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

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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


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 ×borisii-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).

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, Echinos, 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 Anthéros 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 Stamno, 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 Echinos, Papikio and Kecho 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
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 spathulate 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 spathulate 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 spathulate 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 spathulate ones.

Therefore, in western Rodopi *Fagus sylvatica* subsp. *sylvatica* and *F. moesiaca* dominate, whereas forms closely resembling *F. sylvatica* subsp. *orientalis* are rare. In eastern Rodopi and in the area of Echinos cupules with spathulate 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 Moulopoulos (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 Echinos 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 Gómöry & al (1999) that in the Rodopi and the Balkans in general only a single, separate subspecies of *Fagus sylvatica* occurs.

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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: v]. 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, V), 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.) Woyw. [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, 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 ×borisii-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, 5, 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, 5a, 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, 8, 9]. 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 (G), 7, 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. cyannea (Hayek) Vestergr. [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 (Simkon.) Simonk. (Eleftheriadou & Raus 1996) do not exist in the Fagetalia zone of Rodopi

Symphytum officinale 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) 800-1500 m

*C. sparsa* Friv. subsp. *sparsa* [5]. Rare, but more frequent in the eastern Rodopi [D: r]. 460-1240 m

*C. persicifolia* L. subsp. *patula* [(1: E), 3, 6, 7]. 630-1500 m

*C. sparsa* subsp. *sphaerothrix* (Griseb.) Hayek [1, 3, 4, 5, 6, 7]. 1350-1580 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, 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. italicopanthalis* (L.) Pers. subsp. *italicopanthalis* [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. italicopanthalis* (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) Berber, 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.

_Anthemis 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 baehnii_ 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]. Rare [D: vr]. 1160-1780 m. Two specimens belong to _H. sparsum_ subsp. _schultzianum_ (Pančić & Vis.) Zahn [3 (R), 6], and one to _H. sparsum_ subsp. _sparsum_ [6]

_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. _schultzianum_ (Pančić & Vis.) Zahn [3 (R), 6], and one to _H. sparsum_ subsp. _sparsum_ [6]

_H. cf. subnitenis_ Zahn vel _tschankorijense_ 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 scattered in 6 [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 procurrens 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

Vitis-idaea L. [2, 3 (R), 5, 6 (G)]. Rare in 3, scattered elsewhere [A: vr, B: s]. 1100-1380 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]. Rare [B, C, D: vr]. 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 Echinos (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 subsp. medwediewii (A. Camus) Menitsky [1, 2, 3, 4, 5, 6 (G), 7 (G), 8, 9]. Scattered in 3 and 7, rare elsewhere [A: c, B: vr, C, D: r]. (400) 800-1150 (1450) m (G: 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. Frohlich. [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]. 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* × *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)

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

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

**Lamiium 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 cackehtic. 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. vernus (L.) Bernh. [1, 4, 7, 8]. Rare [C, D: vr]. 640-1220 m

Securigera varia (L.) Lassen [1, 2, 3 (R), 4, 5, 6, 8]. Rare [A, B, C: vr, D: s]. 760-1340 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: vr, C: c, D: c!]. (180) 500-1200 (1520) 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. marshalliana (Willd.) Hayek [(1: E), 4, 6, 8]. Rare. Usually in good quality stands. 890-1500 m. (E: as C. bulbosa subsp. marshalliana (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: r, B: vr, D: c]. (410) 700-1400 (1690) m. (G: as P. veris subsp. columnae (Ten.) Lüdi).

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, 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, B: c, D: vc]. (180) 1000-1700 (1690) m. (S: as Pyrola secunda L.)

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

Pyrola 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 aquilegiifolium 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.)


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]. 380-1310 m. (E: as C. monogyna Jacq. subsp. monogyna). – Taxonomy according to Christensen (1992)

P. micrantha DC. [1, 2, 3, 4, 5, 6, 7]. Rare [B, D: vr, C: r]. 460-1230 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: vr, C: r]. 550-1440 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. canescens DC. [1, 2, 3, 4, 5, 6, 7, 8, 9]. Rare in 3, 4 and 5, scattered elsewhere [B: vr, C: r, 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, D: s]. (390) 600-1700 m

R. idaeus L. [1, 2, 3 (S, V), 4, 5, 6, 7]. Rare in 2, common elsewhere [A: vr, B: s, C, D: c]. (390) 600-1600 (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 subsp. torminalis (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 chamaeephylla L. [3, 6]. Recently recorded for Greece by Arbatzis & Vidakis (1996), further records from Rodopi by Athanasiadis & al. (2000) including our findings [B, C, D: vr]. 700-1340 m

Rubiacceae

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, D: r]. (450) 1000-1700 m

C. laeves Opiz [2, 5, 8, 9]. Rare [B, D: vr]. 660-1250 m

Galium aggregatum Krendl [1, 2, 3, 4, 5, 6, 7, 8]. Common in 5, 7 and 8, 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), 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 (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. scopolii Hoppe var. scopolii [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: c, B: c, C, D: rc']. (180) 600-1500 (1770) 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 (Z, 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), 3 (Z, S, V), 4, 5, 6 (G), 7, 8]. Common [A: c, B: c, D: vr]. (950) 750-1510 (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.)
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)

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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: rl]. 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
Bellardiochloa 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: vr, 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 (G), 7, 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: rl!, 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, 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!, B: vr], C, D: c]. (180) 700-1500 m
F. oviniformis 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 (1700) 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:
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. luculina (Vill.) Dalla Torre & Sarntb. [1, (3: R), 4, 5, 6 (Z, G)]. Common in 5, rare elsewhere [A, B, C: r, D: vr]. (950) 1200-1750 m

L. luculoides (Lam.) Dandy & Wilmott subsp. luculoides [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. luculoides subsp. cuprina (Asch. & Graebn.) Chrték & Kaísa. 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. luculoides)

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, Cr!, D: vr]. 950-1250 m

P. verticillatum (L.) All. [1 (E), 3 (Z, P, 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, 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 L. latifolia All.)
4.2. Taxa randomly appearing in the Rodopi beech forest


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References


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Mathew, B. F. 1989: Hellebores. – St John’s Woking, Surrey.


Volpers, Th. 1989: Changes in microclimate and vegetation after thinning in a montane virgin forest. – Phytocoenologia 17: 71-104.


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