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Coenological and syntaxonomical analysis of the beech woodlands of the Laga Mountains (Central Italy)

ROMEO DI PIETRO

Dipartimento Industrial design, Tecnologie dell'Architettura e Cultura dell'Ambiente (ITACA), Università "La Sapienza" di Roma, via Flaminia 70, 00196 Roma (Italy); e-mail: romeo.dipietro@uniroma1.it

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SUMMARY

This paper provides a coenological and syntaxonomical analysis of the *Fagus sylvatica* woodlands of the Laga Mountains (Central Apennines). These woodlands are unusual among Central Apennines *Fagus* forests in that they grow on siliceous acid substrata and the composition of the understory is, as a consequence, influenced markedly by the texture of the soils and by the low pH values. Vegetational sampling was carried out using the Zurich-Montpellier phytosociological approach. The 115 relevés were further treated with multivariate analysis alghoritms (classification and ordination). Two main types of beech woodland were identified: a termophilous aspect of the lower montane belt and a microthermic aspect of the upper montane belt. The phytosociological literature reports various association-names proposed by different authors to identify the beech woodlands of the Laga mountains (*Aquifolio-Fagetum, Abieti-Fagetum, Luzulo-Fagetum, Trochiscantho-Fagetum, Polysticho-Fagetum, Veronico-Fagetum, Solidagini-Fagetum*). Each of these association names was based to a large degree on the three original phytosociological tables published in Longhitano and Ronsisvalle (1974). However, on the basis of both floristic-coenological and syntaxonomical-nomenclatural considerations it now emerges that these syntaxonomical references are no longer suitable to Laga beech woods. In this paper a new association, *Prenantho purpureae-Fagetum sylvaticae* ass. nova is proposed for the microthermic beech of the Laga mountains. This association is further sub-divided into three different sub-associations based on edapho-morphological parameters: *Prenantho-Fagetum typicum*, *Prenantho-Fagetum vaccinietosum myrtilli* (on convex slopes and shallow soils) and *Prenantho-Fagetum athyrietosum filicis-foeminae* (in gullies and on deeper soils). The lower altitude termophilous beech woods of the Laga mountains (lower montane belt), on the other hand, are here included in *Dactylorhizo fuchsii-Fagetum sylvaticae* in the form of a new subassociation *Dactylorhizo-Fagetum aremonietosum agrimonioidis*. Owing to the lack of adequate syntaxonomical references for higher rank syntaxa a new sub-alliance named *Veronico urticifoliae-Fegenion sylvaticae* suball. nov. is here proposed. Comparison (coenological and statistical) with exsisting similar associations occurring elsewhere in the Apennines led to the inclusion of this suballiance in *Aremonio-Fagion* alliance.

INTRODUCTION

The Laga mountains are unique among the mountain systems of central Italy, since they are the only siliceous massif of significant altitude and extension (they stretch for about 24 km across the Abruzzo, Marches and Latium regions with

summits exceeding 2.400 m slm) in a general geological context which is composed almost entirely of limestone (Gran Sasso, Sibillini, Velino-Sirente, Majella, Terminillo, Simbruini-Ernici etc.). The bedrock of the Laga mountains has a strong influence on the edapho-morphology (abundance surface running water which becomes channelled into a complex dreinage system cutting deeply into the steep slopes). It also obviously has marked effects on the vegetation, the peculiarities of which, in comparison to that of the surrounding mountain ranges, has been the subject a various investigations (Pedrotti, 1982; Pedrotti, 1983; Di Pietro et al., 2001; Biondi et al., 2002; Blasi et al., 2003; Tondi et al., 2004; Di Pietro and Tondi, 2005). As a clear result of the high average altitude of the Laga mountains, beech woods are today the most common forest type to be found, despite the fact that over recent centuries the beech woods had become severely depleted due to human disturbance (especially in the form of enlargement of high altitude pasturelands which in some places led to a significant lowering of the timberline). From the phytosociological point of view the beech woods of Laga mountains were the subject of one of the pioneering attempts to provide a syntaxonomical scheme for the forest vegetation of the central Apennines (Longhitano and Ronsisvalle, 1974). The phytosociological tables published in this fundamental study (together, to a lesser extent, with those proposed by Pedrotti, 1982) were subsequently drawn upon by other (Feoli and Lagonegro, 1982; Ubaldi et al., 1990; Ubaldi, 1995; Biondi et al., 2002; Ubaldi, 2003) for the proposal of new references at the level of association, for syntaxonomical schemes on a wider scale, and for nomenclatural revisions. In the last fifteen years various syntaxonomical-nomenclatural revisions have been published for the beech woods of central and southern Europe (Dierschke, 1990; Borhidi and Kevey, 1996; Dierschke, 1998; Dzwonko et al., 1999; Dzwonko and Loster, 2000; Bergmeier and Dimopoulos, 2001; Rivas-Martínez et al., 2001; Willner, 2002; Biondi et al., 2002; Ubaldi, 2003; Di Pietro et al., 2004). Considering the unique ecological and biogeographical situation of the Laga mountains beech woods and the numerous syntaxonomical references to which they have been subject, it seemed appropriate, given that more than thirty years have passed since the previous ones, to undertake a new series of phytosociological sampling. This enabled the exsisting data to be checked against recently gathered data and the old syntaxonomical schemes to be updated in the light of the latest taxonomical, syntaxonomical and nomenclatural revisions.

STUDY AREA

The Laga Mountains ridge, which is nearly 24 km long, lies at the boundary between Latium, Abruzzo and Marches regions in central Italy (Fig. 1). The monocline attitude of this mountain chain determines an evident asymmetry of the slopes, being steeper and less extended the south-western slope (Latium side) whereas the north-eastern slope (Abruzzo side) is milder and more extended. The Laga

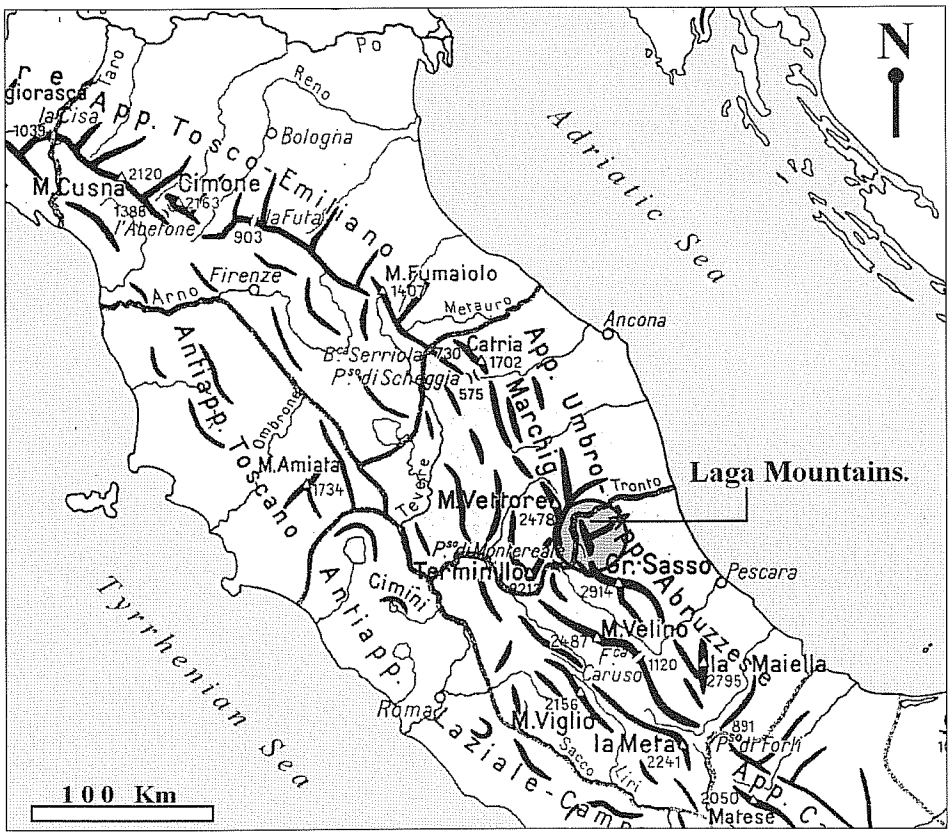

Fig. 1 - Study area: the Laga mountains

mountains are characterised by a torbiditic succession of Messinian age known as Laga Flysch mainly composed of arenaceous and pelithic-arenaceous lithofacies (Figs. 2 and 3). The low permeability degree which characterises the succession of sandstones and marls limits the percolation of rainfall waters and enables their superficial streaming out (Tondi and Plini, 1995). As a consequence the Laga mountains are rich of sources and perennial streams (Torrente Castellano, Rio Volpara, Rio Fucino, Rio Valle Castellana) or rivers (upper course of Tronto, Tordino, and Vomano rivers). Precisely in the upper part of the Vomano river the Laga mountains comes in contact with the adjacent Gran Sasso range which in this area exhibits geological features that are more or less similar to those of the Laga (pelagical facies determining marly of pelitic-arenaceous substrates). The accelerated erosion of the clayey-sandy substrated determines the occurrence of a great number of gullies which in some cases show very large dimensions and give rise to spectacular falls (F.so della Morricana, F.so Gorzano, F.so di Selva Grande, F.so dell'Ortanza etc.) which in most of cases are hidden in the deeper part of the beech forest. In the southern part

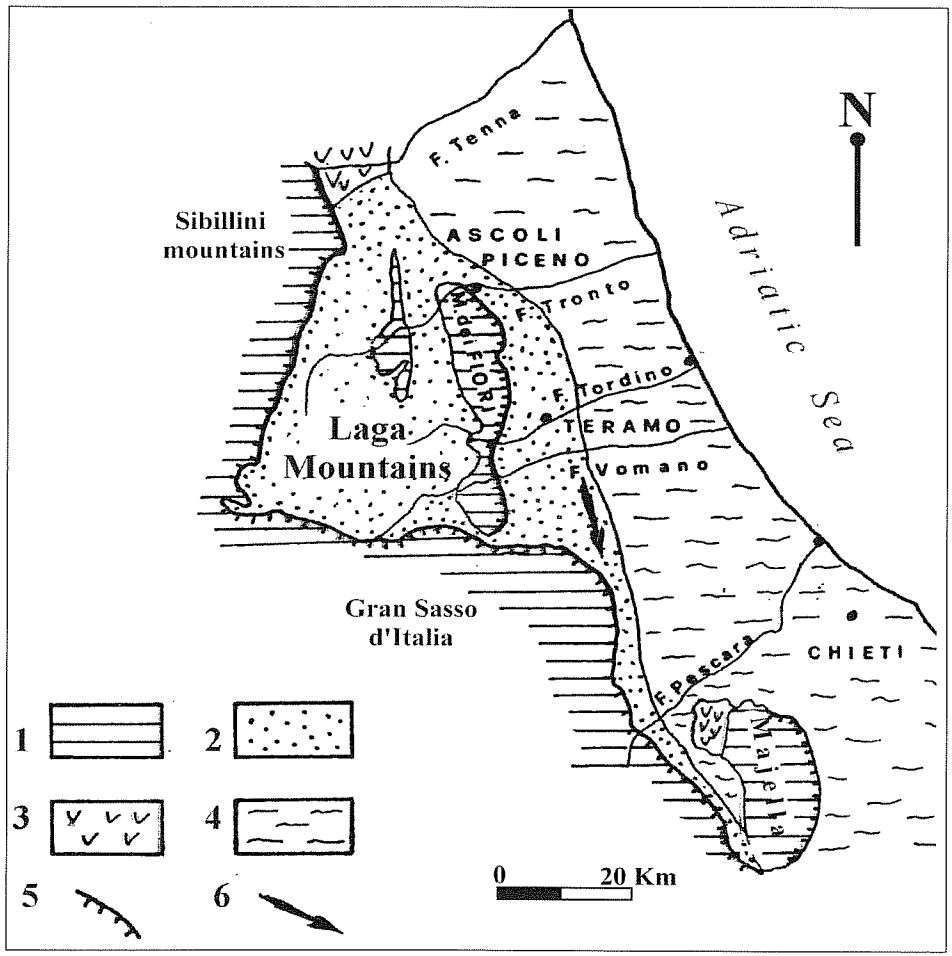

Fig. 2 - Geological features of the Laga mountains and adjacent areas. 1: Sedimentary successions on limestone (upper Trias-medium Miocene); 2: Pelithic-arenaceous Flysch of Laga formation (upper Miocene); 3: Sulphur-Gypsiferous formation (upper Miocene); 4) Marine and continental sediments (Pliocene-Queternary); 5: Thrust front; 6: Paleo-currents direction

of Laga mountains there is the Lake Campotosto, a 13 km^2 artificial pool which is surrounded by woodlands almost enterely dominated by the beech. From a bioclimatic standpoint the study area belongs to the Temperate region. The microthermic beech woods are included in the cold axeric subregion; mean annual temperature is 5.5°C and mean temperature of the coldest month is -4 °C; rainfall are abundant, exceeds 1.600 mm/yr and in the period between November and May assume snowy features; frost occurs for more than one month yearly (Blasi 1994; Tondi and Plini 1995; Blasi, 2006). The beech woodlands of the lower montane belt belong to the mesaxeric-axeric subregion where mean annual temperature is 9°C and that of the coldest month is –2.1°C; rainfalls exceeding 1.400 mm/yr).

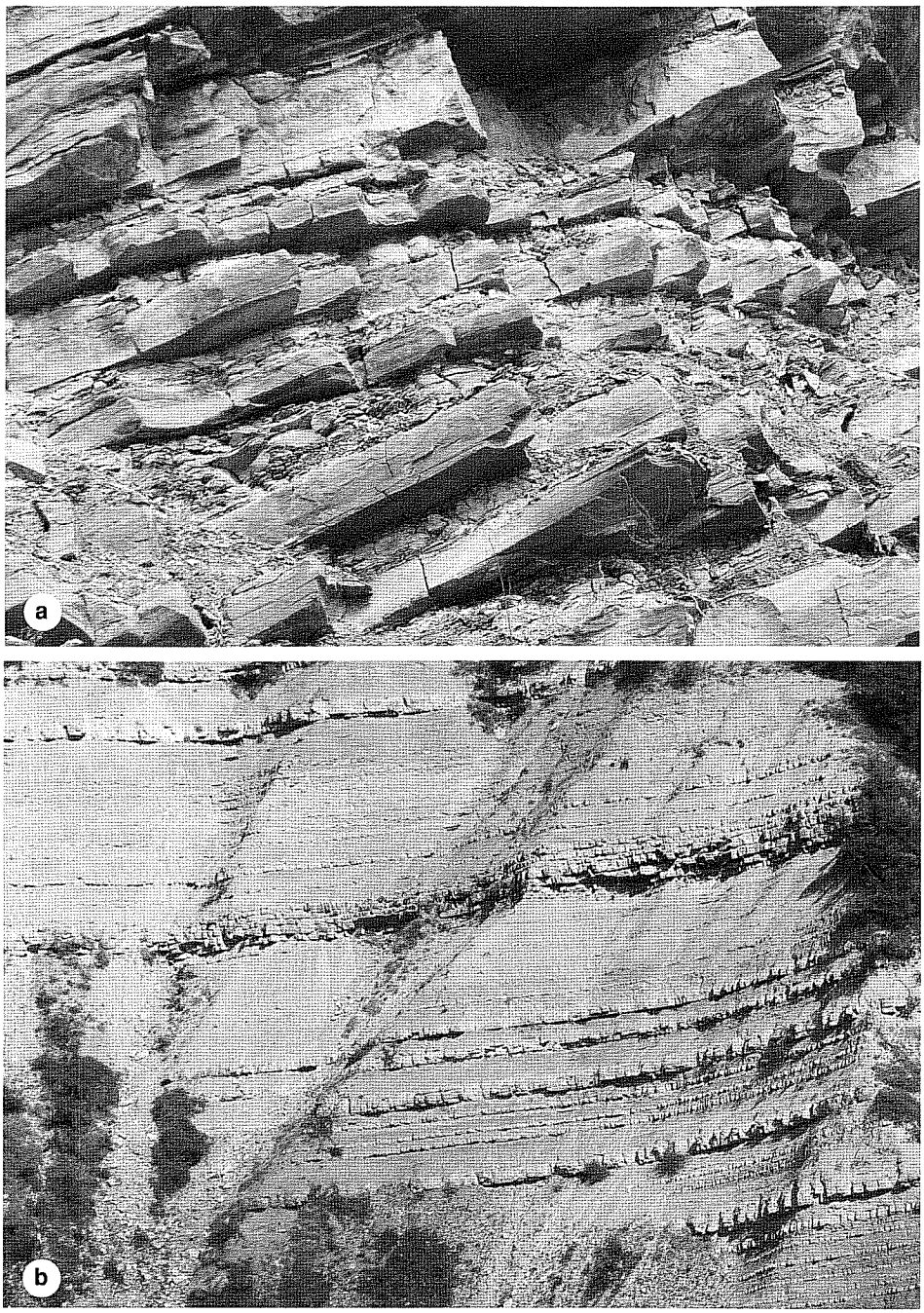

Fig. 3 - Two different aspect of the pelitic-arenaceous Flysh della Laga: a) sandstone component prevailing; b) clay component prevailing

DATA AND METHODS

Field research was carried out in the period 2000-2006. 115 phytosociological relevés were performed following standard methods of the Zurich-Montpellier approach (Braun-Blanquet, 1964). The row matrix was subjected to multivariate analysis (classification and ordination), in order to define vegetation types in terms of association and sub-association. The following scale was adopted for transforming the Braun-Blanquet values into numerical values (Van der Maarel, 1979): r = 1; + = 2; 1 = 3; 2 = 5; 3 = 7; 4 = 8; 5 = 9. For the classification of the phytosociological relevés the chord distance and the average correlation on quantitative data was used. For the ordination a PCA with partition superimposed was performed. In order to compare the Laga beech woodlands communities with the other different types of similar *Fagus sylvatica* woodlands described within the Apennines, a synoptic table was prepared and subsequently subjected to multivariate analysis the similarity ratio algorithm to produce the dissimilarity matrix and the minimum variance linkage as agglomeration criterion (package Syntax 5.2 program, Podani, 1993; 1994). In addition a NMDS (non-metric multidimentional scaling) ordination was performed.

For species nomenclature, reference was made to Anzalone (1996; 1998), Conti (1998) and Conti et al. (2005). For life forms and chorology, reference was made to Pignatti (1982). As to the composition of the chorological spectrum only (Tab. II), the Eurasiatic chorotype was divided into the following components: European, European-Caucasian, Eurasiatic s.s. and SE-European (the latter including the following sub-chorotypes: Pontic, SE-European *s.s.*, South-European-South-Siberian). Chorological and life forms spectra were calculated on the basis of simple presence, frequency and specific cover index. In particular the normal spectrum (norm), which is normally almost never used in this kind of analysis, indicate the % ratio between the total number of species of one chorotype or life form and the total number of species occurring in a given plant community type. This type of spectrum gives essential information about the floristic (and consequently structural and chorological) "base" from which each plant community type draws upon in its physiognomical expression. The frequency spectrum (frq) is probably the most appropriate for coenological information and for this reason the frequency values were used in the floristic histograms of Fig. 13 and Fig. 14. The cover spectrum (cover), represents the "real" quantitative structural and chorological expression of the various plant communities. The cover spectrum is based on the "specific cover index" of the species in the different plant community types (phytosociological table). This index was obtained summing up each species' cover-abundance central values (e.g. 5 = 87.5; 4 = 62.5...) and multiplying this sum by the ratio 100/numbers of relevés. The denomination and nomenclature of syntaxa are in accordance with Weber et al. (2000).

