 (1580) m

C. colurna L. [8]. A single juvenile plant found in one locality. 920 m

Ostrya carpinifolia Scop. [1 (E), 2, 3, 4, 5, 6, 7 (G), 8]. Scattered in 3, 4 and 5, rare elsewhere [B: r, C: c, D: s]. (180) 700-1430 m

Boraginaceae

Myosotis arvensis (L.) Hill [6, 7, 8, 9]. Scattered in 7, rare elsewhere [D: s]. 400-1210 m

M. nemorosa Besser [(1: E), 6]. Rare, in wet places. 1500-1520 m

M. sylvatica Hoffm. s.l. [1, 2, 3 (Z), 4, 5, 6, 7, 8, 9]. Rare, but locally (5) scattered [A, B, C, D: r]. (180) 1100-1650 m. It was not possible to determine always the subspecies, two subspecies were identified:

M. sylvatica subsp. *cyanea* (Hayek) Vesterg. [1, (3: R), 4, 5, 6 (G), (7: G), 8]. The majority of the specimens belong to this subspecies. (180) 700-1570 m

M. sylvatica cf. subsp. *subarvensis* Grau [6, 7]. 460-1410 m

Pulmonaria rubra Schott [1 (Z, E), 2, 3 (Z, S, R), 4, 5, 6 (G), 7, 8]. Common in 1 and 3, scattered in 4, 5, and 6, rare elsewhere [A: vc, B: s, C, D: r]. (370) 1100-1850 m. In spring 1997 we collected many specimens. All individuals had deep pink to red flowers; on drying the flowers became blue (especially when the drying was not made properly) in some specimens. Therefore we conclude that *P. mollis* Hornem. (Eleftheriadou 1992) or *P. cf. dacica* (Simonk.) Simonk. (Eleftheriadou & Raus 1996) do not exist in the Fagetalia zone of Rodopi

Symphytum ottomanum Friv. [1, 3 (Z, S), 4, 5, 6 (Z, G), 7 (G), 8, 9]. Scattered in 8, rare elsewhere [A, D: s, B, C: vr]. (180) 600-1500 (1840) m

S. tuberosum subsp. *angustifolium* (A. Kern.) Nyman [3 (V), 4, 5, 6 (Z)]. Common. The absence in 1 is remarkable (also not found there by Eleftheriadou 1992) because of its frequent presence in the adjacent areas [A: c!, B, C: c, D: vr]. (950) 1200-1500 (1780) m. (Z, V: as *S. tuberosum* L.)

Campanulaceae

- Campanula cervicaria* L. [1, 2, 3, 4, 5, 6, 7, 8]. Scattered in 6 and 7, rare elsewhere. Common in the southeastern part of 6 [B, D: s, C: vr]. (450) 700-1300 (1480). Some specimens from 1 and 3 have flowers 25 mm long, approaching *C. moesiaca* Velen.
- C. lingulata* Waldst. & Kit. [2, 6, 7, 8]. Rare, but more frequent in the eastern Rodopi [D: r]. 460-1240 m
- C. patula* agg. [1, 2, 3, 4, 5, 6, 7, 8]. Common in 2, 5 and 7, rare elsewhere [A: r, B, D: s, C: vr]. (410) 800-1580. Three taxa have been identified, based on adequate specimens
- C. patula* L. subsp. *patula* [(1: E), 3, 6, 7]. 630-1500 m
- C. sparsa* Friv. subsp. *sparsa* [5]. 1350-1580 m
- C. sparsa* subsp. *sphaerothrix* (Griseb.) Hayek [1, 3, 4, 5, 6, 7]. 510-1580 m
- C. persicifolia* L. subsp. *persicifolia* [1, 2, 3, 4, 5, 6, 7 (G), 8, 9]. Scattered in 4 and 5, rare in 1, common elsewhere [A: r, B: c, C: s, D: vc!]. (210) 600-1300 (1650) m. (G: as *C. persicifolia* L.)
- C. rapunculoides* L. [1, 2, 3, 4, 5, 6, 7]. Common in 1, 2, 3, 4 and 7, rare in 5 and 6 [A: vr, B: r, C: c!, D: c]. (410) 700-1550 m
- C. trachelium* subsp. *athoa* (Boiss. & Heldr.) Hayek [1, 3, 4, 5, 6, 7 (G), 8, 9]. Common in 8 and 9, scattered in 4, 5 and 7, rare elsewhere [B: vr, C: r, D: s]. (180) 550-1440 m. (G: as *C. trachelium* L.)

Caprifoliaceae

- Lonicera xylosteum* L. [1, 4]. Rare [C: r]. 1140-1330 m
- Sambucus nigra* L. subsp. *nigra* [1, 3, 5, 6, 7, 8]. Scattered in 7, rare elsewhere [A, B, C: vr, D: r!]. Usually in the lower parts of slopes and in depressions along rivulets. 400-1500 m. – Taxonomy according to Bolli (1994)
- S. racemosa* L. var. *racemosa* [(1: E), 3 (Z, R)]. Rare [A: vr]. 1390-1700 m. (Z, E: as *S. racemosa* L.) – Taxonomy according to Bolli (1994)

Caryophyllaceae

- Moehringia pendula* (Waldst. & Kit.) Fenzl [(1: E) 2, 3 (R), 4]. Common in 2, scattered in 3, rare in 4 [A, B, C, D: r]. 1040-1780 m
- M. trinervia* (L.) Clairv. [1 (E), 2, 3 (R), 4, 5, 6 (Z, G), 7, 8, 9]. Rare in 1 and 9, scattered elsewhere [A, B, D: s, C: r]. (390) 800-1400 (1750) m
- Silene atropurpurea* (Griseb.) Greuter & Burdet [1 (E), 3, 4, 5, 6 (G), 7, 8]. Common in 7 and 8, scattered in 3 and 6, rare elsewhere [B: r, C: vr, D: c]. (380) 600-1200 (1420) m. (G, E: as *Lychnis viscaria* subsp. *atropurpurea* (Griseb.) Chater)
- S. coronaria* (L.) Clairv. [2, 6, 7, 8]. It rarely enters into thermophilous forests [D: vr]. 400-1240 m
- S. heuffelii* Soó [6, 8]. It enters rarely beech forests [A, B, D: vr]. 770-1260 m
- S. italica* (L.) Pers. subsp. *italica* [2, (6: G), 7, 8, 9]. Rare in 2 and 7, scattered in 8, common in 9 [D: r]. 580-1100 m. (G: as *S. italica* (L.) Pers.)
- S. viridiflora* L. [1, 2, 3, 4, 5, 6, 7, 8]. Scattered in 2, 7 and 8, rare elsewhere [B, C: vr, D: s]. 460-1420 m
- S. vulgaris* subsp. *bosniaca* (G. Beck) Greuter & al. [2, 3, 4, 5, 6 (G), 7, 8]. Scattered in 5, 6, 7 and 8, rare elsewhere [B: r, C: vr, D: s]. (400) 700-1510 m. (G: as *S. vulgaris* (Moench) Garcke)
- Stellaria holostea* L. [8]. It was found only in one locality (41°15'20"N, 25°22'02"E), but with many individuals. 760 m. In Greece known only from Dirfi (Evvia), Athos and Cholomontas (Chalkidiki)
- S. nemorum* L. s.l. [1 (E), 3 (Z, V, R), 6 (G)]. Rare but locally (3) scattered [A: s]. 1350-1780 m. (Z, G, V, R: as *S. nemorum* L.). According to Strid & Tan (1997) the Greek populations represent subsp. *montana* (Pierrot) Berher, but it is noteworthy that in our specimens the second pair of bracts is distinctly more than 1/3 as long as the first.

Celastraceae

Euonymus latifolius Mill. [4, 5, 7, 8]. Rare [B, C, D: vr]. 700-1280 m

E. verrucosus Scop. [1 (E), 3, 6]. Rare [B, C, D: vr]. 1050-1280 m. – For the spelling of the genus name see Karagiannakidou & Raus (1996)

Compositae

Achillea grandifolia Friv. [1 (E), 5, 8]. Scattered in 8, rare elsewhere [B: vr, D: vr!]. 680-1240 m

Anthemis tinctoria L. subsp. *tinctoria* [7, 8]. It rarely enters into thermophilous forests [D: vr]. 460-1020 m.

A. tinctoria subsp. *parnassica* (Boiss. & Heldr.) Franzén [2, 3]. Rare

Cicerbita alpina (L.) Wallr. [1, 3 (Z)]. Rare. 1530-1750 m

Cirsium appendiculatum Griseb. [1, 3, 6]. Rare [A: r!, B, C: vr]. 1350-1780 m

Doronicum austriacum Jacq. [1 (E), 3 (Z, S, V, R), 6 (Z, G)]. Rare, but locally (3, 6) scattered [A: c, B, D: vr]. (1010) 1200-1820 m. (Z, G, S: as *D. orphanidis* Boiss.)