RESULTS

Flora

Regarding physiognomy and structure, Figs. 4a and 4b show the coenological role of the different species for all the beech woods of the Laga mountains. It is evident that the tree layer of the majority of the woodlands has *Fagus sylvatica* L. as dominant, leaving but a marginal role to the other tree species currently linked to beech woodlands (*Acer pseudoplatanus* L., *A. platanoides* L., *Ulmus glabra* Huds., *Sorbus aucuparia* L.). Only *Abies alba* Mill. seems, at times, to behave as co-dominant, but just in a few restricted areas of Colle

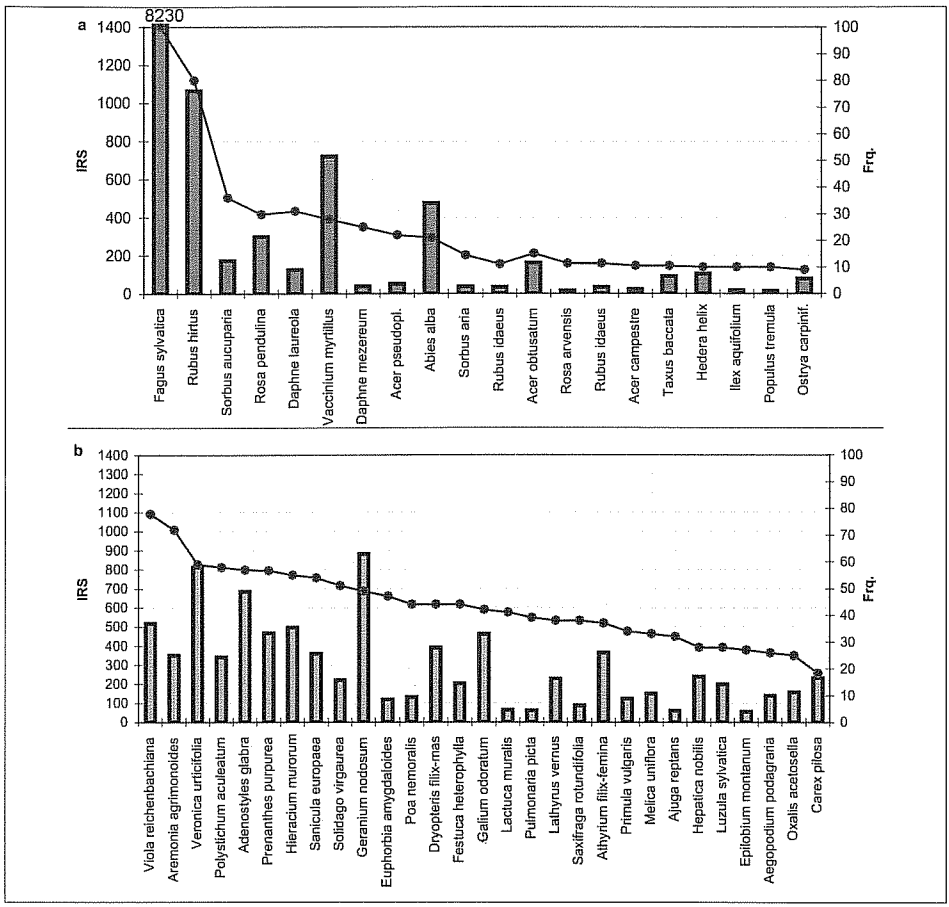

Fig. 4a-b - Species frequency values (line), and specific cover index (IRS) values (columns) calculated considering the entire set of Laga beech woodlands relevés (115) This mixed hystogram considers the most frequent woody species belonging to Phanerophytes s.l. (a), and the most frequent species occurring in the herb layer of the undergrowth belonging to Geophytes, Hemycryptophytes, Chamaephytes and Therophytes

Romicito (Bosco della Martese) and M. Bilanciere (near Cortino), while *Acer opalus* Mill. subsp. *obtusatum* (Waldst. & Kit. ex Willd.) Gams does, occasionally, play a significant role, but always a subordinate one, and in termophilous beech woods only. *Rubus hirtus* Waldst. & Kit. is by far the most widespread scrub species, while *Vaccinium myrtillus* L. can play a very significant role in some aspects of the microthermic beech woodlands, monopolizing the undergrowth space in the form of a continuous heathland. *Rosa pendulina* L. can also be locally abundant, especially at higher altitudes. In the grass layer the most frequent species, *Viola reichenbachiana* Jord. ex Boreau, *Aremonia agrimonioides* (L.) DC. and *Polystichum aculeatum* (L.) Roth, do not coincide with those showing the highest cover index, respectively, *Geranium nodosum* L., *Adenostyles glabra* (Mill.) DC. subsp. *glabra* and *Veronica urticifolia* Jacq. Of interest is the behaviour of *Dryopteris filix-mas* (L.) Schott, *Galium odoratum* (L.) Scop. and *Athyrium filix-foemina* (L.) Roth – although these species occur in less than 50% of the relevés they show high cover index values (especially when compared to those of the adjacent species occurring in the histogram of Fig. 6b), testifying to an important coenological and physiognomical role in the stands in which they occur. This same behaviour is also displayed, though to a lesser extent, by species such as *Hepatica nobilis* Schreb., *Luzula sylvatica* (Huds.) Gaudin subsp. *sylvatica* and *Carex pilosa* Scop.

Significant differences emerge from a comparison between the floristic lists of the phytosociological tables published in Longhitano and Ronsisvalle (1974) and those provided in the present paper (see the complete list in Appendix IV). The 115 relevés performed in the present study led to the collection of 240 taxa; of these, however, "only" 170 were taxa that had been found during the 1974 field-work. Vice versa, some species which occurred in the 1974 phytosociological tables were not found again in the present study, and this might be due to taxonomical problems concerning species belonging to genera which are notoriously critical (e.g. *Platanthera bifolia* (L.) Rchb./*P. clorantha* (Custer) Rchb.; *Melampyrum sylvaticum* L. /*M. italicum* Soó; *Asplenium adianthum nigrum* L./*A. onopteris* L.). Other species, such as *Teucrium siculum* (Raf.) Guss., *Sorbus domestica* L. or *Veronica chamaedrys* L., are very rare within the montane belt, since they mainly characterise the mixed termophilous and mesophilous oak-woods of the hilly and submontane belt (see Blasi et al., 2004). Finally, the occurrence in the 1974 tables of species such as *Cardamine pentaphyllos* (L.) Crantz, *Campanula rotundifolia* L., *Alnus viridis* (Chaix) DC. was probably due to erroneous interpretation, and, as a consequence, these species are to be excluded from the Flora of the Laga mountains (see Conti, 1998; Conti et al., 2005). A large number of species found during the field-work of the present study, on the other hand, are not to be found in the 1974 phytosociological tables. Several of these species (e.g. *Festuca heterophylla* Lam., *Rosa pendulina, Lilium martagon* L., *Carex pilosa, Cardamine kitaibeli* Bech., *Acer pseudoplatanus* etc.) are frequently

linked to beech wood ecosystems, where they often play an important role in the coenological, biogeographical and syntaxonomical definition[1].

Multivariate analysis

Two main clusters ("1" and "2" in Fig. 5) are isolated in the classification dendrogram. The first division separates cluster 1, which is composed of the termophilous beechwoods of the lower montane belt, from cluster 2, which is characterized, almost enterely, by the microthermic beechwoods of the upper montane belt. The second division concern only cluster 2, which has been further divided into three sub-clusters corresponding to the three types of microthermic beech woods identified in the study area, that are: a typical aspect (2a) which characterises the majority of the slopes of the Laga mountains; an edapho-mesophilous aspect (2b), including those beech woods typical of gullies or slope's water dreinage lines showing an undergrowth particularly rich in ferns; a relatively edapho-xerophilous aspect (2c), occurring on convex slopes and showing the dominance of *Vaccinium myrtillus* in the herb layer. The PCA (with superimposed partition) calculated along three major axes (Fig. 6), shows a more or less distinct grouping along the first two axes for all the beechwoods community types recognized in the study area. The distribution of the clusters along the first PCA axis shows a sharp distinction, moving right to left, from termophilous to microthermic beechwoods following an increasing altitudinal gradient. Yet along the first axis, a further cluster, which has been defined as "intermediate beech woods" has been identified. This cluster includes those relevés which are particularly impoverished in the most diagnostic species of the Laga beechwoods or which have intermediate floristic-coenological features between the termophilous beechwoods and the microthermic ones (phytosociological tab. 5). The distribution of the three types of microthermic beechwoods (2a, 2b, 2c) along the second PCA axis can be correlated to an increasing gradient of soil moisture. Both the dendrogram and the ordination diagram deriving from the multivariate analysis of the matrix composed of the columns of the synoptic table (microthermic acidophilous *Fagus sylvatica* woodlands described so far for the central and northern Apennines) show that the Laga mountains microthermic beech woodlands find their higher similarities with the microthermic beech woodlands of the northern Apennines whereas the Laga mountains termophilous beech woodlands are mainly related to other types of acidophilous beechwoods occurring in central Apennines (Fig. 15).

1) Apart from the fact that certain species present in the 1974 tables are lacking when compared to the tables of the present paper, it also needs pointing out that regarding some of the species found in both tables there is a marked discrepancy in terms of frequency/abundance values. The case of *Geranium nodosum*, a species which is extremely significant in the syntaxonomy of the beech woodlands of the Apennines, is particularly emblematic. It is extremely sporadic in the 1974 tables (occurring in just one single relevé), whereas in the tables of this paper it is present in 50% of the relevés and exhibits the highest specific cover index among the herb layer component.

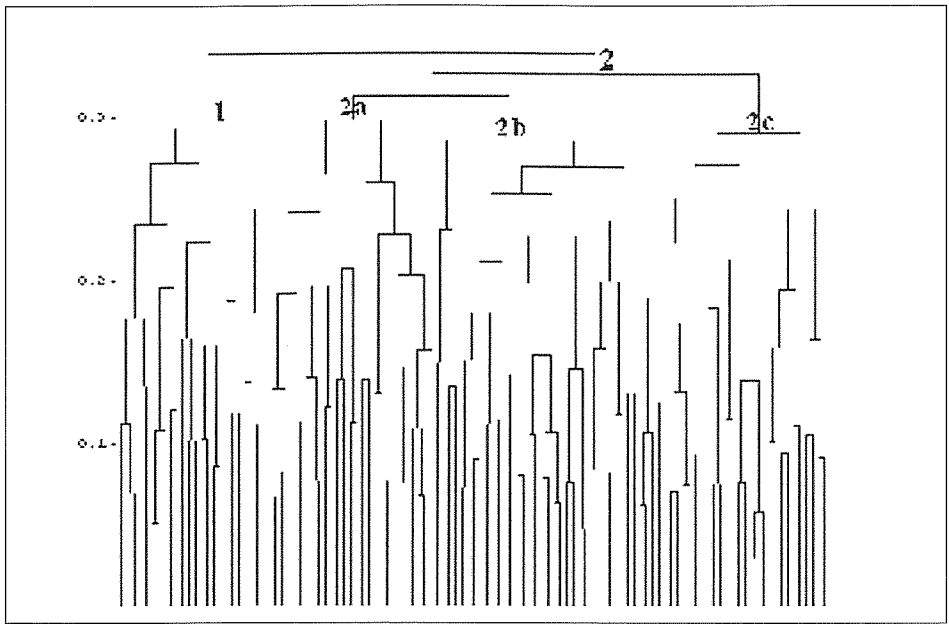

Fig. 5 - Dendrogram of the 115 relevés of Laga mountains

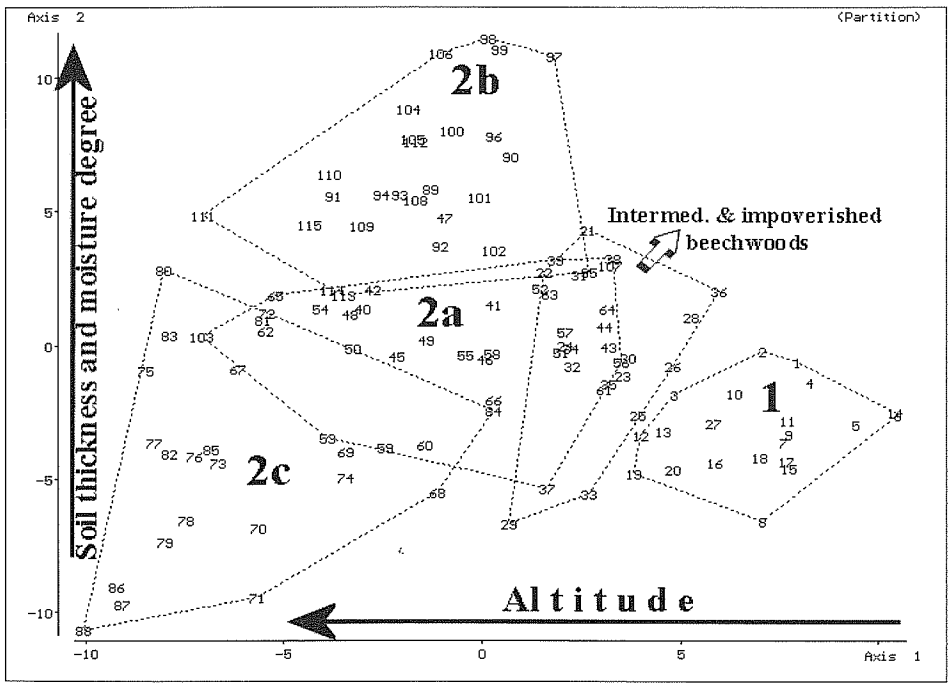

Fig. 6 - Ordination (PCA) of Laga beech woodlands relevés with partition superimposed

Vegetation

Dactylorhizo fuchsii-Fagetum sylvaticae (Biondi et al. 1989) Izco and Biondi 1992 subass. _aremonietosum agrimonioidis_ subass. nova.
(HOLOTYPUS PHYTOSOCIOLOGICAL TAB. 1 REL. 6)

Dactylorhizo-Fagetum occur in the lower montane belt at altitudes ranging between 900 m and 1.350 m. This association exhibits its best aspects in the upper part of the Vomano river (C.le Cappelli, C.le Lungo, I Tre Monti) and in the wooded areas enclosed between the toponyms of Rocca delle Vene, Ortolano and C.le Fucino. Moreover this termophilous beechwoods type occurs in the lower part of Bosco di San Gerbone, C.le Pecerolo and Bosco della Martese (Abruzzo region), as well as in the lower zones of M. Communitore (Marches region) and M. Inversaturo (Latium region). *Dactylorhizo-Fagetum* is mainly developed on predominantly north-exposure having within a variable range of slope degree. In the most of the cases these woodlands are coppices converted in high woods where *Fagus sylvatica* is by far the most important element of the dominant layer while other deciduous species, such as *Acer opalus* subsp. *obtusatum, pseudoplatanus, A. campestre* L., *Fraxinus ornus* L., *Quercus pubescens* Willd., *Ostrya carpinifolia* Scop. and *Quercus cerris* L., may occur in the dominant layer of the community, with much less coverage than *Fagus*. With the addition of *Corylus avellana* L. and, sporadically, of *Carpinus betulus* L., these same woody species are those characterising the secondary tree-layer. The scrub layer is mostly composed of mesophylous and sub-mesophilous *Prunetalia spinosae* species such as *Rubus hirtus, Rosa arvensis* Huds., *Daphne laureola* L. *Pteridium aquilinum* (L.) Kuhn, *Juniperus communis* L. and *Hedera helix* L. while less common are *Crataegus laevigata* (Poir.) DC., *C. monogyna* Jacq., *Lonicera xylosteum* L., *L. caprifolium* L. and *Euonymus latifolium* (L.) Mill. The specific character component of *Dactylorhizo-Fagetum* (sub *Carici sylvaticae-Fagetum*) was specified in Biondi et al., 1989 and it was composed of the following three species: *Carex sylvatica* Huds., *Geranium nodosum* and *Prenanthes purpurea* L. On the basis of both the new set of relevés performed in the present paper and of the comparison with the phytosociological tables concerning other termophilous beechwood types described or identified recently for the central Apennines (Scoppola and Caporali, 1998; Allegrezza, 2002; Biondi et al., 2002; Biondi et al., 2004; Blasi et al. 2005; Ciaschetti et al., 2006), a redefinition of the characteristic species of *Dactylorhizo-Fagetum* is here proposed. As a consequence *Prenanthes purpurea*, which, was extremely sporadic also in the original table published in Biondi et al. (1989) has been excluded from the specific characteristic component of the association being more pertinent to the microthermic beech woods (at least within the central Apennines). The new list of characteristic and differential species of *Dactylorhizo-Fagetum* is composed of: *Geranium nodosum, Dactylorhiza maculata* (L.) Soó subsp. *fuchsii* (Druce) Hyl., *Carex sylvatica, Pteridium aquilinum, Hepatica nobilis, Hedera helix* and *Aegopodium poda-*

Phytosociological tab. 1 - *Dactylorhizo fuchsii-Fagetum sylvaticae aremonietosum agrimonioidis* subass. nov.

altitude dam a.s.l.	98	100	101	92	108	113	117	91,5	92,5	95	98,5	129	135	91	100	117	129	119,5	122,5	127,5	135
exposure	n	ne	nw	n	ne	n	n	nw	nw	se	ese	e	nw	wnw	nw	nw	nw	ne	ese	ene	ne
slope°	40	35	40	30	15	20	25	30	10	25	30	30	35	30	20	25	20	30	10	20	15
area m²	340	350	310	280	340	400	415	300	370	410	270	320	430	500	400	460	320	510	480	320	400
relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Dactylorhizo fuchsii-Fagetum sylvaticae						T															
Hedera helix L. subsp. helix	1	2	1	2	.	+	.	1	.	1	2	.	.	3	.	.	.	+	.	.	.
Pteridium aquilinum (L.) Kuhn	.	.	.	.	2	1	2	.	2	1	1	1	.	1	+	.	.	1	.	.	+
Aegopodium podagraria L.	2	1	.	1	2	2	2	.	1	.	.	.	.	1	1	.	.	2	.	.	.
Hepatica nobilis Schreb.	.	+	1	2	.	+	.	1	.	.	.	.	1	.	1	2	.	2	.	.	1
Carex sylvatica Huds.	.	.	.	.	+	+	.	1	2	+	+	+	.	.	.	.	.	.	.	.	+
Dactylorhiza maculata (L.) Soó subsp. fuchsii (Druce) Hyl.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Geranium nodosum L.	3	3	2	3	3	3	2	.	.	2	.	.	.	2	1	.	.	.	.	.	.
diff. subass. aremonietosum agrimonioidis																					
Daphne laureola L.	1	+	1	+	1	1	1	2	1	2	1	1	.	1	1	1	.	1	.	+	1
Euphorbia amygdaloides L.	1	1	1	1	+	+	1	+	.	1	.	+	.	+	1	.	+	+	.	+	+
Acer opalus Mill. subsp. obtusatum (Waldst. & Kit. ex Willd.) Gams	.	+	+	.	2	2	2	2	2	3	2	.	1	2	+	+	.	+	1	.	.
Acer pseudoplatanus L.	1	+	.	.	.	+	+	1	.	.	.	1	.	1	1	.	1	.	+	.	.
relict. variant with Abies alba																					
Abies alba Mill.	.	.	.	.	.	.	.	.	.	+	+	1	.	.	.	.	.	4	4	4	4
diff. termophilous																					
Cyclamen hederifolium Aiton subsp. hederifolium	1	1	1	1	.	.	.	2	+	1	2	1	.	2	.	.	2	+	.	.	.
Polystichum setiferum (Forssk.) T. Moore ex Woyn.	1	1	1	1	.	.	.	+	+	1	1	.	.	.	.	.	.	.	.	.	.
Corylus avellana L.	.	.	.	+	2	1	1	.	.	.	.	.	.	1	.	.	+	.	.	+	.
Tamus communis L.	.	.	.	+	+	+	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.
Lilium bulbiferum L. subsp. croceum (Chaix) Jan	.	.	.	.	+	+	.	.	.	.	.	.	+	+	.	1	.	.	.	.	.
Polystichum x bichnellii (Christ) Hahne	1	1	1	1	.	.	.	+	+	1	1	.	.	1	.	+	.	.	.	.	.
Cornus sanguinea L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.
Veronico urticifoliae-Fagenion sylvaticae																					
Solidago virgaurea L. subsp. virgaurea	+	1	1	.	1	1	.	1	.	1	.	1	.	1	+	+	+	.	.	+	.
Luzula sylvatica (Huds.) Gaudin subsp. sylvatica	.	.	1	.	.	.	.	1	+	+	1	1	.	.	.	+	+	+	+	+	1
Festuca heterophylla Lam.	+	+	.	+	.	.	2	+	.	.	.	+	.	+	+	+	.	.	.	+	+

Phytosociological tab. 1 - *Dactylorhizo fuchsii-Fagetum sylvaticae aremonietosum agrimonioidis* subass. nov.

altitude dam a.s.l.	98	100	101	92	108	113	117	91,5	92,5	95	98,5	129	135	91	100	117	129	119,5	122,5	127,5	135
exposure	n	ne	nw	n	ne	n	n	nw	nw	se	ese	e	nw	wnw	nw	nw	nw	ne	ese	ene	ne
slope°	40	35	40	30	15	20	25	30	10	25	30	30	35	30	20	25	20	30	10	20	15
area m²	340	350	310	280	340	400	415	300	370	410	270	320	430	500	400	460	320	510	480	320	400
relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Pulmonaria picta Rouy	+	+	.	+	1	1	+	.	.	1	1	.	.	.	.	.	.	.	.	.	.
Fragaria vesca L. subsp. vesca	.	.	+	.	.	.	.	+	1	.	.	.	.	.	1	1	+	.	+	.	+
Cytisus hirsutus L.	.	.	.	.	.	.	.	+	+	.	.	.	+	.	+	.	.	.	+	.	.
Veronica urticifolia Jacq.	.	.	2	.	.	.	.	1	.	2	.	.	.	.	.	.	.	.	.	.	.
Hieracium racemosum W.& K. ssp. virgaurea (Cosson) Zahn	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	.	+
Rosa pendulina L.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.
Oxalis acetosella L.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.
Aremonio-Fagion																					
Aremonia agrimonoides (L.) DC.	+	.	1	.	+	1	1	.	.	1	1	2	+	+	1	1	+	.	3	1	1
Saxifraga rotundifolia L. subsp. rotundifolia	.	1	1	+	+	.	.	+	.	1	.	1	.	+	.	.	.	.	.	.	.
Euonymus latifolius (L.) Mill.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	+	+	.	.
Fraxinus ornus L. subsp. ornus (d)	.	.	+	.	.	.	.	1	1	.	.	.	+	+	1	+	.	.	+	.	.
Ostrya carpinifolia Scop. (d)	.	.	.	.	.	.	1	3	1	.	2	.	1	2	+	.	.	.	1	.	.
Fagetalia sylvaticae																					
Fagus sylvatica L.	5	5	5	5	4	4	4	4	4	5	4	5	4	4	5	5	5	4	3	3	4
Sanicula europaea L.	1	+	1	+	2	1	.	+	1	2	2	2	.	1	2	3	+	1	2	1	2
Viola reichenbachiana Jord. ex Boreau	1	1	.	1	1	1	1	1	1	1	1	+	+	1	1	1	+	2	1	2	.
Poa nemoralis L. subsp. nemoralis	1	1	+	.	.	+	+	.	.	.	.	.	.	+	.	.	+	.	.	.	.
Campanula trachelium L.	1	1	+	.	.	.	.	+	.	.	.	+	.	+	.	.	.	.	.	.	.
Polygonatum multiflorum (L.) All.	1	.	+	.	.	+	.	.	.	+	.	1	.	.	.	.	1	.	.	.	.
Salvia glutinosa L.	.	.	+	.	.	.	.	.	1	.	.	.	.	+	.	.	.	+	+	.	.
Lilium martagon L.	+	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Mercurialis perennis L.	2	1	.	2	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
Neottia nidus-avis (L.) Rich.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	+	.	.	.	+	.
Monotropa hypopitys L.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	+	1	.
Acer platanoides L.	+	1	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.
Euphorbia dulcis L.	.	+	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Prenanthes purpurea L.	.	+	1	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.