D. columnae Ten. [6, (7: G)]. Rare, found along rivulets and on rocks covered with moss. (180) 1140-1190 m. The altitude (180-210 m) given by Gamisans & Hebrard (1980) is surprising

D. orientale Hoffm. [7, 8, 9]. Rare in 7, scattered in 8, common in 9 [D: r]. 490-920 m

Hieracium bauhini Besser [8]. It rarely enters into thermophilous forests [D: vr]. 640 m. Some not adequate specimens that resemble this taxon have also been collected from areas 6 and 9

H. bifidum Hornem. [6]. Rare, but perhaps undercollected [B, D: vr]. 1260-1420 m

H. erythrocarpum Peter [1, 3, 5, 6, 7, 8, 9]. Rare, but locally scattered [B, D: r, C: vr]. 450-1490 m. *H. erythrocarpum* may be confused with *H. rechingeriorum* Zahn. Both have leaves attenuate at base and the determination of specimens without flowers is impossible. Nevertheless, the occurrence of *H. erythrocarpum* in the above areas is documented by adequate specimens

H. heldreichii Boiss. [1]. It rarely enters into calcareous forests [C: vr]. 1110-1330 m

H. cf. jankae Uechtr. [2]. Rare (found in one locality in acidophilous forest). 1330 m

H. lachenalii C. C. Gmel. [7, 8]. Rare [D: vr]. 510-650 m

H. murorum L. [1, 2, 3 (R), 4, 5, 6 (G), 7, 8, 9]. Common in 2, 3, 6, and 7, rare in 4 and 5, scattered elsewhere [A: vr, B: s, C: r, D: c]. (380) 600-1300 (1750) m. (G: as *H. grex murorum* L., R: as *H. murorum* subsp. *semisilvaticum* (Zahn) Zahn)

H. olympicum Boiss. [1, 2, 3, 4, 5, 6, 7, 8, 9]. Common in 2, 7, 8 and 9, scattered in 3 and 6, rare elsewhere [B: r, C: vr, D: c]. (380) 600-1200 (1490) m

H. cf. olympicum Boiss. × *H. murorum* L. [8]. Rare (collected in one locality in thermophilous forest). 630 m

H. pavichii Heuff. [7, 8, 9]. Rare [D: r]. 450-840 m

H. praecurrens Vuk. [5]. Rare, found in one locality (41°23'29"N, 24°37'36"E) in thermophilous forest. 950 m. According to G. Gottschlich (pers. comm.) this taxon is new to Greece

H. racemosum Willd. [1 (E), 2, 3, 4, 6, 7, 8]. Common in 7, scattered in 6, rare elsewhere [B: r, C: vr, D: c]. 390-1420 m. Many specimens have features intermediate between *H. olympicum* and *H. racemosum*

H. rechingeriorum Zahn [3, 5, 6, 7, 8, 9]. Rare (see comments for *H. erythrocarpum*) [B, D: vr]. 490-1500 m

H. scardicum Bornm. & Zahn [4]. Rare (collected in one locality in calcareous forest). 1140 m.

H. sparsum Friv. s.l. [3, 6]. It rarely enters into beech forests [B, D: vr]. 1160-1780 m. Two specimens belong to *H. sparsum* subsp. *schantzianum* (Pančić & Vis.) Zahn [3 (R), 6], and one to *H. sparsum* subsp. *sparsum* [6]

H. cf. subnitens Zahn vel *tschamkorijense* Zahn? [1]. Found in one locality in mesophilous forest. 1450 m

Lapsana communis L. subsp. *communis* [1 (Z), 2, 3, 5, 6, 7, 8, 9]. Common in 7, 8 and 9, scattered in 5, rare elsewhere [A: r, B, C: vr, D: c]. All the adequate specimens belong to this subspecies, but the occurrence of other subspecies must be considered possible. (390) 600-1400 (1580) m. (Z: as *L. communis* L.)

- Mycelis muralis* (L.) Dumort. [1 (Z), 2, 3 (S, V), 4, 5, 6 (Z, G), 7 (G), 8, 9]. Common [A, B, C, D: vc]. In acidophilous forests it is relatively less frequent than in the other ecological groups. (180) 700-1500 (1850) m
- Prenanthes purpurea* L. [1 (E), 2, 3 (Z, S, V, R), 4, 5, 6 (G), 8]. Common in 3 and 6, scattered in 4, rare elsewhere. In 8 it was found only in one locality, at relatively high altitude [A: c!, B: c, C, D: r]. (750) 1000-1700 (1850) m
- Senecio nemorensis* agg. [1, 3 (V), 5, 6 (Z, G), 8]. Scattered in 3, rare elsewhere [A: s, B, D: vr]. (760) 1100-1780 m. (Z: as *S. fuchsii* C. C. Gmel., G, V: as *S. nemorensis* L.). In adequate specimens the following two taxa have been distinguished:
- S. germanicus* Wallr. var. *germanicus* [(1: E), 8]. Rare. Collected in mesophilous and generally in good quality stands. 1000-1100 m. (E: as *S. nemorensis* L. subsp. *nemorensis*)
- S. hercynicus* Herborg var. *hercynicus* [1 (E), 3, 6]. Scattered in 3, rare elsewhere. Collected in mesophilous forests. 1470-1700 m. (E: as *S. nemorensis* subsp. *fuchsii* (C. C. Gmel.) Čelak.)
- S. squalidus* L. [1, 3 (V, R), 4]. It rarely enters into beech forests [A, B, C: vr]. 1280-1700 m
- Solidago virgaurea* L. [4, 5, 6, 7, 8]. Rare but locally (southeast part of 6, 7) scattered [B: vr, D: r!]. (380) 600-1200 (1520) m
- Tanacetum corymbosum* (L.) Sch. Bip. subsp. *corymbosum* [1, 2, 3, 4, 5, 6, 7, 8]. Common in 3, 7 and 8, scattered in 6, rare elsewhere [B: r, C: s, D: c]. 380-1460 m

Cornaceae

- Cornus mas* L. [1, 3, 4, 6, 7 (G), 8]. Common in 7, rare elsewhere [B: vr, C: r, D: s]. (180) 400-1000 (1230) m

Crassulaceae

- Sedum cepaea* L. [6, 7, 8]. Common in 7, rare in 6 and 8 [D: r]. 390-830 m
- Hylotelephium telephium* (L.) Ohba [3, 7]. Rare [D: vr]. 460-1120 m
- Umbilicus luteus* (Huds.) Webb & Berthel. [8]. Found only in two localities, but with many individuals [D: vr]. 890-920 m

Cruciferae

- Arabis procurrans* Waldst. & Kit. [3, 4, 5, 6]. Rare but locally scattered in 6 [B, D: vr, C: r]. Our localities were reported by Eleftheriadou & al. (1998). 750-1430 m.
- A. turrita* L. [(1: E), 2, 4, 5, 6, 7, 8]. Rare, except in 8, where it is scattered [A, B, C: vr, D: r!]. 410-1460 m
- Cardamine amara* subsp. *balcanica* Marhold & al. [1 (E), (3: Z, R), 6]. Rare, in wet places. 1210-1700 m. (Z, E, R: as *C. amara* L.)
- C. bulbifera* (L.) Crantz [1 (E), 2, 3 (Z, V, R), 4, 5, 6 (Z, G), 7 (G), 8]. Common in 3, 4, 5 and 8, rare in 2, scattered elsewhere [A: vc, B: r, C: c, D: s]. Independent of the ecological group, it occurs in good quality stands. (180) 900-1600 (1780) m
- C. impatiens* L. subsp. *impatiens* [(1: E), 3, 4 (P), 5, 6, 7]. Rare [A, B, C, D: vr]. 750-1380 m. (E: as *C. impatiens* L., S: as *C. impatiens* s. str.)
- C. impatiens* subsp. *pectinata* (DC.) Stoj. & Stef. [1 (E), 3, 6]. Rare. 1140-1770 m. (E: as *C. pectinata* DC.)
- C. acris* Griseb. [6]. Rare, in wet places. 1550 m
- Rorippa thracica* (Griseb.) Fritsch [(1: E), 2, 3, 4, 5, 6 (G), 7, 9]. Common in 2, rare elsewhere (locally scattered in the southeastern part of 6). [B, C: vr, D: r!]. 700-1480 m

Dipsacaceae

- Knautia ambigua* (Friv.) Boiss. & Orph. [1, 3, 4]. It rarely enters into beech forests, especially on calcareous substrates [B, C, D: vr]. 1020-1310 m
- K. drymeia* subsp. *nympharum* (Boiss. & Heldr.) Ehrend. [1, 2]. It rarely enters into beech forest [B, C: vr]. 1180-1390 m

Ericaceae

Vaccinium myrtillus L. [1, 2, 3 (S, V), 4, 5, 6 (Z, G)]. Scattered in 4, common elsewhere [A: c, B: vc!, C, D: r]. (750) 1200-1500 (1830) m

V. vitis-idaea L. [2, 3 (R), 5, 6 (G)]. Rare in 3, scattered elsewhere [A: vr, B: s]. 1040-1750 m

Euphorbiaceae

Euphorbia amygdaloides L. subsp. *amygdaloides* [1 (Z), 2, 3 (Z, S, V), 4, 5, 6 (Z, G), 7 (G), 8].

Common [A, B, C, D: vc]. (180) 700- 1500 (1840) m. (Z, G, S, V: as *E. amygdaloides* L.)

E. epithymoides L. [7, 8]. Scattered in 7, rare in 8 [D: r]. 410-910 m

E. seguieriana subsp. *niciciana* (Borbás) Rech. f. [1, 4, 6]. Rare [B, C, D: vr]. 1100-1380 m

Mercurialis perennis L. [3, 4 (P), 6, 7 (G), 8]. Rare [C, D: vr]. (180) 750-1300 m

Fagaceae

Quercus cerris L. [1 (E), 4, 9]. Scattered in 1, rare in 4 and 9 [B, D: vr, C: s]. 740-1360 m

Q. frainetto Ten. [1, 7, 9]. Common in 7, rare in 1 and 9. Only in Echinus (7) beech forest intergrades with *Q. frainetto* forest [C: vr, D: s]. 380-700 (1310) m

Q. petraea subsp. *medwediewii* (A. Camus) Menitsky [1, 2, 3, 4, 5, 6 (G), 7 (G), 8, 9]. Scattered in 3, rare in 1 and 4, common elsewhere. Much more common in the beech forests of eastern Rodopi than in west [B: r, C: s, D: vc]. (180) 600-1150 (1450) m (G: as *Q. dalechampii* Ten.)

Q. petraea Liebl. subsp. *petraea* [3]. Found only in one locality in an opening of mixed spruce-beech stand in the Virgin Forest of Frakto

Gentianaceae

Gentiana asclepiadea L. [1 (E), 3, 4, 6]. Scattered in 3, rare elsewhere [A, B: vr, C: r]. 1050-1480 m

Geraniaceae

Geranium macrorrhizum L. [1, 2, 3 (Z, S), 4, 5, 6 (G)]. Scattered in 1 and 4, rare elsewhere.

Mainly on rocks and rock-rubble along rivulets [A, B, C: s, D: vr]. (940) 1100-1600 (1800) m

G. robertianum L. subsp. *robertianum* [1 (Z), 2, 3 (S, V, R), 4, 5, 6 (Z, G), 7, 8, 9]. Scattered in 3 and 7, rare elsewhere [A: c, B: vr, C, D: r]. (400) 800-1600 (1840) m. (Z, G, S, V: as *G. robertianum* L.)

G. sanguineum L. [1, 3, 4, 6]. Rare [B, D: vr, C: r!]. 1110-1430 m

G. sylvaticum L. subsp. *sylvaticum* [3 (R)]. Rare (found in two localities). 1690-1780 m

Gesneriaceae

Haberlea rhodopensis Friv. [4]. Rare. Found in a small area (41°26'24"-41°27'03"N, 24°34'17"-24°34'35"E) in the beech forest in 1250-1300 m. Scattered on calcareous boulders

Grossulariaceae

Ribes alpinum L. [1 (E), (3: Eleftheriadou & al. 1994), 4, 5, 6 (Eleftheriadou & al. 1994)]. Rare [A, B, C: vr]. Usually in good quality stands. 1210-1680 m. The first time recorded for Greece by Athanasiadis & Gerasimidis (1981) from Mt Lailias, Nomos of Serres

Guttiferae

Hypericum aucheri Jaub. & Spach [7, 8]. Rare in 7, scattered in 8. It enters into thermophilous, bad quality forests [D: vr]. 600-1030 m

H. cerastoides (Spach) N. Robson [1, 2, 3, 4, 5, 6 (G), 7, 8, 9]. Rare in 1, 3, 4, scattered in 6, common elsewhere [A, C: vr, B: s, D: c]. (390) 600-1400 (1650) m

H. maculatum subsp. *immaculatum* (Murb.) A. Fröhl. [1, 3, 4, 5, 6]. Rare [A: r, B, C, D: vr]. 1100-1660 m

H. perforatum L. [1, 2, 3, 4, 5, 6, 7, 8, 9]. Common in 2, 5, 6 and 7, scattered in 1 and 4, rare elsewhere [A: r, B: c, C, D: s]. 550-1580 m

H. spruneri Boiss. [3, 4, 6 (G), 7 (G), 8, 9]. Common in 8, scattered in 7 and 9, rare elsewhere (scattered in the southeast part of 6) [B, C: vr, D: c]. (210) 400-1100 (1340) m

Juglandaceae

Juglans regia L. [1, 3, 4, 6, 7, 8, 9]. Common in 7, rare elsewhere [B, C: vr, D: s]. Its occurrence is connected with human impact. 390-1000 (1180) m

Labiatae

Ajuga genevensis L. [1 (E), (6: G), 7]. It rarely enters into beech forests [A, B, C: vr]. 1210-1550 m

A. genevensis L. × *A. pyramidalis* L. [(3: R)]. 1750 m

A. pyramidalis L. [5]. Rare. In two localities (41°24'59"N, 24°41'00"E; 41°24'03"N, 24°42'20"E) in acidophilous forest [B: vr]. 1410-1480 m. The only known localities in Greece are Elatia and Frakto Virgin Forest (Eleftheriadou 1992, Eleftheriadou & Raus 1996)

A. reptans L. [1 (Z, E), 3 (S, V), 4, 5, 6, 7, 8]. Common in 1 and 3, scattered in 5 and 8, rare elsewhere [A: c, B, C: s, D: r]. (450) 1000-1600 (1850) m

Galeopsis bifida Boenn. [1, (3: V, R)]. Rare [A: vr]. 1400-1750 m

G. speciosa Mill. [1]. Rare [A: vr]. 1280-1530 m

Lamium galeobdolon (L.) L. subsp. *galeobdolon* [1 (E), 3 (S, V, R), 4, 5, 6]. Rare but locally scattered [A: c, B, C, D: vr]. 950-1840 m. (S, V: as *Lamiastrum galeobdolon* (L.) Ehrend. & Polatschek, E: as *Lamiastrum galeobdolon* subsp. *galeobdolon*)

L. garganicum subsp. *laevigatum* Arcang. [4, 6, 8]. Rare [B, C, D: vr]. 920-1410 m

L. maculatum L. [3 (V), 5, 6, 7, 8]. Scattered in 8, rare elsewhere [A, D: r, C: vr]. (410) 700-1300 (1780) m

Melittis melissophyllum subsp. *albida* (Guss.) P. W. Ball [6, 7 (G), 8, 9]. Scattered in 6 (but common in its southeastern part), rare in 9, common in 7 and 8 [B: vr, D: c]. (180) 500-1000 (1340) m. (G: as *M. albida* Guss.)

Prunella vulgaris L. [3, 7, 8]. It rarely enters into beech forests [C, D: vr]. 410-1350 m

Salvia glutinosa L. [1 (E), 2, 3, 4, 5, 6, 7, 8]. Common in 3, 4 and 7, scattered in 2, rare elsewhere [A: vr, B: r, C: c!, D: s]. (450) 700-1460 m

Satureja menthifolia (Host) Fritsch [2, 4, 6, 7, 8]. Common in 7, scattered in 8, rare elsewhere [C: vr, D: c]. 390-1000 (1290) m

S. vulgaris (L.) Fritsch s.l. [1 (Z), 3, 4, 5, 6, 7, 8, 9]. Common in 5, rare in 9, scattered elsewhere [A, B: r, C: c, D: s]. (390) 700-1580 m. Adequate material allowed the identification of the following subspecies:

S. vulgaris subsp. *orientalis* (Bothmer) Greuter & Burdet [1, 4, 5, 8]. 850-1580 m

S. vulgaris (L.) Fritsch subsp. *vulgaris* [1, 3 (R), 4, 5, 6, 7]. 410-1580 m. Much more common than the first subspecies but many specimens have intermediate characteristics (length of calyx and of its upper teeth)

Scutellaria columnae All. subsp. *columnae* [6, 8]. Rare [D: vr]. 720-900 m

Stachys alpina L. subsp. *alpina* [1 (P, E), (3: R), 4, 5, 6, 7, 8]. Scattered in 7 and 8, rare elsewhere [A, C: vr, B: r, D: s]. 540-1470 (1790) m. (P, E: as *S. alpina* L.)

S. sylvatica L. [1 (Z), 6(G)]. Rare [A: vr]. 1210-1580 m

Teucrium chamaedrys L. subsp. *chamaedrys* [1, 4, 5, 6, 7]. Rare [C, D: vr]. 410-1320 m

Thymus species [1, 2, 3, 5, 6, 7, 8, 9]. Common in 2, 7 and 9, scattered in 8, rare elsewhere [B, C: vr, D: c]. 380-1100 (1410) m. They enter thermophilous forests quite often, but they are in most cases cachectic. Therefore, a small number of specimens are sufficient for determination, the following taxa have been identified:

T. degenii Heinr. Braun [7]. 640 m

T. longicaulis subsp. *chaubardii* (Boiss. & Heldr.) Jalas var. *chaubardii* [6, 7, 8, 9]. 410-1110 m

T. sibthorpii Benth. var. *sibthorpii* [7, 8]. 780-810 m

T. thracicus Velen. var. *thracicus* [8]. 760 m.

The second and the third taxon occur more often than the other.