Phytosociological tab. 1 - *Dactylorhizo fuchsii-Fagetum sylvaticae aremonietosum agrimonioidis* subass. nov.

altitude dam a.s.l.	98	100	101	92	108	113	117	91,5	92,5	95	98,5	129	135	91	100	117	129	119,5	122,5	127,5	135
exposure	n	ne	nw	n	ne	n	n	nw	nw	se	ese	e	nw	wnw	nw	nw	nw	ne	ese	ene	ne
slope°	40	35	40	30	15	20	25	30	10	25	30	30	35	30	20	25	20	30	10	20	15
area m²	340	350	310	280	340	400	415	300	370	410	270	320	430	500	400	460	320	510	480	320	400
relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Actaea spicata L.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Adenostyles glabra (Mill.) DC. subsp. glabra	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Arum maculatum L.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.
Veronica montana L.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.
Sorbus aucuparia L.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.	.	.
Ilex aquifolium L.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.
Galium odoratum (L.) Scop.	.	.	.	.	.	.	.	.	.	.	.	1	.	+	.	.	.	.	.	.	.
Paris quadrifolia L.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cardamine bulbifera (L.) Crantz	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carpinus betulus L.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cephalanthera rubra (L.) Rich.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lamium galeobdolon L. subsp. montanum (Pers.) Hayek	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Cardamine chelidonia L.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
Cephalanthera damasonium (Mill.) Druce	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.
Quercetalia pubescenti-petraeae & Querco-Fagetea																					
Rubus hirtus Waldst. & Kit.	1	2	2	2	2	3	1	1	2	2	2	2	2	2	1	2	3	2	2	.	2
Primula vulgaris Huds. subsp. vulgaris	.	.	1	+	1	2	.	2	2	1	.	1	1	1	2	1	1	1	1	1	1
Melica uniflora Retz.	1	1	1	2	2	2	+	2	.	1	1	.	+	2	.	.	+	+	2	+	.
Lathyrus venetus (Mill.) Wohlf.	+	2	2	1	2	1	2	.	.	.	.	.	.	1	2	.	+	1	.	+	.
Acer campestre L.	1	.	+	.	1	1	1	1	.	.	.	.	.	+	1	.	+	.	+	.	.
Lactuca muralis (L.) Gaertn.	1	.	1	.	+	.	.	1	+	+	.	+	.	1	.	+	.	+	.	.	.
Rosa arvensis Huds.	+	.	1	+	.	.	.	.	.	.	.	.	1	.	+	+	.	+	+	+	+
Carex digitata L.	.	+	+	1	.	.	.	.	.	.	.	.	.	.	2	+	.	1	1	1	+
Potentilla micrantha Ramond ex DC.	+	+	1	.	1	1	.	.	1	.	.	.	.	.	1	.	.	.	+	.	+
Ajuga reptans L.	.	.	+	.	+	.	.	.	.	+	.	.	+	.	1	.	.	+	.	.	.
Brachypodium sylvaticum (Huds.) P. Beauv.	+	1	.	+	.	.	.	.	1	1	.	.	.	.	.	+	.	.	.	.	.
Geranium robertianum L.	+	1	.	1	.	.	.	.	+	.	.	.	.	+	.	.	.	1	.	.	.

Phytosociological tab. 1 - *Dactylorhizo fuchsii-Fagetum sylvaticae aremonietosum agrimonioidis* subass. nov.

altitude dam a.s.l.	98	100	101	92	108	113	117	91,5	92,5	95	98,5	129	135	91	100	117	129	119,5	122,5	127,5	135
exposure	n	ne	nw	n	ne	n	n	nw	nw	se	ese	e	nw	wnw	nw	nw	nw	ne	ese	ene	ne
slope°	40	35	40	30	15	20	25	30	10	25	30	30	35	30	20	25	20	30	10	20	15
area m²	340	350	310	280	340	400	415	300	370	410	270	320	430	500	400	460	320	510	480	320	400
relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Hieracium murorum L.	.	.	.	.	1	.	.	.	.	.	.	1	.	.	+	+	.	+	.	.	+
Hieracium racemosum W. & K. ssp. crinitum (SM.) Zahn														+	1	+					
Clematis vitalba L.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	+	.	1	1	.	.
Castanea sativa Mill.	.	.	.	.	.	.	.	1	1	.	.	1	.	.	.	.	+	.	.	.	.
Epipactis helleborine (L.) Crantz	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.
Ranunculus lanuginosus L.	1	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	+
Quercus cerris L.	.	.	.	.	.	+	.	.	.	.	.	.	2	.	1	.	.	.	+	.	.
Dryopteris filix-mas (L.) Schott	.	.	.	.	.	.	.	.	+	1	1	.	.	+	.	.	.	.	.	.	.
Hieracium racemosum W.& K. ssp. virgaurea (Cosson) Zahn	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	1	.	+
Sambucus nigra L.	+	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.
Populus tremula L.	1	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.
Vicia sepium L.	.	.	.	.	+	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.
Chaerophyllum temulum L.	.	.	.	.	.	+	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.
Laburnum anagyroides Medik.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	.	.	+	.	.
Cephalanthera longifolia (L.) Fritsch	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	1	+	.
Cruciata glabra (L.) Ehrend.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	+	.
Bromus racemosus L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1	.	+	.
Campanula persicifolia L.	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Digitalis lutea L. subsp. australis (Ten.) Arcang.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.
Geum urbanum L.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.
Helleborus bocconei Ten.	.	.	.	.	.	.	.	.	1	.	.	.	.	+	.	.	.	.	.	.	.
Taxus baccata L.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.
Prunus avium L. subsp. avium	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.
Anemone nemorosa L.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Sorbus aria (L.) Crantz	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Salix caprea L.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.

Phytosociological tab. 1 - *Dactylorhizo fuchsii-Fagetum sylvaticae aremonietosum agrimonioidis* subass. nov.

altitude dam a.s.l.	98	100	101	92	108	113	117	91,5	92,5	95	98,5	129	135	91	100	117	129	119,5	122,5	127,5	135
exposure	n	ne	nw	n	ne	n	n	nw	nw	se	ese	e	nw	wnw	nw	nw	nw	ne	ese	ene	ne
slope°	40	35	40	30	15	20	25	30	10	25	30	30	35	30	20	25	20	30	10	20	15
area m²	340	350	310	280	340	400	415	300	370	410	270	320	430	500	400	460	320	510	480	320	400
relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Symphytum tuberosum L. subsp. angustifolium (A. Kern.) Nyman (910)	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.
Tilia platyphyllos Scop.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.
Helleborus foetidus L. subsp. foetidus	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.
Polygonatum odoratum (Mill.) Druce	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.
Viola odorata L.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
Luzula forsteri (Sm.) DC.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.
Sesleria autumnalis (Scop.) F.W.Schultz	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.
Knautia drymeia Heuff. subsp. centrifrons (Borbàs) Ehrend.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.
Viola alba Besser subsp. dehnhardtii (Ten.) W. Becker	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.
other species																					
Crataegus monogyna Jacq.	+	.	.	.	+	+	1	.	.	.	.	.	.	.	.	+	.	.	.	.	.
Juniperus communis L. subsp. communis	.	.	.	+	.	.	.	.	.	.	.	.	1	+	+	+	.	.	.	.	.
Polystichum x bichnellii (Christ) Hahne	+	1	1	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Asplenium trichomanes L. subsp. quadrivalens D.E. Mey	.	.	+	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.
Lonicera xylosteum L.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	1	.	.	+	.	.	.
Heracleum sphondylium L. subsp. sibiricum (L.) Simonk.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	+	.
Hieracium racemosum W. & K. ssp. sublateriflorum Zahn	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.
Aquilegia vulgaris auct. Fl. Ital.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Urtica dioica L. subsp. dioica	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.
Lonicera caprifolium L.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.
Crataegus laevigata (Poir.) DC.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	+	.	.	.	.
Galium mollugo L. subsp. erectum Syme	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.
species per relevé	41	36	37	29	33	31	23	37	32	30	19	29	28	48	35	30	25	37	31	24	20

graria L. While *Geranium nodosum* (Fig. 7) provides a clear biogeographical identity, the next four species testify to the presence of acidic substrates. *Hedera helix,* which behaves as typically termophilous species in the Laga mountains geographical context, serve to indicate spatial contacts with mixed oak-woods. Other thermophilous species which could be considered differentials as regards to microthermic beech woodlands are *Fraxinus ornus, Corylus avellana, Ostrya carpinifolia, Cyclamen hederifolium* Aiton, *Lilium bulbiferum* (L.) *subsp. croceum* (Chaix) Jan, *Cornus sanguinea* L., *Polystichum setiferum* (Forssk.) T. Moore ex Woyn., where the latter species behaves as ecological vicariant of *Polystichum aculeatum.* Considering that *Dactylorhizo-Fagetum*, in its original form, was described for the low-altitude hetherotopic beech woods of the Umbrian-Marches Apennines (Serre di Burano), it includes several mediterranean termophilous species (*Cyclamen repandum* Sm., *Sorbus domestica, Pyracantha coccinea* M. Roem.), and species which normally belong to the lowland euthrophic woodlands (*Loncomelos pyrenaicus* (L.) Hrounda ex J. Holub, *Arisarum proboscideum* (L.) Savi, *Rumex conglomeratus* Murray, *Circaea lutetiana* L.) which are not to be found in the Laga mountains beechwoods. These latter, although identified, in the present paper, as "termophilous", are completely included in the montane belt (900-1350 m) and for this reason they exhibit minor percentages of termophilous species and a higher number of species which are strictly related to the beech woodland ecosystem. In order to emphasize this peculiarity, a distinct new subassociation named *Dactylorhizo-Fagetum aremonietosum agrimonioidis* is here described for the lower montane belt of the Laga mountains only. This subassociation is distinguishable from *Dactylorhizo-Fagetum typicum* through the following differential species: *Aremonia agrimonioides, Daphne laureola, Euphorbia amygdaloides* L., *Acer opalus subsp. obtusatum e Acer pseudoplatanus.* In a restricted areas of the Laga mountains, precisely within the eastern slopes of M. Bilanciere *Fagus sylvatica* shares with *Abies alba* the dominance of the upper tree layer. The high cover values of the silver fir, together with the thick ecto-organic humus layers on the ground lead to a sharp decrement of the cover-abundance indexes (but apparently not in the number) of the herb layer species. This *Fagus-Abies* stands has been identified as a "relictual" variant with *Abies alba*" of *Dactylorhizo-Fagetum aremonietosum* (relevés 18-21, phytosociological tab. 1).

Prenantho purpureae-Fagetum sylvaticae Di Pietro ass. nova hoc loco subass. *typicum*

(HOLOTYPUS PHYTOSOCIOLOGICAL TAB. 2 REL. 25)

Most of the Laga mountains beechwoods occur at altitudes above 1.400 m, where, as well as the better preserved and more structurally diversified aspects of *Fagus* woodland, are also to be found the majority of those differential species that differentiate Laga beechwoods from beechwoods of the rest of the central Apennines (*Veronica urticifolia, Vaccinium myrtyllus, Deschampsia flexuosa* (L.)

Fig. 7 - *Geranium nodosum*, which occurs both in the thermophilous and microthermic Laga beechwoods is a very important diagnostic species in the syntaxonomy of the central Apennine beech woods (explanation in the text)

Trin., *Gymnocarpium dryopteris* (L.) Newman, *Polygonatum verticillatum* (L.) All., *Pyrola minor* L., *Pyrola rotundifolia* L., *Pyrola media* Sw., *Athyrium filix-foemina*, *Blechnum spicant* (L.) Roth, *Ranunculus platanifolius* L., *Galium rotundifolium* L. subsp. *rotundifolium*, *Carex pilosa*, *Cirsium erisithales* (Jacq.) Scop. etc.).

The physiognomical-structural features of the microthermic Laga beechwoods together with the floristic composition of the undergrowth are strictly related to the morphology of the slopes. The typical aspect of *Prenantho-Fagetum* is widely and uniformly distributed throughout the entire range. It is developed on relatively deep soils and on slopes of varying steepness, but which almost never have a high percentage of rochyness of unstable detritus. The combination of high altitudes, siliceous substrates and the lack of suitable syntaxonomical references among those available in the phytosociological literature (see the syntaxonomical discussion, below), meant that a new association, *Prenantho purpureae-Fagetum sylvaticae*[2] ass. nova needed to be defined.

2) The most appropriate name would have been *Veronico urticifoliae-Fagetum*, since *Veronica urticifolia* is, without doubt, the species which in autoecological terms best represents the peculiarities of the Laga mountain acidophilous beechwoods, as against the basiphilous beechwoods of the rest of the central Apennines. However, because a validly described beechwood association bearing the name *Veronico urticifoliae-Fagetum* already exists (Montacchini, 1972), and has been used improperly several times for the Apennines, the choice of *Prenanthes purpurea* was considered more advisable. This species, though not exclusively related to acidic soils, is particularly suitable for indicating microthermic conditions (at least in the Apennines).

Phytosociological tab. 2 - *Prenantho purpureae-Fagetum sylvaticae* ass. nov. (subass. typicum)

relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
altitude dam a.s.l.	131	137	156	152	150	135	138	184	168	168	154	155	164	172	154	153	153	152	133	131	149	171	149	143	146	135	177	148	137	145	150
exposure	se	ese	s	ese	se	ene	ene	nne	w	wnw	ne	nne	nw	n	sw	w	w	nw	nne	nne	sw	n	wnw	nw	nw	n	wsw	nw	n	sw	wsw
slope°	15	20	10	25	10	5	20	35	20	30	45	30	40	40	40	15	20	15	25	40	45	25	25	25	30	30	40	30	25	20	15
area m²	360	390	420	400	500	470	500	280	600	490	350	560	400	600	500	350	400	550	500	400	250	310	450	400	500	410	400	450	480	400	430
char. & diff. Prenantho-Fagetum																									T.						
Veronica urticifolia Jacq.	.	1	.	1	+	.	.	2	.	2	1	1	2	2	2	+	1	1	2	2	+	2	.	+	3	+	3	.	2	2	2
Adenostyles glabra (Mill.) DC. subsp. glabra	.	+	+	1	2	.	.	2	.	.	+	1	+	1	+	+	1	+	.	.	.	2	2	+	+	+	2	+	+	.	2
Prenanthes purpurea L.	+	.	.	.	.	.	.	2	2	2	.	+	+	2	+	.	.	.	2	+	.	2	1	.	1	+	1	+	1	2	+
Daphne mezereum L.	.	.	.	.	.	.	.	.	.	.	.	1	1	1	.	+	.	+	.	.	.	.	.	+	+	1	+	.	+	.	+
Carex pilosa Scop.	.	.	.	2	.	1	2	.	.	+	.	.	.	.	.	.	.	+	.	.	.	.	.	2	2	.	.	.	1	2	3
Cirsium erisithales (Jacq.) Scop.	2	.	.	1	.	.	.	.	.	.	.	.	+	+	.	.	.	+	.	.	.	.	.	.	1	.	.	.	+	1	.
Hieracium bifidum Kit. ex Hornem.	.	.	.	.	+	.	.	.	.	.	.	1	1	.	3	2	2	1	.	.	.	+	.	.	+	.	.	.	.	.	.
Pyrola minor L.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	1	.	+	.	+	1	.
relictual variant with Abies alba																															
Abies alba Mill.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	1
Veronico urticifoliae-Fagenion sylvaticae																															
Festuca heterophylla Lam.	2	.	.	2	+	.	.	+	.	1	.	+	+	.	1	.	+	.	1	1	1	.	.	+	1	.	+	.	.	1	1
Solidago virgaurea L. subsp. virgaurea	1	.	.	1	.	.	.	.	.	.	1	+	3	+	1	.	1	.	2	1	+	+	+	.	+	.	1	.	2	1	+
Pulmonaria picta Rouy	.	1	1	+	1	.	.	.	.	.	+	+	.	+	.	+	.	.	.	.	1	.	+	1	+	1	.	+	+	.	.
Rosa pendulina L.	.	.	.	3	.	.	.	.	.	.	+	2	.	1	.	+	1	3	.	.	.	+	.	.	+	1	.	.	.	.	.
Vaccinium myrtillus L.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	+	+	.	.	.	.	1	.	+	.	.	.	+
Dactylorhiza maculata (L.) Soó ssp. fuchsii (Druce) Hyl.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	+	.	.	.	.	.	+	+	+	.	.	.	.	.	.	+
Luzula sylvatica (Huds.) Gaudin subsp. sylvatica	.	.	.	.	+	.	+	.	.	.	.	.	.	.	+	.	+	.	2	2	.	.	.	.	.	.	.	.	.	.	.
Orthilia secunda (L.) House	.	.	.	.	.	.	.	.	1	+	.	.	2	.	.	.	.	+	.	.	.	.	.	.	+	.	1	.	.	.	.
Hieracium racemosum Waldst. & Kit. ex Willd.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	1	.	1	.	.	.	.	1	.	.	.	.	1	.	.	.	.
Oxalis acetosella L.	.	.	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	2	1	.
Veronica officinalis L.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	2
Fragaria vesca L. subsp. vesca	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	2	.	.	.	.	.	.
Lathyrus linifolius (Reichard) Bässler	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	+	.	.	.	.	.
Calamagrostis arundinacea (L.) Roth.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Deschampsia flexuosa (L.) Trin.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Aremonio-Fagion sylvaticae																															

Phytosociological tab. 2 - *Prenantho purpureae-Fagetum sylvaticae* ass. nov. (subass. typicum)

relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
altitude dam a.s.l.	131	137	156	152	150	135	138	184	168	168	154	155	164	172	154	153	153	152	133	131	149	171	149	143	146	135	177	148	137	145	150
exposure	se	ese	s	ese	se	ene	ene	nne	w	wnw	ne	nne	nw	n	sw	w	w	nw	nne	nne	sw	n	wnw	nw	nw	n	wsw	nw	n	sw	wsw
slope°	15	20	10	25	10	5	20	35	20	30	45	30	40	40	40	15	20	15	25	40	45	25	25	25	30	30	40	30	25	20	15
area m²	360	390	420	400	500	470	500	280	600	490	350	560	400	600	500	350	400	550	500	400	250	310	450	400	500	410	400	450	480	400	430
char. & diff. Prenantho-Fagetum																									T.						
Aremonia agrimonoides (L.) DC.	.	+	1	.	+	+	+	.	+	1	2	2	+	1	1	1	+	1	1	+	.	+	1	1	2	1	.	.	1	1	2
Saxifraga rotundifolia L. subsp. rotundifolia	.	+	.	+	.	.	.	+	.	1	+	.	.	1	+	.	+	.	.	.	.	.	1	.	.	.	+	.	1	1	.
Valeriana tripteris L. subsp. tripteris	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	+	.	.	.	.
Euonymus latifolius (L.) Mill.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	1	.	+	.	.	.	.	.
Cardamine enneaphyllos (L.) Crantz	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.
Cardamine kitaibelii Bech.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Fagetalia sylvaticae																															
Fagus sylvatica L.	4	5	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	4	4	4	5	5	5	5	5
Viola reichenbachiana Jord. ex Boreau	+	2	+	.	1	+	.	1	2	+	2	3	.	2	2	2	3	2	2	+	+	.	1	1	1	2	.	+	2	2	2
Poa nemoralis L. subsp. nemoralis	1	.	.	+	1	.	1	.	1	+	1	1	+	+	2	1	+	+	1	+	.	+	+	.	1	.	.	1	.	.	+
Polystichum aculeatum (L.) Roth	.	2	2	2	+	.	.	.	.	+	.	1	.	1	+	+	+	+	.	.	+	1	1	1	.	.	.	+	1	.	+
Euphorbia amygdaloides L.	.	1	+	.	.	.	1	.	.	.	.	1	+	+	1	1	2	1	.	+	.	+	+	.	.	+	.	1	1	1	+
Lathyrus vernus (L.) Bernh.	.	.	.	.	.	+	1	.	.	.	2	2	1	2	2	2	3	1	.	.	+	1	2	+	1	2	.	.	1	+	.
Sanicula europaea L.	.	2	.	.	2	.	.	1	.	.	1	2	.	+	.	1	1	1	+	+	1	.	1	.	.	.	.	.	2	2	.	1
Galium odoratum (L.) Scop.	.	.	1	2	2	.	.	1	2	2	.	2	.	2	+	+	2	.	.	.	.	.	.	.	1	.	+	1	1	2	.
Geranium nodosum L.	.	.	.	.	.	2	.	2	.	2	3	4	.	.	+	+	2	.	.	.	.	.	2	2	2	.	.	.	.	.	.
Acer pseudoplatanus L.	.	.	.	.	.	.	1	.	.	+	.	+	.	.	.	.	.	1	+	.	.	.	.	.	.	+	.	.	.	+	.
Sorbus aucuparia L.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	+	+	2	.	.	.	.	.	.	.	.	+	.	.	.	+
Actaea spicata L.	.	+	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	1	1	.	+	.	.	.	.	.
Neottia nidus-avis (L.) Rich.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	+	+	.	.	.	.	.	.	.	.	.	+	+
Salvia glutinosa L.	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	2	+
Polystichum lonchitis (L.) Roth	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	+	.	+	.	.	1	.	.	.	.
Cephalanthera damasonium (Mill.) Druce	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	1	.	.	+	.	.	.	.	.	+	.	.	.	.	.
Cephalanthera rubra (L.) Rich.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.
Cardamine bulbifera (L.) Crantz	.	.	.	.	1	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.
Veronica montana L.	.	.	.	.	.	.	.	.	+	+	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.
Senecio ovatus (P. Gaertn., B. Mey. & Scherb.) Willd.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	+	+	.	.	.	.	.	.

Phytosociological tab. 2 - *Prenantho purpureae-Fagetum sylvaticae* ass. nov. (subass. typicum)

relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
altitude dam a.s.l.	131	137	156	152	150	135	138	184	168	168	154	155	164	172	154	153	153	152	133	131	149	171	149	143	146	135	177	148	137	145	150
exposure	se	ese	s	ese	se	ene	ene	nne	w	wnw	ne	nne	nw	n	sw	w	w	nw	nne	nne	sw	n	wnw	nw	nw	n	wsw	nw	n	sw	wsw
slope°	15	20	10	25	10	5	20	35	20	30	45	30	40	40	40	15	20	15	25	40	45	25	25	25	30	30	40	30	25	20	15
area m²	360	390	420	400	500	470	500	280	600	490	350	560	400	600	500	350	400	550	500	400	250	310	450	400	500	410	400	450	480	400	430
char. & diff. Prenantho-Fagetum																									T.						
Ilex aquifolium L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	1	.	.	.	.	.	.	+	.	.	.
Monotropa hypopitys L.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.
Lilium martagon L.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.
Adoxa moschatellina L. subsp. moschatellina	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Galium rotundifolium L. subsp. rotundifolium	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
Milium effusum L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	1
Asperula taurina L. subsp. taurina	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.
Scrophularia scopolii Hoppe ex Pers.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hordelymus europaeus (L.) Harz	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Ulmus glabra Huds.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.
Festuca altissima All.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.
Polygonatum multiflorum (L.) All.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.
Quercetalia pubescenti-petraeae & Querco-Fagetea																															
Rubus hirtus Waldst. & Kit.	2	3	2	+	1	2	2	.	1	1	1	1	.	2	+	2	2	2	1	1	2	.	1	1	+	.	.	2	.	2	2
Hieracium murorum L.	2	.	+	.	1	+	.	2	2	2	1	1	.	2	.	.	.	.	1	1	.	2	1	.	1	1	2	.	1	2	2
Lactuca muralis (L.) Gaertn.	.	+	.	.	1	.	1	.	.	.	.	+	.	+	1	+	+	.	+	+	.	+	+	+	+	.	+	.	.	+	+
Dryopteris filix-mas (L.) Schott	.	2	1	1	.	+	1	.	+	.	.	+	.	.	+	.	.	+	.	.	.	.	.	.	1	.	+	+	1	.	.
Ajuga reptans L.	.	.	.	.	.	.	1	1	+	+	.	.	.	.	.	.	+	.	+	.	.	.	+	+	1	1	+	1	.	.	.
Hepatica nobilis Schreb.	2	.	.	.	.	.	.	.	.	.	2	2	1	.	1	2	2	1	.	.	.	.	2	+	.	3	.	.	.	.	.
Primula vulgaris Huds. subsp. vulgaris	.	.	.	1	.	.	.	+	.	.	+	1	.	.	.	+	+	.	.	.	+	.	+	.	.	.	.	+	+	.	1
Digitalis lutea L. subsp. australis (Ten.) Arcang.	1	.	.	.	.	.	+	.	.	.	+	.	.	.	+	1	.	.	+	.	.	.	+	.	+	+	.	.	.	.	+
Hieracium racemosum W.& K. ssp. virgaurea (Cosson) Z.	1	+	+	.	.	.	.	1	1	.	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1
Daphne laureola L.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	1	.	+	.	1	.	.	.	.	.	.	+	.	+	+
Carex sylvatica Huds.	.	+	.	.	1	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	+	.	.	+	+	.	1
Brachypodium sylvaticum (Huds.) P. Beauv.	1	.	.	.	.	.	1	.	.	.	+	.	+	.	+	+	.	+	.	.	.	.	+	.	.	.	.	.	.	.	.
Potentilla micrantha Ramond ex DC.	+	.	.	.	.	.	.	.	.	.	.	+	.	+	.	+	1	.	.	+	.	.	+	.	.	.	.	.	.	+	.
Epipactis helleborine (L.) Crantz	.	.	.	.	+	.	+	.	.	.	.	+	.	.	+	.	.	+	.	+	.	.	.	.	.	+	.	.	.	.	.

Phytosociological tab. 2 - *Prenantho purpureae-Fagetum sylvaticae* ass. nov. (subass. typicum)

relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
altitude dam a.s.l.	131	137	156	152	150	135	138	184	168	168	154	155	164	172	154	153	153	152	133	131	149	171	149	143	146	135	177	148	137	145	150
exposure	se	ese	s	ese	se	ene	ene	nne	w	wnw	ne	nne	nw	n	sw	w	w	nw	nne	nne	sw	n	wnw	nw	nw	n	wsw	nw	n	sw	wsw
slope°	15	20	10	25	10	5	20	35	20	30	45	30	40	40	40	15	20	15	25	40	45	25	25	25	30	30	40	30	25	20	15
area m²	360	390	420	400	500	470	500	280	600	490	350	560	400	600	500	350	400	550	500	400	250	310	450	400	500	410	400	450	480	400	430
char. & diff. Prenantho-Fagetum																									T.						
Melica uniflora Retz.	.	.	.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	+	.	2	.	.	.	1	1
Campanula trachelium L.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	1	1	1	1	.	.	.	.	.	.	.	+	.	.	.	.	.
Ranunculus lanuginosus L.	.	.	.	.	1	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	+	.	.	.	+	.	.	+
Geranium robertianum L.	.	.	1	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.	1
Sorbus aria (L.) Crantz	.	.	.	.	.	.	.	.	.	.	.	1	+	+	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.
Populus tremula L.	.	.	.	.	.	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.
Salix caprea L.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	.	.	.	.	.	1
Taxus baccata L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	2	1	.	.	.	.	.	.	.	.	.	1	.
Chaerophyllum temulum L.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.
Hieracium grovesianum A.-T. ex Belli	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Bromus racemosus L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+
Platanthera chlorantha (Custer) Rchb.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Prunus avium L. subsp. avium	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	2	.	.	.	.	.	.	.
Laburnum anagyroides Medik.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Myosotis sylvatica Hoffm.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Quercus cerris L.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Vicia sepium L.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Knautia drymeia Heuff. subsp. centrifrons (Borbàs) Ehrend.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cruciata glabra (L.) Ehrend.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Geum urbanum L.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rosa arvensis Huds.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Peucedanum oreoselinum (L.) Moench	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Hypericum montanum L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Luzula forsteri (Sm.) DC.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
Campanula persicifolia L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Viola odorata L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
other species																															

Phytosociological tab. 2 - *Prenantho purpureae-Fagetum sylvaticae* ass. nov. (subass. typicum)

relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
altitude dam a.s.l.	131	137	156	152	150	135	138	184	168	168	154	155	164	172	154	153	153	152	133	131	149	171	149	143	146	135	177	148	137	145	150
exposure	se	ese	s	ese	se	ene	ene	nne	w	wnw	ne	nne	nw	n	sw	w	w	nw	nne	nne	sw	n	wnw	nw	nw	n	wsw	nw	n	sw	wsw
slope°	15	20	10	25	10	5	20	35	20	30	45	30	40	40	40	15	20	15	25	40	45	25	25	25	30	30	40	30	25	20	15
area m²	360	390	420	400	500	470	500	280	600	490	350	560	400	600	500	350	400	550	500	400	250	310	450	400	500	410	400	450	480	400	430
char. & diff. Prenantho-Fagetum																									T.						
Epilobium montanum L.	.	.	1	.	.	.	1	.	.	.	+	+	.	.	1	.	.	.	.	.	.	.	1	+	.	.	+	.	.	+	+
Athyrium filix-femina (L.) Roth	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	1	+	+	.	.	.	1	.	+	1	+	+	.
Heracleum sphondylium L. subsp. sibiricum (L.) Simonk.	.	.	.	+	.	.	.	.	.	.	.	.	.	1	.	+	1	1	.	.	.	2	.	.	.	+	.	.	.	+	.
Campanula micrantha Bertol.	+	.	.	1	.	.	.	.	.	1	.	.	+	.	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pteridium aquilinum (L.) Kuhn	2	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	2	.	.	.	.	.	.	1
Laserpitium latifolium L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	1	1	.	.	.	.	+	.	.	.	.	.	.	.	.
Aegopodium podagraria L.	.	.	.	.	.	.	.	.	.	.	+	1	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	+	1
Rubus idaeus L.	.	.	1	1	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
Epipactis baumanniorum Soldano & F. Conti	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	+
Aquilegia vulgaris auct. Fl. Ital.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.
Chaerophyllum hirsutum L. subsp. hirsutum	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1
Juniperus communis L. subsp. communis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Viburnum lantana L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	+	.	.	.	.	.
Lathraea squamaria L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	+	.	.	.
Silene dioica (L.) Clairv.	.	.	.	.	+	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rumex acetosa L. subsp. acetosa	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
Saxifraga granulata L. subsp. granulata	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.
Ribes uva-crispa L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.
Peucedanum verticillare (L.) Mert. & W.D.J. Koch	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Sambucus ebulus L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Epipactis microphylla (Ehrh.) Sw.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.
Silene nutans L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+
Polypodium vulgare L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.
Polystichum x bichnellii (Christ) Hahne	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.
species per relevé	21	16	15	20	26	14	24	17	15	26	24	42	33	33	40	37	35	38	25	30	17	26	31	31	37	30	23	27	29	33	43

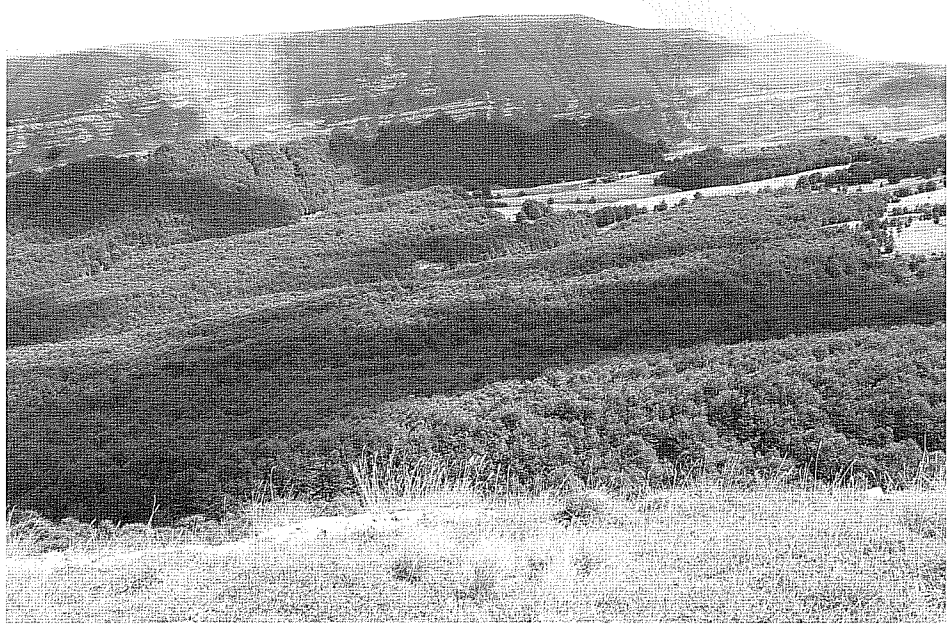

Fig. 8 - The upper montane belt beechwoods of Macera della Morte at the boundary between Lazio, Abruzzo and Marche region

The characteristic species of this association are as follows: *Veronica urticifolia, Prenanthes purpurea, Adenostyles glabra, Pyrola minor, Hieracium bifidum* Kit. ex Hornem., *Carex pilosa, Cirsium erisithales*. Among these species *Veronica urticifolia, Pyrola minor* and *Cirsium erisithales* are indicative of the presence of fairly acidic substrates; *Prenanthes purpurea* (Fig. 9) and *Adenostyles glabra* are species which normally find their optimum in the upper montane belt and so they are good indicators of the microthermic character of the association; *Hieracium bifidum* and *Carex pilosa*, although they are species of low frequency in the beechwoods investigated for the present study, nevertheless on the Laga mountains appear to play a significant sociological role, even if they do not do so elsewhere in the central Apennines.

As far as the edaphic features are concerned, the Laga mountains beechwoods exhibit a form of oligotrophic soils which are not so different to those which normally characterise the acidophilous beech woodlands. According to the Soil Taxonomy (U.S.D.A., 1998), the soils on which *Prenantho-Fagetum* is developed (Tab. I) resulted to be "Typic Dystrudepts" with an "Amphimull" humus type". Their profile consists of a surface horizon which does not meet the requirements (colour, thickness etc.) for an umbric epipedon, underlain by a cambic horizon. Matrix is not calcareous; texture is sand or loamy sand, and

Fig. 9 - *Prenanthes purpurea*, typical element of the microthermic beechwoods of Laga mountains

pratically without skeleton. It exhibits an acidic reaction (the pH values of the A horizon range between 5.3 and 5.8 being lower on convex slopes and higher in the gullies) and a relatively low values of organic matter (less than 5%), Cation exchange capacity (C.E.C.) and a high C/N ratio[3].

The *Prenantho-Fagetum* stands of Bosco della Martese are to be considered, today, the best example of mixed wood of *Fagus sylvatica* and *Abies alba* of the whole central Apennines. In this unique wood the mixed silver fir populations are developed at altitudes ranging between 1.300 and 1.800 (Colle Romicito). On the Marches slopes of the Laga mountains the occurrence of the silver fir is sparse, with a very low number of individuals restricted to the right side of F.sso della Volpara, at altitudes ranging between 1.400 and 1.500 m. On the Latium slopes, instead, the silver fir is completely absent, even if it would seem this disappearance happened only relatively recently (the existence of a group of dead trunks in the vicinity of the Pannicaro Lakes bears witness to this fact). Regarding the sociological-syntaxonomical role of *Abies alba* the present study confirms what was stated in Di Pietro and Fascetti (2005) for the beechwoods with *Abies alba* of Campania and Basilicata regions, namely that the presence of the silver fir among the Laga mountains communities does not mean the taxon is deserving of any discriminant role in the definition of autonomous associations or sub-

3) The soil analysis were kindly provided by Paolanti M. & Chiuchiarelli I. from ARSSA, Abruzzo unpublished database.

Tab. I - Soil features concerning two aspects of *Prenantho-Fagetum*: "a" lower altitude on deeper soils; "b" higher altitudes on shallow soils

Ceppo (F.sso Castellano) Rocca Santa Maria (TE). Beech woodland soil profile 27.VII.2000. Alt. 1320: coord. N: 4724626 E: 373988													
Hor.	depth cm	sand %	silt %	clay %	$CaCO_3$%	C org. %	Org. mat %	pH (H_2O)	Ca^{++}	Mg^{++}	C.E.C.	N. tot.	K ass.
A1	16	73	21	6	1,7	0.98	1.69	5.8	3.1	0.1	20.30	0.04	30
Bw	59	65	26	10	2,3	0.58	1.00	5.5	2.0	0.8	16.73	0.03	17
Bc	79	80	12	8	2,4	0.16	0.28	6.1	3.9	1.7	13.88	0.02	0
Ceppo (Lago dell'Orso) Rocca Santa Maria (TE). Beech woodland soil profile 27.VII.2000. Alt. 1730: coord. N: 4724023 E: 372319													
Hor.	depth cm	sand %	silt %	clay %	$CaCO_3$%	C org. %	Org. mat %	pH (H_2O)	Ca^{++}	Mg^{++}	C.E.C.	N. tot.	K ass.
A1	7	87	9	5	0,73	2.64	4.54	5.3	4.7	1.0	16.59	0.38	133
Bw	40	83	12	5	1,73	3.24	5.57	5.0	2.6	0.7	26.61	0.14	25
C	65	79	16	6	2,42	0.00	0.00	6.3	1.5	0.4	19.76	0.09	0

associations, whereas it can be used to define a "relictual variant". The available paleobotanical data (Di Rita and Magri, 2004) are demonstrating that in the central Apennines the presence of the silver fir had been progressively decreasing during the postglacial, firstly (upper postglacial), for climatic reasons, and secondly (lower postglacial) for the selective cutting due to man.

Prenantho-Fagetum: sub-associations

In addition to the typical aspect of *Prenantho-Fagetum*, two different aspects of this association – distinguishable from each other both ecologically and floristically – were identified in the more inland areas of the range where deeper valleys and gorges occur. These two aspects are strictly related to the peculiar edapho-morphological features of the slopes, which are characterized by the regular alternation of gullies and ridges due to the selective erosion of surface drainage water on the pelitic-arenaceous substrates.