Leguminosae

- Chamaecytisus austriacus* (L.) Link [4, 6, 7, 8]. Rare in 4 and 6, common in 7 and 8 [B: vr, D: c]. 390-1000 (1330) m
- C. hirsutus* agg. [4, 6, 8]. Common in 8, rare in 4 and 6 [A, B, C: vr, D: r]. 490-1340 m. Most of the specimens have rather big leaves and probably belong to *C. falcatus* (Waldst. & Kit.) Holub. Two specimens [8] have rather small leaves and legumes covered all over with hairs and thus probably belong to *C. polytrichus* (M. Bieb.) Rothm.
- Genista carinalis* Griseb. [2, 3, 4, 5, 6, 7, 8, 9]. Scattered in 2, 8 and 9, rare elsewhere [B, C: vr, D: s]. (380) 600-1350 m
- G. tinctoria* L. [8]. It rarely enters into thermophilous forests [D: vr]. 410-850 m
- Lathyrus laxiflorus* (Desf.) Kuntze subsp. *laxiflorus* [8, 9]. Common in 8, scattered in 9 [D: r]. 410-870 m
- L. niger* (L.) Bernh. subsp. *niger* [6, 7 (G), 8]. Scattered in 7, rare in 6 and 8 [D: r]. 180-990 m. (G: as *L. niger* (L.) Bernh.)
- L. pratensis* L. [1, 2, 3, 4, 5, 7]. Rare [B, D: vr, C: r!]. (660) 1000-1550 m
- L. venetus* (Mill.) Wohlf. [(3: Z), (7: G)]. 180- 210 (1650) m. The record by Zoller & al. (1977) (1650 m) may be erroneous. All specimens we found in adjacent areas belong to the following taxon
- L. vernus* (L.) Bernh. [1, 4, 7, 8]. Rare [C, D: vr]. 640-1220 m
- Securigera varia* (L.) Lassen [1, 2, 3, 5, 6, 8]. Rare [A, C, D: vr]. 760-1340 m
- Trifolium pseudomedium* Hausskn. [1, 2, 3 (R), 4, 5, 6, 7, 8]. Scattered in 7 and 8, rare elsewhere [A, B, C: vr, D: s]. 500-1520 (1750) m. – Taxonomy according to Hendrych (1993)
- Vicia cassubica* L. [(1: E), 2, 4, 7, 8]. Rare [D: vr]. 550-1310 m
- V. cracca* subsp. *incana* (Gouan) Rouy [1]. It rarely enters into beech forests. 1390 m. Some specimens without flowers and legumes may belong to this taxon or to *V. villosa* Roth subsp. *villosa*
- V. sepium* L. [1, 3]. Rare [A, B, C: vr]. 1190-1460 m

Oleaceae

- Fraxinus ornus* L. [1, 3, 4, 5, 6 (G), 7 (G), 8]. Rare in 1, and 5, scattered in 3 and 6, common elsewhere [A, B: vr, C: c, D: c!]. (180) 500-1200 (1520) m

Onagraceae

- Circaea lutetiana* L. [(1: E), (3: Z), 6, 7, 8]. Rare [A, D: vr]. Also in wet places. 490-1650 m
- Epilobium angustifolium* L. [1, 2, 3 (Z, V), 4, 5, 6]. Common in 5, scattered in 2 and 4, rare elsewhere [A, B: s, C, D: vr]. 1040-1680 m
- E. lanceolatum* Sebast. & Mauri [3, 5, (6: G), 7, 8, 9]. Rare in 3 and 5, common in 7, 8 and 9 [B, C: vr, D: c]. (390) 600-1000 (1420) m
- E. montanum* L. [1 (Z), 2, 3 (Z, S, V, R), 4, 5, 6 (G), 7, 8]. Scattered in 7 and 8, common elsewhere. Generally, much more often in the western than in the eastern Rodopi [A, B: vc, C: c, D: s]. (540) 1000-1500 (1850) m

Oxalidaceae

- Oxalis acetosella* L. [1 (Z, E), 2, 3 (Z, P, S, V, R), 4, 5, 6 (Z, G)]. Common in 3, rare in 2 and 6, scattered elsewhere [A: vc, B: r, C, D: vr]. (1000) 1200-1900 m

Papaveraceae

- Corydalis cava* subsp. *marschalliana* (Willd.) Hayek [(1: E), 4, 6, 8]. Rare. Usually in good quality stands. 890-1500 m. (E: as *C. bulbosa* subsp. *marschalliana* (Pallas) Chater)
- C. solida* subsp. *incisa* Lidén [(1: E) 6, 8]. Rare. Usually in good quality stands and in depressions. 740-1210 m. (E: as *C. solida* (L.) Swartz subsp. *solida*)
- Chelidonium majus* L. [7]. Rare. 370-670 m

Polygonaceae

Rumex acetosella subsp. *acetoselloides* (Balansa) Den Nijs [1 (E), 3, 4, 5, 6, 7]. Scattered in 5, rare elsewhere. Its occurrence is related with the grazing of cattle. 740-1460 m (E: as *R. acetosella* L.)

Primulaceae

Cyclamen hederifolium Aiton [7]. Rare. 500 m

Lysimachia punctata L. [1, 3, 4, 5, 6, 7, 8]. Common in 7, scattered in 3 and 8, rare elsewhere [A, C: r, B: vr, D: c]. (410) 600-1100 (1370) m

Primula acaulis (L.) L. subsp. *acaulis* [7]. Rare [D: vr]. 400-630 m

P. elatior (L.) L. subsp. *elatior* [(1: E), 3 (S, R), 6]. Rare. Known in Greece only from Elatia and the Virgin Forest of Frakto. In 6 it was found only in one locality (41°21'08"N, 24°45'53"E). 1570-1820 m. (S: as *P. elatior*, E: as *P. elatior* subsp. *intricata* (Gren. & Gordon) Lüdi)

P. veris subsp. *columnae* (Ten.) Maire & Petitm. [1, 2, 3, 4, 5, 6 (G), 7 (G), 8, 9]. Common [A: s, B: c, C, D: vc]. (180) 700-1400 (1690) m. (G: as *P. veris* subsp. *columnae* (Ten.) Lüdi). Taxonomy following Wisskirchen & Haeupler (1998: 391)

Soldanella rhodopaea F. K. Mey. [(1: E), 3 (V, R), 5, 6]. Rare. The locality in 5 (41°25'16"N, 24°38'47"E) is new for this rare endemic species. In 6 it is scattered in the Preserved Monument of Nature (also recorded by Sfikas 1995) [A: r]. 1110-1780 m

Pyrolaceae

Monotropa hypopitys L. [1 (E), 2, 3 (R), 4, 5, 6 (G), 7 (G), 8]. Rare in 8, common elsewhere, but in 7 less frequent than in the other areas [A: s, B, C: vc, D: c]. (180) 1000-1700 m. Few specimens have the characteristics of *M. hypopitys* var. *glabra* Roth [1, 3, 4, 5, 6]

Orthilia secunda (L.) House [1 (E), 2, 3 (S, V, R), 4, 5, 6 (Z, G), 7]. Scattered in 3 and 4, rare in 7 (found only in one locality in its northwestern part), common elsewhere [A, C: s, B: c!, D: vr]. (970) 1200-1500 (1830) m. (S: as *Pyrola secunda* L.)

Pyrola chlorantha Sw. [1, 2, 3 (R), 5, 6]. Rare [B: vr!, D: vr]. 1200-1750 m

P. media Sw. [5, 6]. Rare [B: vr]. 1130-1550. New record for the Greek flora. In total, eight localities have been found (two in 5 and six in 6)

P. minor L. [1 (E), 2, 3 (V, R), 5, 6]. Rare [A: vr, B:r!]. 1170-1840 m

Ranunculaceae

Aconitum lycoctonum subsp. *neapolitanum* (Ten.) Nyman [3 (R)]. Rare. 1690-1700 m

Actaea spicata L. [1 (E), (3: Z, S, R), 4, 6 (G), 8]. Rare [A: r!, B, C: vr]. 900-1700 m

Anemone nemorosa L. [3 (V, R), 4, 5, 6 (Z, G)]. Scattered in 3 and 5, rare in 4 and 6 [A: s!, B, D: vr, C: r]. 950-1780 m

A. ranunculoides L. [(3: Z)]. Recorded by Zoller & al. (1977) from the Frakto Virgin Forest, but neither found by us nor by Eleftheriadou & Raus (1996). However, its presence is possible, because it was found by Eleftheriadou (1992) in 1 (though not in beech forest). 1650 m

Clematis vitalba L. [1, 2, 3, 4, 6, 7, 8]. Scattered in 4 and 7, rare elsewhere [B: vr, C: s!, D: r]. 460-1320 m

Helleborus cyclophyllus (A. Braun) Boiss. [1 (E)]. Rare. It was found only in the southeastern part of 1 [C: vr]. 1110-1240 m. – Taxonomy according to Mathew (1989)

Ranunculus platanifolius L. [1, (3: Z)]. Rare. 1580-1750 m

R. repens L. [1, 3, 4]. It rarely enters into beech forests in wet places or along rivulets. 1190-1350 m

Thalictrum aquilegifolium L. [(3: R), 5, 6 (Z, G)]. It rarely enters into forests [A, B, C: vr]. 1190-1600 m

Rosaceae

Aremonia agrimonioides (L.) DC. subsp. *agrimonioides* [1 (Z, E), 2, 3 (Z, S, V, R), 4, 5, 6 (G), 7 (G), 8, 9]. Scattered in 8, common elsewhere. More common in the western than in the