Prenantho purpureae-Fagetum sylvaticae vaccinietosum myrtilli subass. nova hoc loco
(HOLOTYPUS PHYTOSOCIOLOGICAL TAB. 3 REL. 5)

Beech woodlands were found with *Vaccinium myrtillus* occurring in the undergrowth (Fig. 10), especially in areas where the arenaceous bedrocks come to the surface more frequently, such as convex slopes, ridges and watershed lines. In these environments the atmospheric agents tend to prevent the persistence of litter on the ground, and as a consequence soils tend not only to be significantly shallower, but also to exhibit a lower degree of hydric retention and to experience the influence of the physical-chemical characteristics of the bedrock more directly (i.e. higher presence of skeleton in the substrates, lower pH values etc.). In structural terms this woodland type is quite diversified. The dominant tree layer is often characterised by young individuals; the cover-degree of the canopy normally

Fig. 10 - Physiognomical aspect of *Prenantho-Fagetum vaccinietosum* with *Vaccinium myrtillus* largely dominant in the undergrowth of the microthermic beechwoods located within ridges or slope's convexities

ranges between 60 and 90 percent, and for this reason the amount of light radiation directly reaching the ground leads to the herb layer exhibiting relatively high floristic richness, one perfectly comparable to that of *Prenantho-Fagetum typicum.* The physiognomical and coenological features of the undergrowth may be quite different, too. In some cases *Vaccinium* populations are so dense they cover the herb layer of the woodland uninterruptedly, while in other cases this species exhibits cover/abundance indexes which are similar to those of the other surrounding high frequency species (*Veronica urticifolia, Rosa pendulina, Solidago virgaurea* L., *Luzula sylvatica* etc.). For these *Vaccinium*-rich beechwoods of the Laga mountains a new subassociation named *Prenantho-Fagetum vaccinietosum myrtilli* has been identified. The differential species of this subassociation are *Vaccinium myrtillus, Campanula micrantha* Bertol. and *Melampyrum italicum*[4], together with some other acidophilous species which are exclusive to this community, but which exhibit significantly lower frequency indexes, such as *Blechnum*

4) The specimens of both *Campanula micrantha* and *Melampyrum italicum* collected on the Laga mountains exhibit some peculiar morphological features which make the Laga speciemens a little bit "different" when compared to the typical forms of the species. Also their occurrence in a microthermic acidophilous beechwood environment is effectively somewhat unusual. For this reason a taxonomical study (in collaboration with Dr. L. Gubellini and Dr. F. Conti coordinators of resp. Centro ricerche floristiche delle Marche and Centro ricerche floristiche dell'Appennino, together with other researchers) is currently in progress to understand the real taxonomical identity of the Laga specimens.

Phytosociological tab. 3 - *Prenantho purpureae-Fagetum sylvaticae vaccinietosum myrtilli* subass. nov.

relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
altitude dam a.s.l.	159	163	170	181	178	177	172	150	165	156	162	147	146	140	140	139	135	148	138	134	135	135
exposure	se	w	nnw	n	ne	nw	n	n	n	wnw	nw	ene	ene	wnw	w	nw	se	se	nw	w	nw	w
slope°	20	45	30	35	30	25	30	20	35	25	20	30	5	20	10	15	20	25	15	20	20	35
area m²	250	300	400	340	350	400	350	390	450	240	260	340	440	350	330	340	400	450	270	300	320	350
Prenantho-Fagetum sylvaticae					T.																	
Prenanthes purpurea L.	+	2	2	+	2	1	1	2	2	2	3	+	2	+	1	+	2	2	+	2	1	1
Veronica urticifolia Jacq.	2	.	3	2	2	2	2	2	2	3	2	+	3	1	2	2	2	2	2	2	2	2
Adenostyles glabra (Mill.) DC. subsp. glabra	+	.	1	+	+	.	.	1	2	+	2	.	.	.	+	+	+	+	.	.	.	.
Cirsium erisithales (Jacq.) Scop.	.	.	.	.	.	.	.	1	+	1	1	.	1	.	+	.	1	1	.	.	.	.
Pyrola minor L.	.	+	.	.	.	.	.	.	.	1	.	2	.	.	.	2	.	1	+	.	.	.
Carex pilosa Scop.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	+	2	.	.	.	.
Hieracium bifidum Kit. ex Hornem.	.	.	.	.	.	1	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.
Prenantho-fagetum sylvaticae vaccinietosum myrtilli																						
Vaccinium myrtillus L.	2	2	2	4	3	4	4	2	1	2	1	3	2	3	2	4	2	3	5	4	4	4
Campanula micrantha Bertol.	1	+	.	1	+	+	1	.	.	+	.	.	.	.	.	.	.	.	.	1	1	1
Melampyrum italicum Soó	.	.	.	1	+	+	3	.	.	.	.	.	.	.	+	2	.	.	1	2	3	3
Pyrola rotundifolia L.	.	.	.	+	1	+	1	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.
Blechnum spicant (L.) Roth	.	.	.	.	2	+	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.
relict. variant with Abies alba																						
Abies alba Mill.	.	.	.	.	.	.	.	+	.	.	.	.	.	4	3	3	3	2	1	.	+	.
variant with Erica arborea																						
Erica arborea L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	2	3
Veronico-Fagenion																						
Rosa pendulina L.	2	1	.	.	2	2	2	2	+	.	3	.	1	1	2	2	.	1	2	2	1	2
Solidago virgaurea L. subsp. virgaurea	2	2	+	.	1	1	1	+	1	+	1	.	+	.	.	1	.	1	.	+	2	1
Festuca heterophylla Lam.	1	2	1	.	+	1	1	.	.	1	.	2	1	1	.	1	.	1	2	1	+	2
Orthilia secunda (L.) House	.	.	+	1	+	2	1	.	.	+	.	.	.	.	1	2	1	1	+	.	+	.
Luzula sylvatica (Huds.) Gaudin subsp. sylvatica	.	1	.	.	.	.	.	.	.	1	.	.	.	2	1	2	.	+	2	2	2	2
Daphne mezereum L.	.	+	1	.	.	.	.	+	.	+	.	1	.	1	1	+	.	.	.	.	.	.
Oxalis acetosella L.	.	.	+	+	1	+	.	.	.	.	.	.	.	.	.	.	2	1	.	.	.	.
Dactylorhiza maculata (L.) Soó subsp. fuchsii (Druce) Hyl.	.	.	.	+	+	.	.	+	+	.	.	1	.	.	.	.	.	.	.	.	.	.
Pulmonaria picta Rouy	.	+	.	.	.	.	.	+	+	.	.	+	.	.	+	.	.	.	.	.	.	.
Hieracium racemosum Waldst. & Kit. ex Willd.	.	.	.	1	1	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Phytosociological tab. 3 - *Prenantho purpureae-Fagetum sylvaticae vaccinietosum myrtilli* subass. nov.

relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
altitude dam a.s.l.	159	163	170	181	178	177	172	150	165	156	162	147	146	140	140	139	135	148	138	134	135	135
exposure	se	w	nnw	n	ne	nw	n	n	n	wnw	nw	ene	ene	wnw	w	nw	se	se	nw	w	nw	w
slope°	20	45	30	35	30	25	30	20	35	25	20	30	5	20	10	15	20	25	15	20	20	35
area m²	250	300	400	340	350	400	350	390	450	240	260	340	440	350	330	340	400	450	270	300	320	350
Cytisus hirsutus L.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	2
Calamagrostis arundinacea (L.) Roth.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	2
Deschampsia flexuosa (L.) Trin.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	1
Veronica officinalis L.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lathyrus linifolius (Reichard) Bässler	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Fragaria vesca L. subsp. vesca	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Aremonio-Fagion																						
Aremonia agrimonoides (L.) DC.	+	1	.	.	.	+	.	+	1	1	.	2	.	+	+	+	1	1	2	.	.	.
Saxifraga rotundifolia L. subsp. rotundifolia	+	2	+	+	1	.	.	1	.	.	.	.	1	+	.	.	1	.	.	.	.	.
Valeriana tripteris L. subsp. tripteris	.	.	.	.	.	.	.	1	.	.	.	.	.	.	2	+	.	.	.	.	.	.
Cardamine enneaphyllos (L.) Crantz	.	.	.	.	+	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cardamine kitaibelii Bech.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Fagetalia sylvaticae																						
Fagus sylvatica L.	4	5	5	5	5	5	5	5	5	4	5	4	5	3	5	5	5	5	5	5	5	4
Sorbus aucuparia L.	.	2	1	+	1	1	1	2	1	1	2	1	.	.	1	1	.	.	1	1	2	2
Viola reichenbachiana Jord. ex Boreau	+	1	+	+	1	.	.	.	+	1	.	.	+	1	1	1	1	1	2	.	.	.
Polystichum aculeatum (L.) Roth	1	.	.	+	.	+	.	2	+	.	1	.	+	1	+	+	1	+	.	.	.	.
Geranium nodosum L.	.	2	1	.	+	.	.	.	.	2	1	2	1	2	2	2	.	.	1	.	.	.
Lathyrus vernus (L.) Bernh.	.	+	+	.	.	.	.	+	+	2	1	.	1	+	1	.	.	+	.	.	.	.
Galium odoratum (L.) Scop.	2	1	+	.	.	.	.	2	1	.	+	.	.	1	.	+	1	.	.	.	.	.
Poa nemoralis L. subsp. nemoralis	.	2	+	+	.	.	.	.	1	.	.	1	+	.	.	+	+	.	.	.	.	.
Euphorbia amygdaloides L.	.	1	.	.	.	.	.	+	+	.	.	.	.	.	1	1	.	+	.	.	.	.
Festuca altissima All.	2	.	.	.	+	.	+	.	.	.	1	.	.	.	.	.	.	+	.	.	.	.
Sanicula europaea L.	.	.	.	.	1	.	.	.	.	.	.	.	.	+	1	1	+	.	.	.	.	.
Galium rotundifolium L. subsp. rotundifolium	1	.	.	.	.	.	.	.	.	.	.	.	.	2	+	.	+	.	.	.	.	.
Neottia nidus-avis (L.) Rich.	.	.	+	.	.	.	+	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.
Lilium martagon L.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	+	.	.	.	.	.	.	.
Ilex aquifolium L.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	.	.	.	.	.	+	.
Milium effusum L.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	+	.	.	.	.	.

Phytosociological tab. 3 - *Prenantho purpureae-Fagetum sylvaticae vaccinietosum myrtilli* subass. nov.

relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
altitude dam a.s.l.	159	163	170	181	178	177	172	150	165	156	162	147	146	140	140	139	135	148	138	134	135	135
exposure	se	w	nnw	n	ne	nw	n	n	n	wnw	nw	ene	ene	wnw	w	nw	se	se	nw	w	nw	w
slope°	20	45	30	35	30	25	30	20	35	25	20	30	5	20	10	15	20	25	15	20	20	35
area m²	250	300	400	340	350	400	350	390	450	240	260	340	440	350	330	340	400	450	270	300	320	350
Polystichum lonchitis (L.) Roth	2	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Veronica montana L.	.	+	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Monotropa hypopitys L.	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Cardamine bulbifera (L.) Crantz	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Polygonatum verticillatum (L.) All.	.	.	.	.	.	.	.	+	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Taxus baccata L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	+
Campanula latifolia L.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Stellaria nemorum L.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Senecio ovatus (P. Gaertn., B. Mey. & Scherb.) Willd.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Acer pseudoplatanus L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.
Quercetalia pubescenti-petraeae & Querco-Fagetea																						
Hieracium murorum L.	1	2	3	2	2	1	.	+	1	3	1	.	2	1	2	1	1	2	2	1	1	2
Rubus hirtus Waldst. & Kit.	1	1	.	.	.	.	.	+	+	.	+	2	.	2	1	1	1	2	1	.	.	.
Hepatica nobilis Schreb.	.	1	+	.	.	.	.	.	.	.	1	+	1	1	1	.	.	.	.	.	.	.
Ajuga reptans L.	.	+	+	.	.	.	.	.	+	.	.	2	+	.	.	+	.	.	.	.	.	.
Melica uniflora Retz.	.	.	.	.	.	+	.	+	.	.	+	.	.	.	.	1	+	.	1	.	.	.
Sorbus aria (L.) Crantz	.	+	.	.	.	.	.	.	.	.	+	.	.	1	2	.	.	.	1	.	.	+
Daphne laureola L.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	1	.	+	1	.	.	.
Dryopteris filix-mas (L.) Schott	1	.	+	.	.	.	.	1	.	.	.	+	.	.	.	.	1	.	.	.	.	.
Primula vulgaris Huds. subsp. vulgaris	.	1	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.
Brachypodium sylvaticum (Huds.) P. Beauv.	.	.	.	.	.	1	+	.	.	.	.	.	.	.	1	.	.	.	2	.	.	.
Lactuca muralis (L.) Gaertn.	+	.	.	.	.	.	.	.	+	.	.	+	.	.	+	.	.	.	.	.	.	.
Ranunculus lanuginosus L.	.	.	.	+	1	.	.	+	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Carex sylvatica Huds.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	+
Hieracium racemosum W. & K. ex Willd. ssp. virgaurea (Coss.) Z.	.	.	1	.	.	.	.	.	.	.	.	.	.	1	1	+	.	.	.	.	.	.
Potentilla micrantha Ramond ex DC.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	1	.	.	.
Carex digitata L.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	+	.	.
Campanula persicifolia L.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	.	.	.	.	.	.	.
Laburnum anagyroides Medik.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.

Phytosociological tab. 3 - *Prenantho purpureae-Fagetum sylvaticae vaccinietosum myrtilli* subass. nov.

relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
altitude dam a.s.l.	159	163	170	181	178	177	172	150	165	156	162	147	146	140	140	139	135	148	138	134	135	135
exposure	se	w	nnw	n	ne	nw	n	n	n	wnw	nw	ene	ene	wnw	w	nw	se	se	nw	w	nw	w
slope°	20	45	30	35	30	25	30	20	35	25	20	30	5	20	10	15	20	25	15	20	20	35
area m²	250	300	400	340	350	400	350	390	450	240	260	340	440	350	330	340	400	450	270	300	320	350
Chaerophyllum temulum L.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cruciata glabra (L.) Ehrend.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Laserpitium latifolium L.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Asperula laevigata L.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Digitalis lutea L. subsp. australis (Ten.) Arcang.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Populus tremula L.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Salix caprea L.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	.
Acer opalus Mill. subsp. obtusatum (Waldst. & Kit. ex Willd.) Gams	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.	.
Ostrya carpinifolia Scop.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.
Knautia drymeia Heuff. subsp. centrifrons (Borbàs) Ehrend.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.
Peucedanum oreoselinum (L.) Moench	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.
Epipactis helleborine (L.) Crantz	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.
Genista tinctoria L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
other species																						
Athyrium filix-femina (L.) Roth	.	.	1	.	1	.	.	1	+	.	1	.	.	.	.	.	1	.	.	.	.	.
Rubus idaeus L.	+	+	+	.	.	.	.	.	+	.	.	2	.	.	.	.	.	.	.	.	.	.
Juniperus communis L. subsp. communis	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	1	.	.	+
Epilobium montanum L.	.	.	+	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Ruscus hypoglossum L.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	+	.	.	.	.
Equisetum hyemale L.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	1	.	.	.	.
Sesleria italica (Pamp.) Ujhelyi	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	+	.	.	.
Thesium bavarum Schrank	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	1
Polypodium vulgare L.	1	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.
Dactylis glomerata L.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bellis sylvestris Cirillo	.	.	.	1	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Brachypodium genuense (DC.) Roem. & Schult.	.	.	.	1	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Dryopteris affinis (Lowe) Fr.-Jenk. ssp. borrerii (Newman) Fr.-Jenk	.	.	.	.	.	.	.	1	.	.	.	.	.	.	1	.	.	.	.	.	.	.
species per relevé	24	37	30	21	29	24	16	43	31	19	23	31	19	29	39	37	25	30	25	18	20	23

spicant (Fig. 12a), *Pyrola rotundifolia*, *Pyrola media* and *Calamagrostis arundinacea* (L.) Roth. In the vicinity of Colle dell'Abete (Valle della Corte, Marches region) and in some limited areas of Bosco della Martese (Abruzzo region) a highly unusual aspect of *Prenantho-Fagetum vaccinietosum* was identified. This consisted of a plant community type which is probably unique in Peninsular Italy, where species such as *Fagus sylvatica, Abies alba, Vaccinium myrtillus* and *Erica arborea* L. grow together at altitudes around 1.400 m.

Among all the woodland communities occurring in the whole of the central Apennines, *Prenantho-Fagetum vaccinietosum* is the one whose previous history appears most readily identifiable as having been closely connected with boreal coniferous woods. According to various paleobotanical studies (Chiarugi, 1936a; 1936b; Marchetti, 1936; Paganelli, 1982; Marchesoni 1959, Follieri et al., 1998; Di Rita and Magri, 2004) in some periods of the upper Pleistocene and especially during the last pleniglacial interstadials (about 20.000 years ago) these "ancient" woodlands, which were probably dominated by *Pinus, Abies* and *Picea* with a woody undergrowth composed of *Juniperus* and *Vaccinium sp.pl.*), played the role of potential vegetation types at the end of the arboreal vertical zonation.

Fig. 11 - Typical features of *Prenantho-Fagetum athyrietosum* within the gullies with abundance of ferns in the herb layer

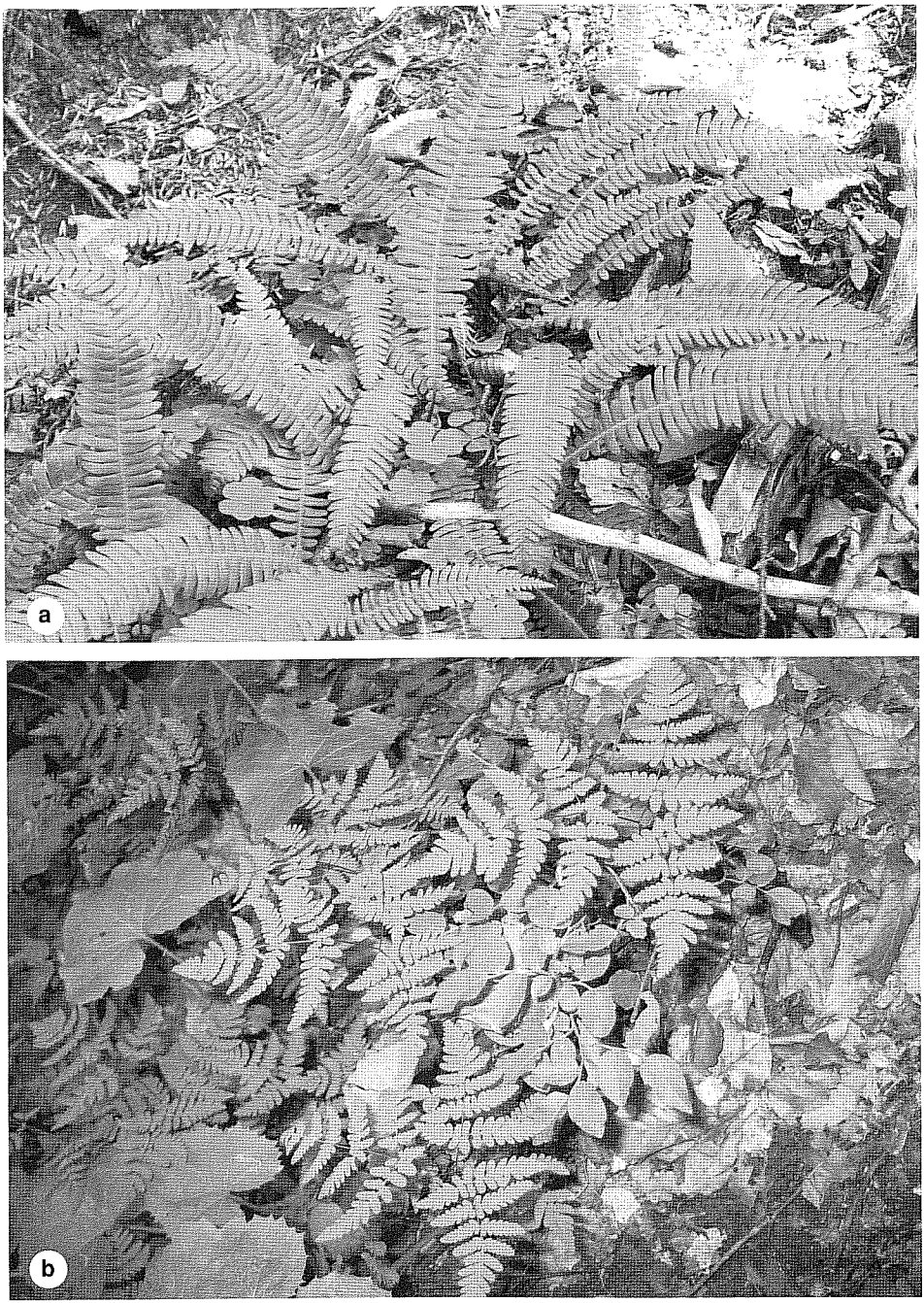

Fig. 12 - The presence of *Blechnum spicant* (a), and *Gymnocarpium dryopteris* (b) testify respectively the acidophilous and microthermic character of the upper montane belt Laga mountains beechwood

Prenantho purpureae-Fagetum sylvaticae athyrietosum filicis-foeminae **subass. nova hoc loco**
(HOLOTYPUS PHYTOSOCIOLOGICAL TAB. 4 REL. 16)

Prenantho-Fagetum athyrietosum is mainly composed of high-altitude woods distributed within gullies or depressions occurring on slopes in the vicinity of water drainage lines. Owing to the frequent lack of both dominated tree layer and shrub layer, these woodlands often exhibit a poorly diversified structural stratification. The canopy is often very dense and consequently conditions of diffused and subdued lighting are very common at ground level. This factor, together with the high hydric capacity of the soils, leads to the development of a herb layer characterised floristically by the marked presence of ferns and megaforbs (especially *Adenostyles glabra*) (Fig. 11). For this fern-rich type of microthermic beechwood the new subassociation, *Prenantho-Fagetum athyrietosum filicis-foeminae* is proposed, whose differential species are identified as *Athyrium filix-foemina, Dryopteris filix-mas* and *Polystichum aculeatum*, with the addition of *Gymnocarpium dryopteris* (Fig. 12b), for those beechwood stands occurring at altitudes exceeding 1.600 m, and (sporadically) of *Dryopteris affinis* (Lowe) Fraser-Jenk subsp. *borrerii* (Newman) Fraser-Jenk. A floristic comparison with both *Prenantho-Fagetum typicum* and *Prenantho-Fagetum vaccinietosum myrtilli* shows that *Prenantho-Fagetum athyrietosum* exhibits a lower average number of species per relevé, and consistently lower values for the degree of cover of the herb layer.