- eastern Rodopi [A, B, C: vc, D: c]. (180) 900-1600 (1850) m. (Z, G, S, V: as *A. agrimonioides* (L.) DC.)
- Crataegus monogyna* Jacq. var. *monogyna* [1 (E), 3, 4, 5, 6, 7, 8]. Common in 7, scattered in 3, rare elsewhere [A, B: vr, C: r, D: c]. 380-1310 m. (E: as *C. monogyna* Jacq. subsp. *monogyna*). – Taxonomy according to Christensen (1992)
- Fragaria vesca* L. [1, 2, 3 (V), 4, 5, 6 (Z, G), 7, 8]. Scattered in 7, rare in 8, common elsewhere. Much more common in the western than in the eastern Rodopi [A: c, B, C: vc, D: s]. (450) 1000-1500 (1780) m
- Malus sylvestris* Mill. [1, 3, 5, 6, 7]. Rare, mainly juvenile plants [B, C, D: vr]. 460-1230 m
- Geum urbanum* L. [1 (Z), 3, 4, 5, 6 (G), 7, 8, 9]. Rare [A, C, D: r, B: vr]. 630-1530 m
- Potentilla geoides* M. Bieb. subsp. *geoides* [7, 8]. It rarely enters into thermophilous forests [D: vr]. 700-840 m
- P. micrantha* DC. [1, 2, 3, 4, 5, 6 (G), 7 (G), 8, 9]. Common [A: s, B, C, D: vc]. (180) 700-1400 (1780) m
- Prunus avium* L. [1, 2, 3 (R), 4, 5, 6, 7, 8, 9]. Rare in 2, scattered in 1, 3 and 6, common elsewhere. Usually juvenile plants [A: vr, B: s, C, D: c]. (390) 600-1300 (1680) m
- P. cerasifera* Ehrh. [1, 3, 4, 5, 6, 7, 8]. Rare [B, D: vr, C: r]. 550-1440 m
- Rosa agrestis* Savi [1, 3, 4, 6, 7, 8, 9]. Rare [C: s, D: vr]. 730-1480 m
- R. arvensis* Huds. [1, 3, 4, 5, 6, 7, 8, 9]. Scattered in 4, common in 7, rare elsewhere [A, B: vr, C: s, D: c]. (390) 600-1200 (1460) m
- R. canina* L. [1, 2, 3 (R), 4, 5, 6, 7, 8]. Scattered in 3, common in 1, 4, 5 and 6, rare elsewhere [A: r, B, C: c, D: s]. (610) 1000-1700 m
- R. horrida* Crép. [1, 4, 5, 7]. It enters rarely beech forests [A, C, D: vr]. 720-1480 m
- R. pendulina* L. [1, 3 (V), 4, 5, 6, 7]. Common in 3 and 6, scattered in 4 and 5, rare in 1 and 7 [A, D: r, B: c!, C: s]. 970-1400 (1680) m
- R. pulverulenta* M. Bieb. [1, 2, 3, 4, 5, 6]. Rare [B, C: vr]. 1100-1440 m
- R. tomentosa* Sm. [1, 5, 7, 8]. It rarely enters into beech forests [B, C, D: vr]. 500-1470 m. – Taxonomy of *Rosa* species according to Zieliński (1990)
- Rubus canescens* DC. [1, 2, 3, 4, 5, 6, 7, 8, 9]. Rare in 3, 4 and 5, scattered elsewhere [B: vr, C, D: s]. 500-1470 m
- R. hirtus* Waldst. & Kit. [1, 3, 4, 5, 6, 7, 8, 9]. Rare in 5, 8 and 9, common elsewhere [A: s, B, C, D: c]. (390) 600-1500 (1670) m
- R. idaeus* L. [1, 2, 3 (S, V), 4, 5, 6]. Rare in 2, common elsewhere [A: vc, B, C: c, D: vr]. (970) 1200-1600 (1850) m
- R. saxatilis* L. [1, 3]. Rare in 1 (but locally scattered), scattered in 3 [B: vr, C: r]. 1120-1480 m
- Sorbus aria* (L.) Crantz subsp. *aria* [(1: E), 3, 6, 7]. Rare [B, C, D: vr]. 1020-1490 m. (E: as *S. graeca* (Spach) Kotschy)
- S. aucuparia* L. subsp. *aucuparia* [1 (Z), 3 (Z, S, V, R), 6]. Rare in 1 and 6 (in 6 locally scattered), common in 3 [A: c, B: r, D: vr]. (1050) 1300-1800 m. (Z, S, V: as *S. aucuparia*)
- S. domestica* L. [1, 3, 4, 6, 7 (G), 8, 9]. Scattered in 7, rare elsewhere [A, C: vr, D: r!]. 210-1450 m
- S. torminalis* (L.) Crantz [1, 3, 4, 6, 7 (G), 8, 9]. Rare in 1 and 6, scattered in 3 and 4, common elsewhere [B: vr, C: s, D: c!]. (180) 400-1100 (1330) m
- Spiraea chamaedryfolia* L. [3, 6, 7]. Recently recorded for Greece by Arabatzis & Vidakis (1996), further records from Rodopi by Athanasiadis & al. (2000) including our findings [B, C, D: vr]. 700-1340 m

Rubiaceae

- Cruciata glabra* (L.) Ehrend. [1 (E), 2, 3, 4, 5, 6, 7, 8]. Common in 3 and 5, scattered in 1, 4 and 6, rare elsewhere [A: vr, B: s, C: c, D: r] (450) 1000-1700 m
- C. laevipes* Opiz [2, 5, 8, 9]. Rare [B, D: vr]. 660-1250 m
- Galium agrophilum* Krendl [1, 2, 3, 4, 5, 6, 7, 8]. Common in 5, 7, 8 and 9, scattered in 6 and rare elsewhere [A, C: vr, B: r, D: c]. 460-1530 m. – Taxonomy according to Krendl (1988)

- G. aparine* L. [1, 4, 5, 7, 8, 9]. Scattered in 9, rare elsewhere [B, C, D: vr]. 630-1380 m
G. exaltatum Krendl [1, 4, 5, 6, 7, 8, 9]. Common in 8, scattered in 6 and 7, rare elsewhere [B: r, C: vr, D: s!]. 550-1300 (1520) m. – Taxonomy according to Krendl (1988)
G. hellenicum Krendl [1, 2, 3, 4, 5, 6, 7, 8, 9]. Common in 2, 6 and 9, scattered elsewhere [A: vr, B, D: s, C: c]. (380) 750-1510 m. – Taxonomy according to Krendl (1988)
G. odoratum (L.) Scop. [1 (Z, E), 3 (Z, S, V, R), 5, 6 (Z, G), 8]. Rare but locally scattered (1, 3, 6) [A: vc, B, D: vr]. (870) 1200-1840 m

Salicaceae

- Populus tremula* L. [1 (E), 3, 4, 5, 6, 7, 8]. Rare. Mainly in the higher tree layer or juvenile plants with little chance of establishing [B, C: r, D: vr]. (650) 1100-1450 m
Salix caprea L. subsp. *caprea* [1 (E), 3 (R), 5, 6]. It rarely enters into beech forests [B: vr] 1370-1680 m. (E, R: as *S. caprea* L.)

Saxifragaceae

- Chrysosplenium alternifolium* L. [1 (E), (3: R), 5, 6]. Mainly along rivulets at the edge of beech forests, but rarely, especially at wet places within them. 1110-1710 m
Saxifraga rotundifolia L. subsp. *rotundifolia* [1 (Z, E), 3 (Z, S, V), 4, 5, 6 (G), 7 (G), 8]. Common in 7, scattered in 1, 3 and 6, rare elsewhere [A, D: c, B: s, C: r]. (200) 600-1500 (1840) m. (Z, G, S, V, E: as *S. rotundifolia* L.)

Scrophulariaceae

- Digitalis viridiflora* Lindl. [1, 2, 3, 4, 5, 6, 7, 8]. Scattered in 1, 2 and 3, common elsewhere [A: r, B, D: c, C: s]. (460) 700-1400 (1580) m
Lathraea rhodopea Dingler [3 (R), 6, 7, 8]. Rare. 710-1750 m. Our findings were already reported by Eleftheriadou & al. (1998)
Scrophularia nodosa L. [1 (Z), 3 (Z, S), 5, 6]. Rare [A: s, B: vr]. 1070-1820 m
S. scopoli Hoppe var. *scopoli* [1, 2, 3 (R), 4, 5, 6, 7, 8]. Scattered in 8, rare elsewhere [A: s, B, C, D: vr]. (550) 900-1790 m
Verbascum glabratum Friv. subsp. *glabratum* [1, 4, 5, 6, 7, 8]. Rare [A, B: vr, C, D: r]. (460) 700-1470 m
Veronica chamaedrys L. subsp. *chamaedrys* [1 (Z), 2, 3 (Z, V, R), 4, 5, 6 (G), 7 (G), 8, 9]. Common [A: s, B, C: c, D: vc!]. (180) 600-1500 (1750) m. The record of *V. vindobonensis* (M. A. Fisch.) M. A. Fisch. (as *V. chamaedrys* subsp. *vindobonensis* M. A. Fisch.) by Gamisans & Hebrard (1980) is probably erroneous. (Z, G, V: as *V. chamaedrys* L.)
V. montana L. [1]. Rare, found mainly in mesophilous forests. 1530-1750 m
V. officinalis L. [1 (Z), 3 (V, R), 4, 5, 6 (G), 7, 8]. Rare in 7 and 8, scattered in 3 and 4, common elsewhere [A, B: c, C, D: r]. (600) 1100-1500 (1770) m
V. urticifolia Jacq. [1, 2, (3: Z)]. Rare [A, B: vr]. 1040-1650 m

Solanaceae

- Atropa bella-donna* L. [6, 8]. It rarely enters into beech forests. 970-1130 m
Solanum dulcamara L. [(1: E), 4, 7]. Rare [A, C, D: vr]. 630-1470 m

Thymeleaceae

- Daphne mezereum* L. [3 (V, R), 5, 6 (Z)]. Rare [A, B: vr]. 1370-1780 m

Tiliaceae

- Tilia cordata* Mill. [(1: E), 5, 6]. Rare [B, D: vr]. 950-1220 m
T. tomentosa Moench [7, 8]. Rare [D: vr]. 400-760 m

Ulmaceae

- Ulmus glabra* Huds. [3, 4, 5, 7, 8]. Rare [A, C, D: vr]. 680-1200 m

Umbelliferae

- Aegopodium podagraria* L. [1 (E), 3, 4, 5, 6, 7]. Scattered in 3, rare elsewhere [A, B: vr, C, D: r]. (400) 700-1400 (1780) m

Chaerophyllum aureum L. [1 (E), 3, 4, 6]. Rare [B, C, D: vr]. 1100-1510 m

C. hirsutum L. [1 (E), 3 (E), 5]. Rare [B, C: vr]. 1190-1700 m

C. temulum L. [7]. Rare. 490-710 m

Heracleum sphondylium subsp. *ternatum* (Velen.) Brummitt [1, 3, 4, 5, 6 (G), (7: G), 8]. Scattered in 3, rare elsewhere [A, B, D: vr, C: s]. (180) 700- 1540 m

Physospermum cornubiense (L.) DC. [1, 3, 4, 6, 7, 8]. Scattered in 4, 7 and 8, rare elsewhere. (450) 700-1310 m

Sanicula europaea L. [1 (Z), 3 (Z), 4, 5, 6 (Z, G), 7 (G), 8]. Scattered in 3 and 7, common in 4, rare elsewhere [A: s, B: vr, C: c, D: r]. (180) 600-1650 m

Urticaceae

Urtica dioica L. [1, 2, 3 (Z, S, V, R), 4, 5, 6 (Z), 7, 8]. Scattered in 3, rare elsewhere [A: c, B, C: vr, D: r]. (550) 1050-1600 (1820) m

Parietaria officinalis L. [7]. Rare [D: vr]. 650-910 m

Violaceae

Viola alba subsp. *thessala* (Boiss. & Spruner) Hayek [1, 2, 3, 4, 5, 6, 7, 8, 9]. Common in 7, 8 and 9, rare elsewhere [C: s, D: c!]. 390-1200 (1510) m. – Taxonomy according Livaniou-Tiniakou (1991)

V. macedonica Boiss. & Heldr. subsp. *macedonica* [(1: E), (3: R), 6]. Rare. 1370-1790 m. A record of *V. tricolor* L. by Gamisans & Hebrard (1980) from Drymos (6) may refer to this taxon. (E: as *V. tricolor* L. subsp. *tricolor*, R: as *V. macedonica* Boiss. & Heldr.) – Taxonomy according to Erben (1985)

V. reichenbachiana Boreau [1 (Z), 4, 5, 6, 7]. 450-1500 m

V. riviniana Rchb. [1, 3, 5, 6 (G), (7: G) 8]. 740-1370 m. Most of the specimens of the above two taxa had no flowers, so that it was impossible to determine with certainty to which taxon they belong. Both are common in all areas of the Rodopi except for areas 2 and 9, where they are scattered. Our impression is that both occur almost with the same frequency

V. sieheana W. Becker [5, 6, 7, 8, 9]. Common in 9, scattered in 7 and 8, rare in 5 and 6 [B: vr, D: s]. 380-900 (1310) m

Vitaceae

Vitis vinifera subsp. *sylvestris* (C. C. Gmel.) Hegi [7]. Rare [D: vr]. 640-750 m

Monocotyledoneae

Amaryllidaceae

Galanthus elwesii Hook. f. subsp. *elwesii* [(1: E)]. 1300-1450 m

Araceae

Arum orientale M. Bieb. subsp. *orientale* [3, 5, 7, 8, 9]. Rare [D: r]. 370-1300 m. The record of *A. maculatum* L. for 7 (Gamisans & Hebrard 1980) may refer to *A. orientale*. – Taxonomy according to Boyce (1994)

Cyperaceae

Carex depauperata With. [8]. Rare [D:vr]. 800-990 m

C. digitata L. [1 (E), 2, 3 (V, R), 4, 5, 6, 7, 8]. Scattered in 8, common elsewhere [A: s, B, C, D: vc]. (380) 700-1500 (1750) m

C. flacca Schreb. subsp. *flacca* [1, 3, 4, 6]. Scattered in 1 and 4, rare in 3 and 6 [C: s, D: vr]. 680-1460 m

C. flava L. [3]. Found in a wet place in beech forest. 1350 m

C. halleriana Asso [1, 4]. Rare [C: vr]. 1200-1360 m

C. ovalis Gooden. [1 (E), 4, 5]. Rare [A, B: vr]. 1440-1460 m

C. guestphalica (Rchb.) O. Lang [1, 3, 4, 5, 6, 7, 8]. Rare [A, B, C, D: vr]. 630-1520 m. – Taxonomy according to Loos (1996)

- C. remota* L. [(1: E), 3]. Found in a wet place in beech forest. 1190-1520 m
C. sylvatica Huds. subsp. *sylvatica* [1 (E), 3, 4]. Rare [B, C: vr]. 1190-1500 m

Dioscoreaceae

- Tamus communis* L. [4, 7 (G)]. Scattered in 7, rare in 4 [C: vr, D: r!]. 180-870 m

Gramineae

- Aira elegantissima* Schur [9]. Common. It enters into bad quality and disturbed thermophilous forests [D: vr]. 700-860 m
Anthoxanthum odoratum L. [8, 9]. Rare in 8, common in 9. It enters into bad quality thermophilous forests [D: vr]. 490-710 m
Bellardiachloa variegata (Lam.) Kerguélen [5, 6]. Rare [B, D: vr]. 1100-1450 m
Brachypodium pinnatum (L.) P. Beauv. [1, 2, 3, 4, 6, 7, 8, 9]. Rare in 7 and 8, common elsewhere [A: vr, B: s, C: vc, D: r]. (450) 1000-1550 m
B. sylvaticum (Huds.) P. Beauv. subsp. *sylvaticum* [(1: E), 2, 3, 4, 6, 7, 8, 9]. Common in 7, scattered in 8 and 9, rare elsewhere [B: vr, C: r, D: s]. 410-1000 (1480) m
Bromus benekenii (Lange) Trimen [1, 2, 3, 4, 5, 6, 7, 8]. Scattered in 1, 3 and 4, rare elsewhere [A: r, B, D: vr, C: c]. (390) 1000-1580 m
B. ramosus Huds. [3]. Rare [C: vr]. 1190-1360 m
Calamagrostis arundinacea (L.) Roth [1, 2, 3 (Z, S, V), 4, 5, 6 (G), 7, 8]. Rare in 8, common elsewhere. Less frequent in the eastern than in the western Rodopi [A: vc, B, C: vc!, D: c]. (630) 1000-1850 m
Dactylis glomerata L. s.l. [up to four subspecies in Greece] [1, 2, 3 (V), 4, 5, 6, 7 (G), 8, 9]. Common [A: r, B: s, C, D: c!]. (180) 600-1500 (1710) m
Danthonia decumbens (L.) DC. [5, 6]. Rare [B: vr]. 1330-1460 m
Deschampsia flexuosa (L.) Trin. [1, 2, 3 (Z), 4, 5, 6 (Z, G), 7, 8, 9]. Scattered in 4 and 9, common elsewhere [A: vr, B: vc!, C: s, D: c]. (450) 800-1650 m. (Z: as *Avenella flexuosa* (L.) Drejer)
F. cyllenica Boiss. & Heldr. [6]. Rare in beech forests [B: vr]. 1650 m
Festuca drymeja Mert. & W. D. J. Koch [6, 8]. Rare but locally (Reserved Monument of Nature in 6) scattered [A: r!, B, D: vr]. 830-1480 m
F. gigantea (L.) Vill. [3, (4: P)]. In a wet place in beech forest. 1190-1500 m
F. heterophylla Lam. [2, 3, 4, 5, 6 (G), 7 (G), 8, 9]. Common in 3 and 9, scattered elsewhere. The absence of this taxon in Elatia (1) is remarkable (also not found by Eleftheriadou 1992) [A, B: r, C: s, D: c]. (180) 700-1500 m
F. oviniiformis Vetter [2, 3, 5, 6]. Rare [B, D: vr]. 1180-1470 m
F. rubra subsp. *thessalica* Markgr.-Dann. [2, 3, 5, 6]. Rare. Some incomplete specimens have also been collected in 1 and 4. In 5 more common and may be scattered. Usually in acidophilous forests. 1250-1460 m
F. valesiaca Gaudin [1, 3, 4, 5, 6, 7, 9]. Rare [B: vr, C, D: r]. 550-1400 m
Hordelymus europaeus (L.) Harz [1, 3 (Z, S, V, R)]. Rare [A: vr!, B: vr]. 1490-1820 m. (S: as *Elymus europaeus* L.)
Melica uniflora Retz. [1 (E), 2, 4, 5, 6, 7 (G), 8, 9]. Common in 2, scattered in 7, 8 and 9, rare elsewhere [A, B: vr, C: r, D: s!]. (180) 400-1300 (1490) m
Milium effusum L. [1, 3 (S, V, R), 5, 6 (Z, G), 7, 8]. Common in 8, rare elsewhere [A: c, B: vr, C: r]. It occurs usually in good quality stands. (460) 700-1850 m
Poa bulbosa cf. subsp. *pseudoconcinna* (Schur) Domin [7, 8, 9]. Rare in 7, scattered in 8, common in 9. It occurs in disturbed thermophilous forests [D: r]. The subspecies could not be determined with certainty, because all specimens have proliferating spikelets
P. nemoralis L. [1 (Z), 2, 3 (Z, V, R), 4, 5, 6 (G), 7 (G), 8, 9]. Common [A, B, C, D: vc]. More frequent in thermophilous than in mesophilous forests. (180) 700-1400 (1780) m
P. pratensis subsp. *angustifolia* (L.) Gaudin [1, 2, 3, 4, 5, 6]. Rare in 2, common in 5, scattered elsewhere. Two incomplete specimens found in 7 and 9 may belong to this taxon [A: s, B, C:

c, D: vr]. (720) 1200-1500 (1710) m. The record of *P. pratensis* L. from 3 by Volpers (1989) may refer to this taxon