Life forms and chorological analysis

Observing the life forms spectrum, various structural differences distinguishing *Dactylorhizo-Fagetum* from *Prenantho-Fagetum* and the various subassociations of this latter from each other can be recognised (Tab. II; Fig. 13). As regards the phanerophytes, *Dactylorhizo-Fagetum* exhibits percentages which are both qualitatively and quantitatively higher than those of *Prenantho-Fagetum*. This is due to the fact that *Dactylorhizo-Fagetum* occur at significantly lower altitudes than *Prenantho-Fagetum* and this enables several tree and scrub species which normally belong to the submontane mixed oak woods to find acceptable conditions in the termophilous beechwoods, too. Among the three subassociations of *Prenantho-Fagetum*, subass. *vaccinietosum* exhibits the highest incidence of the phanerophytic component, while subass. *athyrietosum* exhibits the lowest incidence. The subass. *athyrietosum*, in fact, experiences environmental conditions of deeper soils and high water availability, which give the beech an advantage over the other (few) woody species of the upper montane belt, resulting in a somewhat monophytic woodland physiognomy. *Prenantho-Fagetum vaccinietosum* and *Prenantho-Fagetum athyrietosum* are also structurally different as regards the undergrowth (Fig. 13), where the main

Tab. II - Life forms spectrum and chorological spectrum of the Laga mountais beech woodlands

a	Dactylorizo-Fag.			Pren.-Fag. imp.			Pren.-Fag. typ.			Pren.-Fag. vacc.			Pren.-Fag. athyr		
Chorotypes	n	f	c	n	f	c	n	f	c	n	f	c	n	f	c
Boreal	16	15,6	7,7	18,7	19,5	9,5	24,8	21,7	13,5	21	25,7	21,4	23,1	25	16,4
Cosmop	3,8	3,5	2,5	2,8	2,6	1,1	1,3	1,3	0,8	2,5	0,8	0,1	2,5	2	0,8
Endem	2,8	1	0,2	1,9	1	0,3	3,8	2,5	0,7	5,9	3,8	1,8	0,8	0,1	0,07
Euras	24,5	21,7	15,7	26,2	24,6	15,8	24,8	23	13,9	24,4	17,6	6,1	31,4	23,3	13,4
Medit	4,7	6,7	4,6	5,6	4,2	1,5	5,7	2,5	0,4	3,4	1,7	0,3	1,7	0,6	0,1
Europ	9,4	8,4	35,2	9,3	12,1	53,3	7	12,4	46,1	9,2	12,4	40,6	9,1	13,8	40,7
Eu-Cauc	18,9	19,5	9,7	17,8	19,2	9,5	14,6	19,8	10,8	13,4	17,4	12,6	14,9	17,4	10,3
Oroph	5,5	8,1	10	8,4	6,5	6	10,2	10,2	9,2	10,1	11,8	10,2	10,7	12,2	15,6
SE-Eur	9,4	10,9	12,3	5,6	6,2	2,2	5:01	5,1	3,9	5,9	6,2	5,4	2,5	4,9	2,7
Subatl	2,8	3,7	2,2	3,7	2,3	0,7	2,5	1,7	0,7	4,2	2,6	1,5	3,3	0,6	0,1
b	Dactylorizo-Fag.			Pren.-Fag. imp.			Pren.-Fag. typ.			Pren.-Fag. vacc.			Pren.-Fag. athyr		
Life forms	n	f	c	n	f	c	n	f	c	n	f	c	n	f	c
CH	3,8	3,7	0,8	4,4	4,1	0,9	2,7	3,7	1,3	5,5	8,1	15,3	4,3	1,8	0,8
G	27,1	21,5	18,7	23,7	24,3	13,7	22,7	21,3	15,7	20,5	16,8	5,6	26,7	31,6	24,4
H	41,4	42,6	21,1	47,4	45,4	21,0	54,0	56,7	34,4	57,5	53,5	32,2	52,6	50,8	32,3
NP	12,8	14,7	12,5	11,4	10,7	11,3	11,3	10,0	7,4	8,7	11,2	8,2	6,9	6,6	5,4
Pscap	12,8	16,0	46,5	10,5	12,9	52,9	6,0	7,0	40,8	6,3	8,9	36,1	6,0	7,3	36,3
T	2,3	1,5	0,4	2,6	2,5	0,3	3,3	1,3	0,3	1,6	1,5	2,7	3,4	2,0	0,8

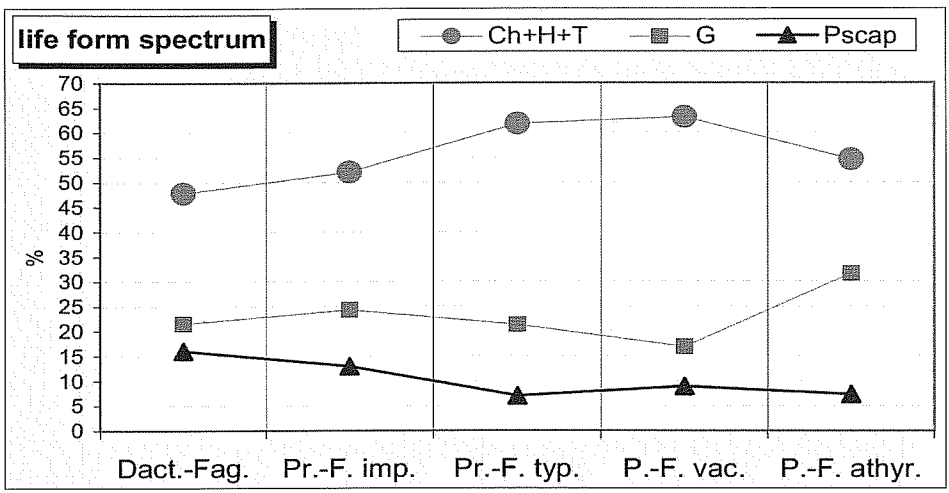

Fig. 13 - Relation between the phanerophytic component, geophytic component and the sum of chamaephytic, hemicryprophytic and therophytic components in the different aspects of Laga mountain beech woodlands identified

discriminant factor is probably the available light radiation. In fact, in subass. *vaccinietosum* there are higher values for the chamaephytic and hemicryptophytic components (which are often composed of slightly heliophilous species), whereas in subass. *athyrietosum* it is the geophytic component which prevails.

Phytosociological tab. 4 - *Prenantho purpureae-Fagetum sylvaticae athyrietosum filicis-foeminae* subass. nov.

relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
altitude dam a.s.l.	144	158	160	183	168	159	155	156	156	160	165	168	173	177	151	149	149	175	162	169	155	158	152	153	154	151
exposure	wnw	n	nw	n	ne	nw	ne	wnw	n	nw	nw	n	n	n	n	ne	nne	ne	nne	n	nw	nw	n	nw	n	se
slope°	40	15	10	40	25	20	20	40	25	30	20	15	25	20	10	35	30	20	10	30	25	20	15	5	10	15
area m²	380	450	500	300	400	490	450	380	500	360	600	400	500	450	450	380	560	450	480	360	420	450	500	480	560	450
Prenantho purpureae-Fagetum																T.										
Veronica urticifolia Jacq.	2	+	3	1	1	1	.	1	.	+	.	2	.	.	1	2	2	.	1	1	3	2	1	2	1	2
Prenanthes purpurea L.	.	.	1	1	2	1	1	.	.	.	+	.	.	.	2	2	1	+	1	2	1	2	1	2	1	1
Adenostyles glabra (Mill.) DC. subsp. glabra	.	2	2	3	2	2	1	2	3	4	4	4	3	3	2	2	2	2	2	2	1	2	2	1	1	1
Cirsium erisithales (Jacq.) Scop.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	.	.	.	1	+	.	+	+	.	.
Carex pilosa Scop.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	+	3	.	.	.	.	1	.	.	.	3
Pyrola minor L.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	+	.	1	.
Hieracium bifidum Kit. ex Hornem.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.
Prenantho purpureae-Fagetum athyrietosum filicis-foeminae																										
Athyrium filix-femina (L.) Roth	2	3	2	1	2	+	+	2	2	2	2	2	2	+	1	1	1	3	3	+	2	2	2	2	2	2
Dryopteris filix-mas (L.) Schott	2	+	2	1	.	2	1	2	3	3	2	2	+	.	2	2	3	2	2	.	.	2	1	2	2	+
Polystichum aculeatum (L.) Roth	2	2	.	+	1	2	1	2	1	2	1	1	2	1	2	1	2	.	.	1	1	1	2	2	2	2
Gymnocarpium dryopteris (L.) Newman	.	1	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	.	.
Dryopteris affinis (Lowe) Fr.-J. ssp. borrerii (Newman) Fr.-J.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.
relict. variant with Abies alba																										
Abies alba Mill.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	1	1
Veronico urticifoliae-Fagenion																										
Oxalis acetosella L.	1	.	1	.	2	.	.	.	1	1	+	.	+	1	.	+	+	2	1	.	.	.	+	1	2	.
Pulmonaria picta Rouy	+	.	.	.	+	.	+	+	+	.	.	.	.	.	.	+	.	.	.	.	+	.	.	+	+	1
Solidago virgaurea L. subsp. virgaurea	+	.	.	.	.	1	+	.	.	.	.	.	.	.	.	1	.	.	.	.	1	1	.	+	+	1
Daphne mezereum L.	.	.	.	.	.	.	+	.	.	+	.	+	.	.	.	.	.	.	.	+	.	.	+	+	+	1
Rosa pendulina L.	.	.	.	.	.	.	1	.	.	1	.	.	.	.	.	+	.	.	.	.	1	.	+	+	.	.
Dactylorhiza maculata (L.) Soó subsp. fuchsii (Druce) Hyl.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.
Hieracium racemosum Waldst. & Kit. ex Willd.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Festuca heterophylla Lam.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Polygonatum verticillatum (L.) All.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.
Lathyrus linifolius (Reichard) Bässler	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.

Phytosociological tab. 4 - *Prenantho purpureae-Fagetum sylvaticae athyrietosum filicis-foeminae* subass. nov.

relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
altitude dam a.s.l.	144	158	160	183	168	159	155	156	156	160	165	168	173	177	151	149	149	175	162	169	155	158	152	153	154	151
exposure	wnw	n	nw	n	ne	nw	ne	wnw	n	nw	nw	n	n	n	n	ne	nne	ne	nne	n	nw	nw	n	nw	n	se
slope°	40	15	10	40	25	20	20	40	25	30	20	15	25	20	10	35	30	20	10	30	25	20	15	5	10	15
area m²	380	450	500	300	400	490	450	380	500	360	600	400	500	450	450	380	560	450	480	360	420	450	500	480	560	450
Orthilia secunda (L.) House	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
Vaccinium myrtillus L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	2	.	.
Blechnum spicant (L.) Roth	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.
Deschampsia flexuosa (L.) Trin.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Veronica officinalis L.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Aremonio-Fagion																										
Aremonia agrimonoides (L.) DC.	+	.	.	+	1	2	3	1	1	1	1	1	1	.	1	+	+	.	.	.	1	.	+	+	1	2
Saxifraga rotundifolia L. subsp. rotundifolia	1	+	+	.	.	+	.	.	.	.	1	1	.	.	+	1	1	.	.	.	1	.	+	1	+	.
Cardamine enneaphyllos (L.) Crantz	+	.	.	.	.	.	.	.	.	1	1	.	.	.	1	1	2	2	.	.	.	.	2	.	2	.
Euonymus latifolius (L.) Mill.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	2	+	.	.	.	.	.	.	.	.	.
Valeriana tripteris L. subsp. tripteris	.	1	.	.	.	1	.	.	.	.	.	1	.	+	.	+	.	.	.	.	.	.	.	.	.	.
Cardamine kitaibelii Bech.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1	.
Fagetalia sylvaticae																										
Fagus sylvatica L.	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Viola reichenbachiana Jord. ex Boreau	2	+	.	2	.	1	2	1	.	1	.	.	+	2	1	2	2	+	.	.	1	.	+	+	+	2
Geranium nodosum L.	.	2	1	1	2	2	3	2	3	2	3	2	2	1	.	3	2	.	.	.	3	2	.	.	.	.
Galium odoratum (L.) Scop.	2	.	1	.	2	2	.	3	3	2	3	.	.	.	3	2	2	.	.	.	+	.	1	2	2	1
Sanicula europaea L.	.	+	.	2	1	1	2	.	1	1	.	1	.	.	1	2	1	.	.	.	1	.	+	+	+	.
Lathyrus vernus (L.) Bernh.	.	.	.	.	.	1	+	+	.	1	.	1	.	.	1	2	1	.	.	1	1	1	+	1	.	.
Cardamine bulbifera (L.) Crantz	1	.	.	.	.	.	+	+	+	+	.	.	.	+	.	.	.	1	1	.	.	.	+	+	+	.
Paris quadrifolia L.	.	.	.	.	+	+	.	.	1	+	+	1	.	.	2	+	1	.	.	.	.	.	.	1	+	.
Sorbus aucuparia L.	.	.	.	.	.	2	1	+	.	+	+	.	.	.	+	+	.	.	.	1	.	.	.	1	.	+
Actaea spicata L.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	1	1	.	.	1	+	.	+	.	1	.
Milium effusum L.	.	+	.	.	.	.	.	.	1	.	.	.	.	.	.	.	1	.	.	.	.	.	+	+	+	1
Poa nemoralis L. subsp. nemoralis	+	.	.	.	+	.	+	1	.	.	+	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.
Veronica montana L.	.	1	.	.	+	+	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.
Euphorbia amygdaloides L.	+	.	.	.	.	.	2	+	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	1
Neottia nidus-avis (L.) Rich.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	+	+	.	.	.	+	.	.	+	.	.	.

Phytosociological tab. 4 - *Prenantho purpureae-Fagetum sylvaticae athyrietosum filicis-foeminae* subass. nov.

relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
altitude dam a.s.l.	144	158	160	183	168	159	155	156	156	160	165	168	173	177	151	149	149	175	162	169	155	158	152	153	154	151
exposure	wnw	n	nw	n	ne	nw	ne	wnw	n	nw	nw	n	n	n	n	ne	nne	ne	nne	n	nw	nw	n	nw	n	se
slope°	40	15	10	40	25	20	20	40	25	30	20	15	25	20	10	35	30	20	10	30	25	20	15	5	10	15
area m²	380	450	500	300	400	490	450	380	500	360	600	400	500	450	450	380	560	450	480	360	420	450	500	480	560	450
Stellaria nemorum L.	.	3	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+	.
Polystichum lonchitis (L.) Roth	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	1	.	+	.	.	.
Senecio ovatus (P. Gaertn., B. Mey. & Scherb.) Willd.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	.	+
Acer pseudoplatanus L.	.	.	.	.	.	2	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.
Taxus baccata L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	3	2	.	.	.	.	.	.	.	.	.
Lilium martagon L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	.	.	1	.	.	.	.	.	.
Stellaria holostea L. subsp. holostea	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.
Scrophularia scopolii Hoppe ex Pers.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Epipactis baumanniorum Soldano & F. Conti	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.
Salvia glutinosa L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	1
Moehringia trinervia (L.) Clairv.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Epipactis muelleri Godfery	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Acer platanoides L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.
Cephalanthera rubra (L.) Rich.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Festuca altissima All.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.
Euphorbia dulcis L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.
Impatiens noli-tangere L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.
Quercetalia pubescenti-petraeae & Querco-Fagetea																										
Rubus hirtus Waldst. & Kit.	+	2	2	.	2	.	2	2	3	3	3	2	.	.	2	2	2	.	.	+	+	+	1	1	2	2
Hieracium murorum L.	.	.	1	1	1	1	+	1	.	.	.	.	.	.	.	.	.	.	.	1	3	2	.	+	+	.
Ajuga reptans L.	+	+	+	1	.	.	.	.	.	.	1	1	.	+	+	.	+	.	.	+	.	.	.	.	.	.
Geranium robertianum L.	+	2	.	.	.	.	.	2	1	1	1	.	.	.	.	.	+	.	.	.	.	.	+	.	1	+
Lactuca muralis (L.) Gaertn.	1	.	.	+	+	+	+	.	.	1	.	+	.	+	.	.	1	.	.	.	+	.	.	.	.	.
Ranunculus lanuginosus L.	.	.	.	+	.	.	.	.	.	1	1	+	1	.	.	+	.	+	.	.	.	.	+	.	+	.
Epipactis helleborine (L.) Crantz	+	.	.	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	+	.
Melica uniflora Retz.	.	.	.	.	.	+	.	1	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.
Primula vulgaris Huds. subsp. vulgaris	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+

Phytosociological tab. 4 - *Prenantho purpureae-Fagetum sylvaticae athyrietosum filicis-foeminae* subass. nov.

relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
altitude dam a.s.l.	144	158	160	183	168	159	155	156	156	160	165	168	173	177	151	149	149	175	162	169	155	158	152	153	154	151
exposure	wnw	n	nw	n	ne	nw	ne	wnw	n	nw	nw	n	n	n	n	ne	nne	ne	nne	n	nw	nw	n	nw	n	se
slope°	40	15	10	40	25	20	20	40	25	30	20	15	25	20	10	35	30	20	10	30	25	20	15	5	10	15
area m²	380	450	500	300	400	490	450	380	500	360	600	400	500	450	450	380	560	450	480	360	420	450	500	480	560	450
Potentilla micrantha Ramond ex DC.	+	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Carex sylvatica Huds.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	+	.
Sorbus aria (L.) Crantz	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.
Hepatica nobilis Schreb.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	1	.	.	.	.	.
Hieracium grovesianum A.-T. ex Belli	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	+	.
Geum urbanum L.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Chaerophyllum remulum L.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cruciata glabra (L.) Ehrend.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rosa arvensis Huds.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Salix caprea L.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Populus tremula L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.
Campanula trachelium L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Brachypodium sylvaticum (Huds.) P. Beauv.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Campanula persicifolia L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.
Carex digitata L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
Anthriscus sylvestris (L.) Hoffm.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Lilium bulbiferum L. subsp. croceum (Chaix) Jan	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.
other species																										
Epilobium montanum L.	1	+	.	.	.	.	+	+	.	+	2	1	.	+	.	+	+	.	.	.	.	.	+	+	.	.
Aegopodium podagraria L.	.	.	.	.	.	+	+	+	.	1	+	.	.	.	1	.	+	.	.	2	+	+	.	.	.	1
Polypodium vulgare L.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	+	.	.	.	.	.
Heracleum sphondylium L. subsp. sibiricum (L.) Simonk.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1	.	.	.	2	.	.	+	.	.	.
Rumex acetosa L. subsp. acetosa	.	.	1	+	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Equisetum hyemale L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	+	.	.
Rubus idaeus L.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	+	.	.	.
Chaerophyllum hirsutum L. subsp. hirsutum	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.	.	.
Silene nutans L.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
species per relevé	15	12	14	11	13	17	14	15	14	21	15	16	7	6	20	24	22	7	8	14	19	12	15	18	19	19