Iridaceae

Crocus pulchellus Herb. [6]. Rare, but perhaps undercollected. 1330 m

C. veluchensis Herb. [4, 5]. Rare, but perhaps undercollected. 1350-1380 m

Juncaceae

Luzula forsteri (Sm.) DC. [6, 7 (G), 8, 9]. Rare in 6, common elsewhere [D: vc]. (180) 400-900 (1100) m

L. luzulina (Vill.) Dalla Torre & Sarnth. [1, (3: R), 4, 5, 6 (Z, G)]. Common in 5, rare elsewhere [A, B, C: r, D: vr]. (950) 1200-1750 m

L. luzuloides (Lam.) Dandy & Wilmott subsp. *luzuloides* [1 (Z), 2, 3 (Z, S, V, R), 4, 5, 6 (Z, G), 7, 8]. Common. Less common in the eastern than in the western Rodopi. Three specimens [1, 8] belong to *L. luzuloides* subsp. *cuprina* (Asch. & Graebn.) Chrtek & Křořsa. This subspecies, appears to be rare but some plants have characteristics intermediate between both subspecies. (Z, S: as *L. albida* (Hoffm.) DC., G: as *L. nemorosa* (Pollich) E. Mey., V: *L. luzuloides*)

L. multiflora (Ehrh.) Lej. subsp. *multiflora* [1, 2, 3, 4, 5, 6, 7, 8]. Scattered in 5, rare elsewhere [A, C: vr, B, D: r]. (730) 1000-1580 m. Most specimens have more or less fimbriate-ciliate bractlets and therefore, according to Kirschner (1993), belong to *L. taurica* (V. I. Krecz.) Novikov. Nevertheless, the differences between both taxa are very subtle

L. sylvatica (Huds.) Gaudin [3 (Z, S, V), 6 (Z)]. Scattered in 3, rare in 6 [A: c, B: vr]. (1130) 1400-1850 m

Liliaceae

Erythronium dens-canis L. [4, 8]. Rare. 700-1350 m

Fritillaria pontica Wahlenb. [8]. Rare, but perhaps undercollected. 810 m

Lilium martagon L. [1 (E), 3, 4, 5, 6, 7]. Rare [V, D: vr, C:s]. 950-1520 m

Ornithogalum nutans L. [8]. Rare. 700-1010 m

Paris quadrifolia L. [1 (E), 3 (R), 5, 6 (Z, G)]. Rare. 1040-1700 m

Polygonatum multiflorum (L.) All. [6 (Z), 8]. Rare [A, D: vr]. 550-1400 m

P. odoratum (Mill.) Druce [3, 4, 6]. Rare [A: vr, C:r!, D: vr]. 950-1250 m

P. verticillatum (L.) All. [1 (E), 3 (Z, P, S, V, R), 6 (G)]. Scattered in 3, rare in 1 and 6 [A: c, B: vr]. 1300-1850 m

Ruscus aculeatus L. [7, 8]. Rare [D: vr]. 400-640 m

Scilla bifolia L. s.l. [1, 3, 4, 5, 6, 7, 8]. Rare but locally scattered. 660-1350 m

Veratrum album L. [(3: Z), 5, 6 (Z)]. Rarely in beech forests, at wet places. 1300-1580 m

Orchidaceae

Cephalanthera damasonium (Mill.) Druce [1, 3, 4]. Common in 1 and 4, rare in 3 [A, B: vr, C: c]. (810) 1100-1550 m

C. longifolia (L.) Fritsch [1 (E), 3, 4, 6, 7, 8]. Scattered in 4, rare elsewhere [C: r!, D: vr]. (390) 710-1310 m

C. rubra (L.) Rich. [1, 2, 3, 4, 6, 8]. Common in 4, scattered in 1 and 3, rare elsewhere [A, B, D: vr, C: vc]. (680) 1000-1520 m

Corallorhiza trifida Châtel. [1 (E), 2, 3 (V), 4, 5, 6 (Z)]. Common in 1 and 2, rare in 3 and 4, scattered in 5 and 6 [A: r, B: c, C: s, D: vr]. (1030) 1200-1500 (1770) m

Epipactis greuteri H. Baumann & Künkele [1, 2, 3, 4, 5, 6, 7, 8]. Scattered in 1, 3 and 4, rare elsewhere [A, B, D: vr, C: c]. (630) 1000-1400 (1520) m. Known in Greece only from few localities in the Pindus Mts and included in the Red Data Book of Greece. This is the first record from NE Greece

E. helleborine (L.) Crantz [1, 2, 3, 4, 5, 6 (G), 7, 8, 9]. Scattered in 2, 5 and 7, rare in 8 and 9, common elsewhere [A: r, B, D: s, C: vc]. (460) 1000-1400 (1570) m. (G: as *E. latifolia* All.)

E. microphylla (Ehrh.) Sw. [1, 3, 4, 6, 8]. Rare [B, D: vr, C: s]. 640-1520 m
Epipogium aphyllum Sw. [1, 6]. Rare. Our localities of this very rare orchid in Greece are reported by Athanasiadis & al. (2000) [B: vr]. 1220-1460 m
Listera ovata (L.) R. Br. [(6: Z)] 1400 m
Neottia nidus-avis (L.) Rich. [1 (Z), 2, 3 (V), 4, 5, 6 (G), 7 (G), 8, 9]. Scattered in 7 and 9, common elsewhere [A, B, D: c, C: vc] (200) 900-1650 m
Platanthera chlorantha (Custer) Rehb. [1, 4, 6, 7, 8, 9]. Rare [C, D: vr]. 490-1210 m

4.2. Taxa randomly appearing in the Rodopi beech forest

Cupressaceae: *Juniperus communis* subsp. *nana* (Willd.) Syme [(3: R)] 1700 m (as *J. communis* subsp. *alpina* (Suter) Čelak.). **Betulaceae:** *Alnus glutinosa* (L.) Gaertn. [8] 550 m. **Boraginaceae:** *Myosotis scorpioides* L. [(3: Z)] 1580 m, *Symphytum bulbosum* K. F. Schimp. [(6: G)] 1190 m (this record may refer to *S. tuberosum* L., because specimens without flowers and rhizome may be misidentified). **Campanulaceae:** *Campanula spatulata* subsp. *spruneriana* (Hampe) Hayek [(6: G)] 1310 m (the presence of the taxon has not been confirmed for Rodopi so far). **Caprifoliaceae:** *Sambucus ebulus* L. [(1: E)] 1390 m. **Caryophyllaceae:** *Cerastium brachypetalum* subsp. *roeseri* (Boiss. & Heldr.) Nyman [9] 740-860 m, *Minuartia garckeana* (Boiss.) Mattf. [8] 740-850 m, *M. verna* (L.) Hiern subsp. *verna* [(1:E)] 1450 m, *Silene dioica* (L.) Clairv. [(3: Z)] 1580 m (as *Melandrium dioicum* (L.) Coss. & Germ., only record for Greece and not confirmed yet), *S. lichenfeldiana* Baumg. [(3: R)] 1750 m, *Stellaria media* (L.) Vill. [8] 810 m. **Cistaceae:** *Helianthemum nummularium* (L.) Mill. subsp. *nummularium* [1, 2] 1240-1360 m. **Compositae:** *Anthemis cretica* subsp. *columnae* (Ten.) Franzén [8] 760-850 m, *Carlina vulgaris* L. subsp. *vulgaris* [(1: E)] 1310 m, *Centaurea affinis* Friv. subsp. *affinis* [(3: R)] 1600 m, *C. stenolepis* A. Kern. subsp. *stenolepis* [1] 1110 m, *Circium ligulare* Boiss. [(3: R)] 1700 m, *Hieracium cymosum* subsp. *sabinum* (Sebast.) Nägeli & Peter [(1: E)] 1700 m, *H. macranthum* (Ten.) Ten. subsp. *macranthum* [9] 740 m, *Inula conyzae* (Griess.) Meikle [(3: R)] 1600 m, *Leontodon cichoraceus* (Ten.) Sanguin. [9] 710-740 m, *L. hispidus* var. *glabratus* (W. D. J. Koch) Bisch. [(3: R)] 1600 m, *L. hispidus* L. var. *hispidus* [(3: R)] 1600 m, *Leucanthemum praecox* (Horvatić) Horvatić [(1: E)] 1500 m (as *L. vulgare* Lam.), *Petasites albus* (L.) Gaertn. [6] 1140 m, *Petasites kablikianus* Bercht. [(3:R)] 1680-1700 m, *Senecio cacaliaster* subsp. *hercynicus* (Herborg) Oberprieler × (?) *S. ovatus* (Gaertn. & al.) Willd. subsp. *ovatus* [(3: R)] 1600 m (taxonomy and nomenclature following Eleftheriadou & Raus 1996), *S. viscosus* L. [2, (3: R)] 1180-1600 m, *Telekia speciosa* (Schreb.) Baumg. [(1: E), (3: R)] 1350-1680 m, *Tussilago farfara* L. [(3: R)] 1710 m. **Crassulaceae:** *Sedum album* L. [(1: E)] 1350 m, *S. cf. griesebachii* Boiss. & Heldr. [(1: E)] 1280 m (as *S. laconicum* Boiss. & Heldr.), *S. hispanicum* L. [(1: E), 6] 1260-1280 m. **Cruciferae:** *Alliaria petiolata* (M. Bieb.) Cavara & Grande [(1: E), 3] 1060-1470 m, *Alyssum murale* Waldst. & Kit. s. str. [(1: E)] 1350 m (as *A. murale* Waldst. & Kit.), *Arabis recta* Vill. [8] 700 m (taxonomy according to Tutin & al. 1993), *A. sagittata* (Bertol.) DC. [1, 7] 760-1360 m, *Berteroa incana* (L.) DC. [3] 1280 m, *Cardamine graeca* L. [8] 700 m, *C. hirsuta* L. [7] 640-680 m, *Erysimum cuspidatum* (M. Bieb.) DC. [8] 760-910 m, *Thlaspi perfoliatum* L. [(1: E)] 1380 m. **Ericaceae:** *Bruckenthalia spiculifolia* (Salisb.) Rehb. [(1: E), 6] 1090-1480 m. **Euphorbiaceae:** *Euphorbia cyparissias* L. [1, 2, 4] 1110-1310 m, *E. stricta* L. [7, 5] 910-1380 m. **Fagaceae:** *Castanea sativa* Mill. [6] 700-750 m. **Geraniaceae:** *Geranium lucidum* L. [8, 9] 700-930 m. **Labiateae:** *Galeopsis ladanum* L. [(1: E)] 1280-1400 m, *Origanum vulgare* L. s.l. [1, 2, 3, 9] 740-1480 m, *Satureja alpina* subsp. *meridionalis* (Nyman) Greuter & Burdet [(3: R)] 1750 m, *S. bulgarica* (Velen.) K. Malý [(1: E)] 1350 m (as *Micromeria dalmatica* subsp. *bulgarica* (Velen.) Guinea), *S. graveolens* (M. Bieb.) Caruel [6, 8] 770-1100 m, *Scutellaria albida* L. s.l. [7] 700 m, *Stachys officinalis* (L.) Trevis. [(1: E), 3] 1400-1480 m, *S. tymphaea* Hausskn. [2] 1310 m. **Leguminosae:** *Galega officinalis* L. [7] 910 m, *Genista lydia* Boiss. [6] 1210-1220 m, *Lotus corniculatus* L. [(1: E), (3: R)] 1410-1500 m, *Trifolium alpestre* L. var. *alpestre* [3] 1250-1400 m, *T. arvense* L. var. *arvense* [9] 860 m, *T. aureum* Pollich subsp. *aureum* [3 (R)] 1280-1700 m, *T.*