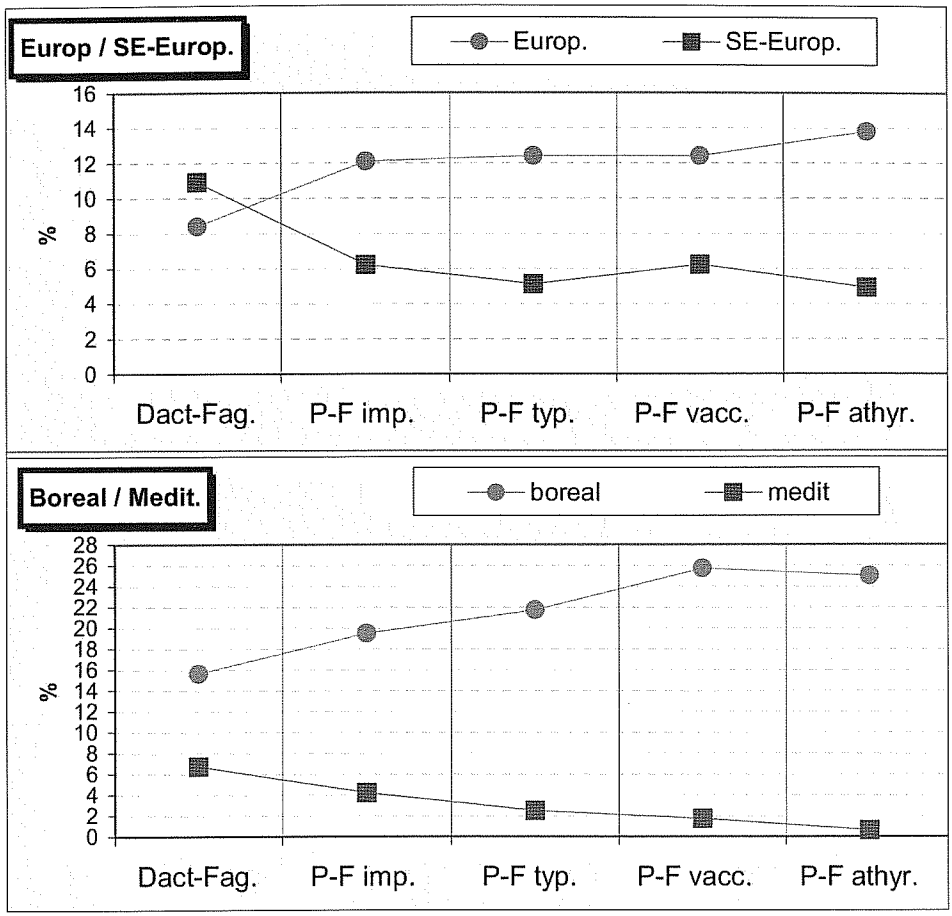

Fig. 14 - Incidence of the most diagnostic chorotypes in the different aspects of Laga mountain beech woodlands

As far as chorology is concerned (Tab. II; Fig. 14), the Boreal and European components increase significantly passing from *Dactylorhizo-Fagetum* to *Prenantho-Fagetum*, and, in this latter, following the sequence of subassociations *typicum-vaccinietosum-athyrietosum*. The opposite is the case, however, when chorological components normally associated with termophilous woodlands such as the SE-European and the Mediterranean are considered. It is interesting to note that in *Dactylorhizo-Fagetum* the SE-European species outweigh the Europeans both in terms of number of species and in terms of their frequency (Tab. II; Fig. 14). The sporadic occurrence of the endemic component is in accordance with the most recent studies on Apennine woodlands and on the Laga in particular (Blasi et al., 2004; Di Pietro and Tondi, 2005). The only Italian endemic species having nemoral attitudes to have been found in the

study area are *Digitalis lutea* subsp. *australis, Melampyrum italicum, Hieracium grovesianum* and *Helleborus bocconei* Ten., whereas the other endemic species found, *Brachypodium genuense* (DC.) Roem. & Schult., *Festuca dimorpha* Guss., *Sesleria italica* (Pamp.) Ujhelyi, *Hieracium tomentosum* (L.) L., and *Campanula micrantha*, behave as ingressive species from the sourrounding grasslands, edges and cliffs. Finally, the cosmopolitan component is also very scarce, and is never associated with ruderal or sinanthropic species, but, instead, to just a few wide-range ferns, like *Pteridium aquilinum, Cystopteris fragilis* (L.) Bernh., *Asplenium trichomanes, Dryopteris affinis* subsp. *borrerii*.

Syntaxonomical discussion

Historical background

The decision to propose a yet another new association for the Laga mountains beech woods was not an easy one. A long series of syntaxonomical and nomenclatural problems have surrounded the analyses of the phytosociological studies published so far concerning, either directly or indirectly, beech woods of the Laga mountains. Unravelling the phytosociological "tangle" therefore called for a painstaking analysis of all the previously published phytosociological literature, paying particular attention to the original diagnoses, to the syn-distribution areas, to the floristic and coenological characteristics of the tables and to the presence of eventual type-relevés.

The first, and without doubt the most important, study on the syntaxonomy of Laga mountain beech woods was the already cited one by Longhitano and Ronsisvalle (1974) who, on the basis of a matrix of 66 relevés x 170 species, identified four forest types, three of which applied to beech woods. Among these types the authors identified *Aquifolio-Fagetum* for the termophilous beechwoods and a not better-defined *Abieti-Fagetum* for the microthermic inner beech woods. Furthermore they gathered together the relevés of uncertain assignment in a separate table entitled "aspetti vari" within which they identified three different facies, with *Luzula sieberi*, with *Vaccinium myrtillus* and with *Ranunculus lanuginosus*.

Montacchini (1972) proposed the new association *Veronico urticifoliae-Fagetum* for the acidophilous beechwoods of Val di Susa (Piedmont Region).

Feoli and Lagonegro (1982), on the basis of the relevés published in Longhitano and Ronsisvalle, identified for the Laga mountains three different beech wood aspects, a main one which they assigned to *Veronico urticifoliae-Fagetum* Montacchini 1972, a secondary one assigned to *Polysticho-Fagetum* Feoli & Lagonegro 1982 and a third, extremely marginal, one which they assigned to *Trochiscantho-Fagetum* Gentile 1974. At more or less the same

Phytosociological tab. 5 - *Fagus* woodlands (impoverished and intermediate aspects)

altitude dam a.s.l.	150	161	133	137	128	130	132	139	145	157	166	154	169	145	130
exposure	e	ene	e	ene	e	ese	wnw	nw	nw	wnw	.	se	e	nw	w
slope°	30	25	15	10	30	25	30	40	15	10	.	40	20	5	20
area m²	280	310	400	415	290	300	490	430	440	350	500	250	340	410	400
relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
char. & diff. Prenantho-Fagetum + subass.															
Dryopteris filix-mas (L.) Schott	2	2	.	+	.	.	1	.	.	+	.	.	.	.	1
Adenostyles glabra (Mill.) DC. subsp. glabra	1	.	.	.	.	.	.	.	2	2	.	.	.	.	+
Carex pilosa Scop.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	2
Prenanthes purpurea L.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Hieracium bifidum Kit. ex Hornem.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.
Pyrola minor L.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Athyrium filix-femina (L.) Roth	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
Vaccinium myrtillus L.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.
char. & diff. Dactylorhizo-Fagetum															
Geranium nodosum L.	.	.	2	1	.	.	1	.	.	1	.	.	.	.	3
Acer pseudoplatanus L.	.	.	.	.	+	+	.	+	1	.	.	.	.	+	.
Pteridium aquilinum (L.) Kuhn	.	.	.	.	1	2	.	.	.	.	.	1	.	.	1
Primula vulgaris Huds. subsp. vulgaris	.	.	.	.	.	.	+	.	.	.	.	1	.	1	.
Hepatica nobilis Schreb.	.	.	.	.	.	.	2	1	.	.	.	.	.	2	.
Carex sylvatica Huds.	+	.	.	.	.	1	.	.	.	.	.	.	.	.	.
Cyclamen hederifolium Aiton subsp. hederifolium	.	.	.	.	.	+	.	.	.	.	.	.	.	.	3
Lilium bulbiferum L. subsp. croceum (Chaix) Jan	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.
Dactylorhiza maculata (L.) Soó subsp. fuchsii (Druce) Hyl.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+
Hedera helix L. subsp. helix	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Acer opalus Mill. subsp. obtusatum (Waldst. & Kit. ex Willd.) Gams	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.
char. & diff. Veronico-Fagenion															
Pulmonaria picta Rouy	+	.	.	.	1	+	+	.	.	.	.	.	1	+	.
Festuca heterophylla Lam.	.	.	1	.	.	.	.	2	.	.	.	2	.	.	+
Luzula sylvatica (Huds.) Gaudin subsp. sylvatica	.	.	.	.	+	.	.	3	2	+	.	.	.	.	.
Solidago virgaurea L. subsp. virgaurea	.	.	.	.	.	.	1	2	.	+	.	.	.	.	1

Phytosociological tab. 5 - *Fagus* woodlands (impoverished and intermediate aspects)

altitude dam a.s.l.	150	161	133	137	128	130	132	139	145	157	166	154	169	145	130
exposure	e	ene	e	ene	e	ese	wnw	nw	nw	wnw	.	se	e	nw	w
slope°	30	25	15	10	30	25	30	40	15	10	.	40	20	5	20
area m²	280	310	400	415	290	300	490	430	440	350	500	250	340	410	400
relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Veronica officinalis L.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	+
Oxalis acetosella L.	.	.	.	.	.	.	.	.	.	+	2	.	.	.	.
Cytisus hirsutus L.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.
Daphne mezereum L.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.
Orthilia secunda (L.) House	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
Erica arborea L.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.
Fragaria vesca L. subsp. vesca	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.
Aremonio-Fagion															
Aremonia agrimonoides (L.) DC.	1	1	.	.	1	.	2	1	1	1	.	1	.	1	.
Saxifraga rotundifolia L. subsp. rotundifolia	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+
Fagetalia sylvaticae															
Fagus sylvatica L.	5	5	5	5	5	5	4	5	4	5	5	5	5	5	5
Viola reichenbachiana Jord. ex Boreau	1	1	1	.	1	1	1	.	.	1	1	+	+	+	+
Polystichum aculeatum (L.) Roth	2	1	+	+	+	+	1	.	.	.	.	.	+	+	1
Euphorbia amygdaloides L.	+	+	.	.	+	.	1	1	1	1	.	.	.	+	+
Poa nemoralis L. subsp. nemoralis	+	.	2	.	+	.	+	1	1	2	.	1	.	.	.
Sanicula europaea L.	.	.	+	.	1	1	+	.	+	.	.	1	.	.	2
Galium odoratum (L.) Scop.	1	2	.	.	.	1	+	.	.	+	.	.	.	.	+
Actaea spicata L.	1	.	1	.	.	.	1	.	.	.	.	.	.	+	+
Sorbus aucuparia L.	.	.	.	.	+	.	1	.	2	1	+	.	.	.	.
Polygonatum multiflorum (L.) All.	.	.	.	.	.	.	1	+	1	.	.	.	.	.	1
Cardamine bulbifera (L.) Crantz	.	.	.	.	.	.	+	.	.	+	.	.	1	.	.
Lathyrus vernus (L.) Bernh.	.	.	1	.	.	.	.	.	.	.	.	.	.	1	.
Abies alba Mill.	.	.	.	.	2	+	.	.	.	.	.	.	.	.	.
Ilex aquifolium L.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.

Phytosociological tab. 5 - *Fagus* woodlands (impoverished and intermediate aspects)

altitude dam a.s.l.	150	161	133	137	128	130	132	139	145	157	166	154	169	145	130
exposure	e	ene	e	ene	e	ese	wnw	nw	nw	wnw	.	se	e	nw	w
slope°	30	25	15	10	30	25	30	40	15	10	.	40	20	5	20
area m²	280	310	400	415	290	300	490	430	440	350	500	250	340	410	400
relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Acer platanoides L.	.	.	.	.	+	.	.	.	2	.	.	.	.	.	.
Neottia nidus-avis (L.) Rich.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.
Epipactis baumanniorum Soldano & F. Conti	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.
Milium effusum L.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.
Festuca altissima All.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Galium rotundifolium L. subsp. rotundifolium	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Senecio ovatus (P. Gaertn., B. Mey. & Scherb.) Willd.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	.
Monotropa hypopitys L.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Veronica montana L.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.
Cephalanthera rubra (L.) Rich.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.
Arum maculatum L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
Lilium martagon L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
Taxus baccata L.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2
Quercetalia pubescenti-petraeae & Querco-Fagetea															
Rubus hirtus Waldst. & Kit.	3	2	2	1	2	3	2	1	2	2	3	+	1	+	2
Hieracium murorum L.	.	1	1	.	.	+	.	2	.	.	.	3	.	.	+
Lactuca muralis (L.) Gaertn.	.	1	.	.	.	.	.	.	1	1	+	+	.	+	.
Melica uniflora Retz.	.	.	1	.	+	.	+	.	.	.	.	+	.	.	1
Potentilla micrantha Ramond ex DC.	.	.	1	.	.	+	.	.	+	.	.	1	.	+	.
Geranium robertianum L.	.	.	.	.	.	+	.	.	+	+	.	.	+	.	+
Daphne laureola L.	.	.	.	.	1	+	.	.	.	.	.	1	.	.	1
Bromus racemosus L.	+	.	.	.	.	+	.	.	+	.	.	.	.	.	1
Quercus cerris L.	.	.	1	+	.	.	.	1	.	.	.	.	.	.	.
Acer campestre L.	.	.	.	.	.	.	1	+	.	.	.	.	.	.	.
Populus tremula L.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.

Phytosociological tab. 5 - *Fagus* woodlands (impoverished and intermediate aspects)

altitude dam a.s.l.	150	161	133	137	128	130	132	139	145	157	166	154	169	145	130
exposure	e	ene	e	ene	e	ese	wnw	nw	nw	wnw	.	se	e	nw	w
slope°	30	25	15	10	30	25	30	40	15	10	.	40	20	5	20
area m²	280	310	400	415	290	300	490	430	440	350	500	250	340	410	400
relevé number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Prunus avium L. subsp. avium	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.
Cruciata glabra (L.) Ehrend.	.	.	+	.	.	.	.	.	.	.	.	1	.	.	.
Hypericum montanum L.	.	.	+	.	.	.	.	.	.	.	.	1	.	.	.
Ajuga reptans L.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.
Ranunculus lanuginosus L.	.	.	.	.	.	.	+	.	1	.	.	.	.	.	.
Viola odorata L.	.	.	.	.	.	.	1	.	+	.	.	.	.	.	.
Chaerophyllum temulum L.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.
Sorbus aria (L.) Crantz	.	.	.	.	.	.	.	+	1	.	.	.	.	.	.
Geum urbanum L.	.	.	.	.	.	.	.	.	1	+	.	.	.	.	.
Epipactis helleborine (L.) Crantz	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.
Salix caprea L.	.	.	.	.	.	.	.	.	+	.	.	.	1	.	.
Corylus avellana L.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.
Campanula trachelium L.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.
Rosa arvensis Huds.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.
Campanula persicifolia L.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.
Luzula forsteri (Sm.) DC.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.
Digitalis lutea L. subsp. australis (Ten.) Arcang.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.
Lathyrus venetus (Mill.) Wohlf.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Brachypodium sylvaticum (Huds.) P. Beauv.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
other species															
Epilobium montanum L.	.	1	.	.	.	.	+	.	1	+	.	.	1	.	.
Aegopodium podagraria L.	.	.	.	.	.	.	1	+	1	1	.	.	.	.	.
Juniperus communis L. subsp. communis	.	.	1	.	.	.	.	+	.	.	.	+	.	.	.
Silene italica (L.) Pers. subsp. italica	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.
Dactylis glomerata L.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.
Sesleria italica (Pamp.) Ujhelyi	.	.	.	.	.	.	.	1	.	.	.	1	.	.	.
species per relevé	16	13	21	6	24	19	32	22	28	22	7	31	9	16	32

time, Pedrotti (1982), referring to the scheme proposed by Feoli and Lagonegro (1982), included the majority of the beech woods of the Marches slopes of the Laga mountains within *Veronico urticifoliae-Fagetum* and just a few relevés, provisionally, within *Polysticho-Fagetum*.

Biondi et al. (1989) described the association *Carici sylvaticae-Fagetum* for the sandstones of the Serre di Burano (Umbrian-Marches Apennines). Since the name *Carici-Fagetum* turned out to be illegitimate it was riproposed as *Dactylorhizo fuchsii-Fagetum sylvaticae* (Izco and Biondi, 1992).

Ubaldi et al. (1987 recte 1990) basing themselves once again on the tables provided in Longhitano and Ronsisvalle, proposed the association *Dactylorhizo fuchsii-Fagetum sylvaticae*, which they intended should include the "Apennine form" of *Veronico-Fagetum* as had been proposed by Feoli and Lagonegro. The *Dactylorhizo-Fagetum* sensu Ubaldi et al. 1990 was divided into five sub-associations, of which four applied to the Laga mountains (*vaccinietosum, juniperetosum, moehringetosum, abietetosum*) and one to Gran Sasso (*cardaminetosum*).

The association *Dactylorhizo-Fagetum* Ubaldi et al. 1990 was invalid (Art. 3). In fact this association only became validated some years later (Ubaldi, 1995), however, since in the meantime another association named *Dactylorhizo fuchsii-Fagetum* (Biondi et al. 1989) Izco and Biondi 1992, had been validly published (see above), Ubaldi (1995) proposed the new name, *Solidagini-Fagetum* for which he also validly typified all the subassociations he had already proposed (but in invalid form) in Ubaldi et al. 1990.

Pignatti (1998) included all the beech woods of the central Apennines in *Polysticho-Fagetum* Feoli and Lagonegro 1982.

Biondi et al. (2002) maintained the single reference *Solidagini-Fagetum* for the Laga mountains, without however entering into detail regarding sub-associations.

Ubaldi (2003), even though he also maintained the reference of *Solidagini-Fagetum* for the Laga mountains, took no account of the majority of the sub-associations which he had already described in Ubaldi et al. (1990) and validly typified by himself in Ubaldi (1995). In this 2003 paper, Ubaldi maintained only the subassociation *S.-F. abietetosum* neglecting to mention even the sub-association *S.-F. moehringetosum* which contained the type-relevé of the association and proposing instead completely new sub-associations (*galietosum rotundifolii, monotropetosum, chaerophylletosum*). In addition he proposed the subassociation *Solidagini-Fagetum festucetosum altissimae* for Mount Gelbison in the Cilento National Park (southern Campania).

Rank of association

Neither *Anemono-Fagetum* (Gentile 1970) Brullo 1984 (=*Aquifolio-Fagetum* Gentile 1970) nor *Abieti-Fagetum* as proposed in Longhitano and Ronsisvalle

(1974) can be maintained as suitable references for the beech woods of Laga mountains. *Anemono-Fagetum* is an association which is limited to southern Italy, where it plays a fundamental role in the definition of *Geranio versicoloris-Fagion* (Di Pietro et al., 2004; Rosati et al., 2005), an alliance with southern Italian distribution area, whose main differential species are lacking on the Laga mountains. In fact, the widespread occurrence of *Geranium nodosum* as a vicariant di *Geranium versicolor* in the beech woods of the Laga mountains, is on its own sufficient to provide them with a clear synchorological and syntaxonomical identity (Gentile, 1974, Biondi, 1982; 1989).

Abieti-Fagetum, on the other hand is a syntaxon which is defined strictly on the basis of its physiognomy and which as been refereed to (often mistakenly from the nomenclatural point of view) by many authors throughout Europe (Moor, 1952; Kuoch, 1954; Oberdorfer, 1936; 1957; Em, 1974; Horvat et al., 1974; Credaro et al., 1980; Ferrari et al., 1979; Ubaldi, 1980, etc.). On the basis of the information in Ronsisvalle (1979), it can be conjectured that the Laga mountains *Abieti-Fagetum* referred to in Longhitano & Ronsisvalle 1974 was similar to a beechwood type described by Knapp (1942) for the Alps. However, this association is a type of *Fagus* mixed wood with *Abies* and *Picea* that is found predominantly in the upper montane belt of the Alps, and it is therefore inappropriate for the Apennines (Moor, 1952; Pfadenhauer, 1973; Ellemberg & Klötzli, 1974; Paglia, 1995).

The reference to *Veronico urticifoliae-Fagetum* Montacchini 1972 which has been used several times (Feoli and Lagonegro, 1982; Pedrotti, 1982; Tammaro et al., 1995 etc.) is clearly to be rejected, in that it is an association having a western Alps distribution and for this reason exhibits floristic-coenological and biogeographical features which cannot be applied to the Apennines (abundance of *Luzula nivea* (L.) DC., *Festuca flavescens* Bellardi, *Vaccinium vitis-idaea* L., *Rhododendron ferrugineum* L., *Larix decidua* Mill. etc.).

The reference to *Polysticho aculeati-Fagetum* (Feoli and Lagonegro 1982; Pedrotti, 1982; Pignatti, 1998) an association widely used to describe the microthermic beech woods on limestone in the central Apennines (in Biondi et al., 2002 considered as a invalid synonym for *Cardamino kitaibelii-Fagetum*) while suitable in biogeographical terms is not so in ecological terms, because it is lacking in the most diagnostic acidophilous species, such as *Vaccinium myrtillus, Pyrola minor, Blechnum spicant, Veronica urticifolia, Deschampsia flexuosa* (etc.).