campestre Schreb. var. *campestre* [9] 860 m, *T. pratense* L. var. *pratense* [(3: R)] 1700 m (as *T. pratense* L.) taxonomy of *Trifolium* species according to Zohary & Heller (1984). **Linaceae:** *Linum capitatum* Schult. subsp. *capitatum* [(3: R)] 1750 m. **Polygonaceae:** *Fallopia convolvulus* (L.) Á. Löve [(1: E)] 1280 m (as *Bilderdykia convolvulus* (L.) Dumort.), *F. dumetorum* (L.) Holub [1] 1400 m, *Rumex alpinus* L. [6] 1550 m, *R. arifolius* All. [(3: V), 6] 1210-1680 m, *R. obtusifolius* L. [(6: Z)] 1400 m. **Ranunculaceae:** *Aquilegia vulgaris* L. subsp. *vulgaris* [3] 1150 m, *Caltha palustris* L. subsp. *palustris* [(1: E), (3: R), 6] 1220-1710 m, *Ranunculus acris* L. [(3: V)] 1680 m, *R. ficaria* subsp. *ficariiformis* Rouy & Foucaud [(1: E)] 1400 m (as *R. ficaria* subsp. *bulbifer* Lawalrée), *R. sartorianus* Boiss. & Heldr. [(3: R)] 1750 m. **Rosaceae:** *Crataegus monogyna* var. *lasiocarpa* (Lange) K. I. Chr. [(7: G)] 180-210 m (as *C. laciniata* Ucria), *Geum rhodopeum* Stoj. & Stef. [(3: R)] 1700 m, *G. rivale* L. [(3: R), 6] 1550-1600 m, *Malus* cf. *dasyphylla* Borkh. [(1: E)] 1400 m (as *M. domestica* Borkh.), *Potentilla sterilis* (L.) Garcke [(3: V)] 1640 m (the determination is probably erroneous), *Prunus domestica* cf. subsp. *insititia* (L.) Bonnier & Layens [1, 7] 740-110 m, *Pyrus pyraster* Burgsd. [7] 460 m, *Rosa gallica* L. [1, 4] 1020-1110 m (taxonomy according to Zieliński 1990), *Sorbus austriaca* (G. Becker) Hedl. subsp. *austriaca* [4] 1130 m. **Rubiaceae:** *Galium album* Mill. [(6, 7: G)] 180-1310 m (the records may refer to different taxa of the *G. mollugo* group), *G. divaricatum* Lam. [9] 700 m, *G. mollugo* L. [(1: Z)] 1530 m (this record may refer to another taxon of the *G. mollugo* group), *G. pseudaristatum* Schur [8, 9] 490-700 m, *G. rotundifolium* L. [(3: Z)] 1650 m (possibly determination erroneous). **Salicaceae:** *Salix alba* L. [(1: E)] 1310 m. **Santalaceae:** *Thesium alpinum* L. [(3: R)] 1700-1750 m. **Scrophulariaceae:** *Digitalis lanata* Ehrh. [8] 720 m, *Euphrasia liburnica* Wettst. [(3: R)] 1750 m, *E. pectinata* Ten. [6] 1090 m, *Linaria genistifolia* subsp. *euxina* (Velen.) Sutton [1, 5] 1480-1570 m, *Melampyrum sylvaticum* L. [(3: Z)] 1650 m (as *M. pratense* L., see Strid & Papanikolaou 1981), *Verbascum densiflorum* Bertol. [6] 1190 m, *V. lanatum* Schrad. [2] 1330 m (not given for Greece by Tutin & al. 1972), *V. longifolium* var. *pannosum* (Vis.) Murb. × (?) *V. speciosum* Schrad. subsp. *speciosum* [(3: R)] 1760 m, *V. nigrum* subsp. *abietinum* (Borbás) I. K. Ferguson [(6: G)] 940 m, *Veronica beccabunga* L. [(1: E), 4] 1350-1520 m, *V. hederifolia* L. subsp. *hederifolia* [8] 800 m, *V. jacquinii* Baumg. [(1: E)] 1430 m (as *V. austriaca* L. subsp. *austriaca*), *V. serpyllifolia* var. *balcanica* (Velen.) Bornm. [1 (E)] 1470-1620 m (as *V. serpyllifolia* subsp. *humifusa* (Dickson) Syme), *V. serpyllifolia* L. var. *serpyllifolia* [(1: E)] 1520 m (as *V. serpyllifolia* L. subsp. *serpyllifolia*). **Umbelliferae:** *Angelica sylvestris* L. [(3: R), 6] 1210-1600 m, *Anthriscus nemorosa* (M. Bieb.) Spreng. [8] 740-1010 m, *Chaerophyllum bulbosum* L. subsp. *bulbosum* [(1: E)] 1400 m, *Heracleum sphondylium* L. subsp. *sphondylium* [(3: R)] 1700 m, *Myrrhoides nodosa* (L.) Cannon [8] 800 m, *Orlaya daucooides* (L.) Greuter [8] 410-700 m, *Smyrniium perfoliatum* L. subsp. *perfoliatum* [8] 800 m. **Valerianaceae:** *Valeriana montana* L. [(7: P)] 1440-1520 m, *V. officinalis* L. subsp. *officinalis* [(1: E)] 1400 m, *V. tripteris* L. [(3: R)] 1680-1750 m. **Violaceae:** *Viola ganiatsasii* Erben × *V. serresiana* Erben [(3: R)] 1700 m (taxonomy following Eleftheriadou & Raus 1996), *V. serresiana* Erben [(3: R)] 1750 m (taxonomy following Eleftheriadou & Raus 1996). **Cyperaceae:** *Carex caryophyllea* Latourr. [(1: E)] 1300 m, *C. pallescens* L. [1] 1420 m, *C. rostrata* Stokes [(1: E)] 1520 m. **Gramineae:** *Bromus sterilis* L. [8] 800 m, *Elymus caninus* (L.) L. [(3: R)] 1700 m, *Milium vernale* M. Bieb. [8] 700 m, *Phleum alpinum* L. [(3: R)] 1750 m, *Poa pratensis* L. subsp. *pratensis* [8] 700 m, *P. trivialis* subsp. *sylvicola* (Guss.) H. Lindb. [9] 740 m. **Juncaceae:** *Juncus effusus* L. [(1: E)] 1520 m, *J. thomasii* Ten. [(1: E)] 1520 m, *Luzula campestris* (L.) DC. [(6: G)] 1310 m. **Liliaceae:** *Muscari* cf. *comosum* (L.) Mill. [6] 680 m, *M.* cf. *neglectum* Guss. [8, 9] 740-760 m. **Orchidaceae:** *Dactylorhiza sambucina* (L.) Soó subsp. *sambucina* [1] 1350 m, *Limodorum abortivum* (L.) Sw. [7] 730 m, *Orchis ustulata* L. [(1: E)] 1400 m

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