The proposal of a new association of beech woods for the Laga mountains made in Ubaldi et al. (1990) using the name *Dactylorhizo-Fagetum* and subsequently perfectly in (1995) with the new name *Solidagini-Fagetum* can be considered to have been reasonable and justified. The nomenclatural and syntaxonomical problems which *Solidagini-Fagetum* has met with over the years,

however, mean that today it is still not fully clear what its precise diagnosis is. In fact any diagnosis made for this association have never been expressed in words, but only by way of the indication of type-relevés and or the compilation of new synoptic columns obtained by mixing together relèves from different parts of the original tables of Longhitano and Ronsisvalle (1974). Apart from anything else, the list of the character and/or differential species of the association has never been provided.

The indication of the type-relevé of the *Solidagini-Fagetum*, which Ubaldi (1995) selected from those present in the table Longhitano and Ronsisvalle (1974) assigned to *Aquifolio-Fagetum*, would lead it to be understood that *Solidagini-Fagetum* is a sort of termophilous beech wood[5].

Considering the constant high altitudes of the Laga mountains, which mean that the beech woods are everywhere able to reach their upper altitudinal limit (timberline) and to come into contact with *Vaccinium myrtillus* subalpine heathlands, the indication of a single beech wood type appropriate for the entire one thousand meters of the montane belt would appear somewhat limiting. Besides the choice to maintain a single association to represent both low altitude and high altitude beech woods is not consistent with what has been described for everywhere else in the Apennines[6]. For this reason it seems reasonable that for the Laga mountains – as has been done for the surrounding limestone massifs – a low altitude beech wood type should be associated to a high altitude one, by way of *Prenantho purpureae-Fagetum*, described as new in this paper.

The specific character component of *Prenantho-Fagetum*, together with the typical pelitic-arenaceous substrates on which it grows, mean that the greatest similarities are to be found with the beech woods of the northern Apennines, where, among other things, comparable edaphic conditions occur (Hofmann, 1969; Ubaldi, 1974; Ferrari et al., 1979; Ubaldi and Speranza, 1985). *Prenantho-Fagetum* displays significant similarities with *Gymnocarpio-Fagetum* and *Roso pendulinae-Fagetum*[7], both of which, being microthermic

5) The lectotype of *Solidagini-Fagetum* was indicated in Ubaldi (1995) using relevé 5 of Tab. II page 64 in Longhitano & Ronsisvalle 1974. In fact, these authors assigned the whole of Tab. II to *Aquifolio-Fagetum* Gentile 1970. The type relevé choosen by Ubaldi (1995) was included in the subassociation *Solidagini-Fagetum moehringetosum*; nevertheless neither *Solidago virgaurea* nor *Moehringia trinervia* appear in the floristic list of this type-relevés. This relevé was collected at 1200 meters, an altitude at which on the Laga mountains *Quercus cerris* woods (Di Pietro & Tondi, 2004) or mixed woods of *Quercus cerris* and *Quercus pubescens* (Longhitano and Ronsisvalle 1974 pag. 70) are generally to be found.

6) The phytosociological literature reports several examples of altitudinal vicariance for beechwoods: in the northern Apennines *Saniculo-Fagetum/Gymniocarpio-Fagetum; Aceri platanoidis-Fagetum/Galeopsi-Fagetum*; in the central Apennines *Lathyro veneti-Fagetum/Cardamino- kitaibelii-Fagetum*; and in the southern Apennines *Anemono-Fagetum/Ranunculo brutii-Fagetum.*

7) It should be noted that by *Roso pendulinae-Fagetum* is meant that cited in Arrigoni, 1998 (pag. 165) which refers to the table "Hetraies et Sapiniers d'altitude" published in Barbero & Bonin (1980) concerning the beechwoods of Sestaione in Tuscan Apennines. Another beechwood association, also named *Roso pendulinae-Fagetum* Rivas-Martínez, Costa & P. Soriano in Rivas-Martínez et al. 2002 has been described for the central sector of the Pyrennes. It is probable that the name *Roso pendulinae-Fagetum* sensu Arrigoni 1998 is to be considered invalid because the paper in which *Roso pendulinae-Fagetum* was proposed as a new association was never actually published.

sub-acidophilous beech woods, contain most of the characteristic and differential species of *Prenantho-Fagetum* (*Veronica urticifolia, Pyrola minor, Prenanthes purpurea, Vaccinium myrtillus* etc.). Nevertheless these two beech wood types also include many differential species whose southernmost distribution area limit occurs on the northern Apennines (*Luzula nivea, Phyteuma scorzonerifolium* Vill., *Phyteuma ovatum* Honck., *Phegopteris con-*

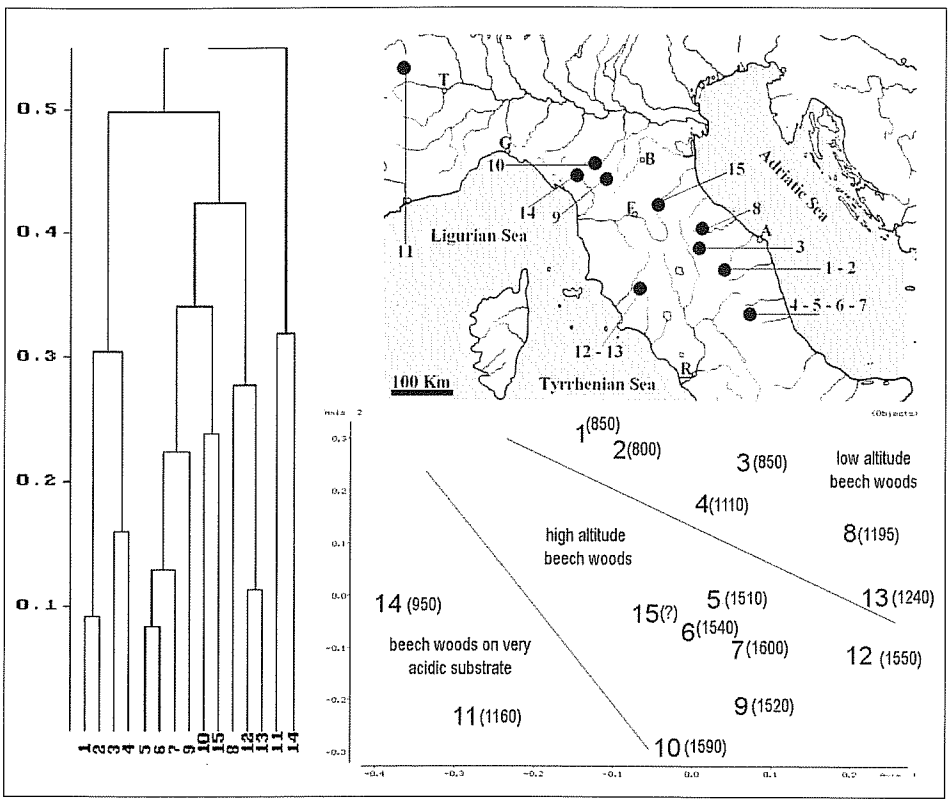

Fig. 15 - Dendrogram (a) and Ordination diagram (b) of the 15 beech woodlands communities included in the synoptic table with the geographical location of these latter on the map (in the ordination diagram the average altitude of the relevés-set of each beechwood community type is reported in brackets). **col. 1**: *Hieracio racemosi-Fagetum luzuletosum sylvaticae* (Mount S. Vicino, Allegrezza, 2002: Tab. 4); **col. 2**: *Hieracio racemosi-Fagetum ericetosum* (Mount S. Vicino, Allegrezza, 2002: Tab. 4); **col. 3**: *Dactylorhizo fuchsii-Fagetum typicum* (Serre di Burano, Biondi et al., 1989: Tab. 9 sub *Carici sylvaticae-Fagetum* ass. nova); **col. 4**: *Dactylorhizo fuchsii-Fagetum aremonietosum* (Laga mountains, present paper); **col. 5**: *Prenantho-Fagetum typicum* (Laga mountains, present paper); **col. 6**: *Prenantho-Fagetum vaccinietosum* (Laga mountains, present paper); **col. 7**: *Prenantho-Fagetum athyrietosum* (Laga mountains, present paper); **col. 8**: *Cardamino kitaibeli-Fagetum* (central Apennines, Ballelli and Biondi, 1982: Tab. 6); **col. 9**: *Gymnocarpio-Fagetum* (northern Apennines, Ubaldi and Speranza, 1985: Tab. 1); **col. 10**: *Roso pendulinae-Fagetum* (Tuscan Apennines, Barbero and Bonin, 1980: "Hetraies et Sapiniers d'altitude"); **col. 11**: *Veronico urticifoliae-Fagetum* (Piedmont, Val di Susa, Montacchini, 1972: Tab. 11); **col. 12**: *Monotropo-Fagetum* (Mount Amiata Arrigoni & Nardi, 1975: Tab. 4 "faggete dell'orizzonte superiore"); **col. 13**: *Agrostio-Fagetum* (Mount Amiata, Arrigoni & Nardi, 1975: Tab. 5 "faggete dell'orizzonte inferiore"); **col. 14**: *Luzulo pedemontanae-Fagetum* (northern Apennines, Oberdorfer & Hofmann, 1967: tab. 9); **col. 15**: *Veronica officinalis* & *Abies alba* comm. (northern Apennines, Ubaldi, 2003: Tab. 20, col. 32 b).

nectilis (Michx.) Watt., *Picea abies* (L.) H. Karst., *Vaccinium gaultherioides* Bigelow, *Listera cordata* (L.) R. Br., *Viola biflora* L.); and this prevents any possibility of extending the syn distribution area of these associations to the Laga mountains or more generally in the central Apennines.

Finally, *Prenantho-Fagetum* also exhibits some similarities with *Monotropo-Fagetum* of the upper montane belt of Mount Amiata on volcanic soils (Arrigoni and Nardi, 1975; Arrigoni, 1998) whose only effective differential is *Luzula pilosa* (L.) Willd., but nevertheless lacks most of the differential species of *Prenantho-Fagetum* such as *Pyrola minor, Cirsium erisithales, Veronica urticifolia, Vaccinium myrtillus* etc.

The presence of *Luzula sylvatica* and *L. forsteri* within *Prenantho-Fagetum* prevent the association from being included in either *Luzulo pedemontanae-Fagetum* of the northern Apennines, or *Luzulo-Fagetum* s.l. of central Europe, both of which are characterised by other species of *Luzula* (e.g. *Luzula pedemontana* Boiss. et Reut., *L. nivea, L. luzulina* (Vill.) D. Torre & Sarnth., *L. luzuloides* (Lam.) Dandy & Wilmott) which do not reach as far south as central Apennines. Nevertheless, *Prenantho-Fagetum* – especially in its *vaccinietosum* form – does exhibit marked similarities with *Luzulo pedemontanae-Fagetum vaccinietosum myrtilli* occurring on the steep, eroded substrates of the Tuscan Apennine Macigno (see Oberdorfer and Hofmann, 1967; Arrigoni, 1998).

As regards the nomenclatural validity of *Solidagini-Fagetum* many uncertainties still exist, in my opinion. Apart from the lack of diagnosis and list of character/differential species of the association, mentioned earlier in this paper, it seems likely that there were already some qualitative and quantitative floristic inaccuracies present in Longhitano and Ronsisvalle (1974) original tables. In fact numerous highly diagnostic nemoral species, that are frequent (in some cases abundantly so) among the relevés performed for the present study, were missing from these original tables (*Festuca heterophylla, Cardamine kitaibelii, Actaea spicata* L., *Ulmus glabra, Rosa arvensis* Huds., *Rosa pendulina, Acer pseudoplatanus, Gymnocarpium dryopteris, Blechnum spicant, Tilia platyphyllos* Scop., *Euonymus latifolius* (L.) Mill., *Valeriana tripteris* L., *Geranium nodosum, Lathyrus venetus* (Mill.) Wohlf., *Lathyrus linifolius* (Reichard) Bässler, *Lamium galeobdolon* L., *Lilium martagon, Lilium bulbiferum* subsp. *croceum, Adoxa moschatellina* L., *Polygonatum verticillatum, Polystichum lonchitis* (L.) Roth, to mention just a few). These species, in my opinion, act as discriminants in the framework of a correct syntaxonomical scheme, and failing to bring them into consideration would lead to the development of an incorrect reference model, one which does not correspond to the real floristic-coenological situation of the area. What is more, it would risk putting into circulation syntaxa which could give rise to

erroneous interpretations if they should be used in revisions on a national and European scale (as has, in fact, already occurred)[8].

As a consequence I maintain that the nomenclatural reference of *Solidagini-Fagetum* Ubaldi et al. ex Ubaldi 1995 (and its various subassociations) which is based almost exclusively on the 1974 tables is to be considered as invalid (in the form of a *nomen dubium*) according to Art. 37 of ICPN (Weber et al., 2000). This, despite acknowledging the undoubted merits of Longhitano and Ronsisvalle 1974 paper, which as a pioneering study was, and is, one of the most important contributions to the knowledge of the forest vegetation of the Apennines.

As mentioned earlier in addition to the *Solidagini-Fagetum* of Laga Mountains there are other acidophilous beechwoods of the lower-montane and sub-montane belts, namely, *Dactylorhizo-Fagetum* (Biondi et al. 1989) Izco & Biondi 1992, and *Hieracio racemosi-Fagetum* Allegrezza 2002 for the neighbouring Umbrian-Marches Apennines, and *Agrostio-Fagetum* for Mount Amiata. Both the floristic lists in the synoptic tables and the results of statistical analysis (Fig. 15) show that *Dactylorhizo-Fagetum* and *Hieracio racemosi-Fagetum* are fairly similar to each other and partially overlapping in synecological terms. As a consequence and in accordance with Principle IV and Art. 23 of ICPN it was decided to use the prior name, *Dactylorhizo fuchsii-Fagetum* as reference association for the low altitude beechwoods of the Laga Mountains, too. The other associations were then considered as synonyms or sub-associations of *Dactylorhizo-Fagetum*[9].

Comparison between the relevés of Laga mountains and those of the Umbrian-Marches Apennines (Serre di Burano and Mount San Vicino) allows *Dactylorhizo-Fagetum* to be divided into different sub-units. 1) A typical sub-association located between 800 and 1000 m (the differential species were mentioned before); 2) A new subassociation, *Dactylorhizo-Fagetum hieracietosum racemosi* stat. nov et comb. nov. (Bas.: *Hieracio-Fagetum luzuletosum sylvaticae* Allegrezza 2002 incl. also *Hieracio-Fagetum ericetosum arboreae*), more termophilous, which is typical of the limestones rich in flint deposits of Mount San Vicino, having as differential species *Hieracium racemosum* Waldst. & Kit., *Polypodium vulgare* L., *Erica arborea* and *Carex olbiensis* Jord. and which exhibits spatial contacts with *Quercus cerris* and *Quercus pubescens* mixed oak woods. 3) A new sub-association of high-

8) In a comparative study of the Italian beechwoods and those of the rest of Europe Pignatti et al. (1990), and in the various revisions at a national level carried out by Ubaldi et al. (1990) and Ubaldi (1995; 2003), the syntaxonomical scheme for central Italy beechwoods in terms of sub-association, associations and higher rank syntaxa was defined on the basis of the results of statistical analyses performed on the numerous published phytosociological and synoptic tables regarding the Apennine beech woodlands. For the Laga mountains the tables used were, naturally, those of Longhitano and Ronsisvalle (1974).

9) Whenever there were no sufficient conditions to consider the association *Solidagini-Fagetum* in the quality of *nomen dubium*, this same association take the role of later syntaxonomical synonym of *Dactylorhizo fuchsii-Fagetum*.

er altitude, *Dactylorhizo-Fagetum aremonietosum agrimonioidis* subass. nov., restricted (for the moment) to the Laga mountains, where the Mediterranean influence is completely absent, which exhibits a lower contact with the mesophilous *Quercus cerris* woods of *Listero ovatae-Quercetum cerridis* and an upper contact with the microthermic beech woods of *Prenantho-Fagetum.*

Higher rank syntaxa

There is still open debate concerning the criteria to be used for limiting the higher syntaxonomical units regarding beech woodlands. According to some authors, (Moor, 1952; Tüxen, 1960; Lausi and Pignatti, 1973; Zoller et al., 1977; Oberdorfer and Müller, 1984, Willner, 2002) the syntaxonomical ranks higher than association should be limited using ecological criteria. For other authors, instead, the limits for the higher rank sintaxa should be based either almost exclusively on biogeographical criteria (Soó, 1965; Gentile, 1970; Marinceck et al., 1993; Scoppola et al., 1995; Biondi et al., 2002) or on both geographical and ecological data (Dzwonko and Loster, 2000; Bergmeier and Dimopoulos, 2001; Di Pietro et al., 2004). According to the syntaxonomical schemes proposed for most of central and southern Europe (Oberdorfer, 1992; 1994; Wallnöfer et al., 1993; Heinken, 1995; Theurillat et al., 1995; Rivas-Martinez et al., 2002), the acidophilous beech woodlands are distinguished from basiphilous ones at least at the syntaxonomical rank of alliance (e.g. *Luzulo (luzuloidis)-Fagion* or *Ilici-Fagion* vs. *Fagion sylvaticae*), but in most cases this "edaphic" separation is maintained at the level of order, too (*Quercetalia roboris* vs. *Fagetalia sylvaticae*). With the exception of north-western Spain (Braun-Blanquet, 1967; Rivas-Martínez et al., 2001), which has its own endemic alliance (*Ilici-Fagion*), for the rest of Europe (Pyrennees included) acidophilous beechwoods are placed in *Luzulo-Fagion* which is characterised by various *Luzula* species such as *Luzula luzuloides, L. nivea, L. luzulina, L. pilosa,* and locally by *Luzula pedemontana,*). The syn-distribution area of this alliance stretches as far as the Apuan Alps and the northern Apennines (Hofmann, 1974; Arrigoni, 1998), where it finds its southernmost limit. Ubaldi (2003) includes the acidophilous beech woods of western Alps and northern Apennines in the new alliance *Luzulo pedemontanae-Fagion* which he considers as a southern geographic vicariant of the central European *Luzulo-Fagion.*

There is also disagreement concerning the higher rank syntaxa to be adopted for central Apennines acidophilous beech woods. According to Pignatti (1998) all acidophilous beechwoods should be considered as belonging to *Luzulo-Fagion*, even if he used the reference of the basiphilous *Polysticho-Fagetum* for the Laga mountains too. Biondi et al. (2002) put the acidophilous beech woods of the Laga together with the rest of central Apennine microthermic beechwoods in the *Aremonio-Fagion* alliance and *Cardamino kitaibeli-Fagenion* suballiance. Ubaldi (2003) includes Laga *Solidagini-Fagetum* in the

Geranio nodosi-Fagion alliance (defining a "eastern race" with *Cardamine enneaphyllos* (L.) Crantz. for the latter) while he includes the *Dactylorhizo-Fagetum* of Umbrian-Marches Apennines in the *Euonymo latifolii-Fagion*, a recently described alliance which is representative of both termophilous *Fagus* woods and *Castanea* woods of the central and northern Apennines.

The syntaxonomical classification at the rank of alliance and suballiance proposed in the present paper is based on both geographical and ecological considerations. The possibility of extending the alliance *Luzulo-Fagion* to the central Apennines depends on whether a large group of ecological differentials can be found in the communities. The major part of these differentials would come from *Quercetalia roboris* with some also coming from *Calluno-Ulicetea* – both of which are sintaxa to which most of the communities normally found in serial and spatial-potential contact with the *Luzulo-Fagion* beech woods belong. As is well-known, In Italy *Quercetalia roboris* communities are quite common in the northern Italy in an area which stretches from the southern slopes of the Alps to northern Tuscany, whereas it becomes extremely sporadic in central Italy where the occasional southernmost stands are to be found in southern Umbrian and northern Latium (Pedrotti et al., 1982). The same distribution is shared, more or less, by *Calluno-Ulicetea* heathlands, whose Italian distribution area approximately coincides with that of *Calluna vulgaris*, which in peninsular Italy finds it southernmost limit on Mount Rufeno, in northern Latium (Scoppola, 1998). The beech woods of central Apennines, instead, are normally dynamically linked to *Rhamno-Prunetea* shrublands and to *Festuca-Bromus-Sesleria* grasslands, while in spatial terms they are in contact with *Carpinion orientalis* and/or *Erytronio-Carpinion* woods and for this reason tend to include many species having a south-eastern European chorotype. If it is certainly true that among the woodlands of the central Apennines those of the Laga mountains are the ones in which the eastern component is the least common and the central European component particularly abundant, it is equally true that species such as *Aremonia agrimonioides, Cardamine enneaphyllos, C. kitaibeli* can be found in the microthermic beech woods, and species such as *Quercus cerris, Fraxinus ornus, Ostrya carpinifolia, Acer opalus* subsp. *obtusatum,* and (very sporadically) *Sesleria autumnalis* in the termophilous beech woods. For this reason it seems plausible that both *Prenantho-Fagetum* and *Dactylorhizo-Fagetum* should be included in an alliance like *Aremonio-Fagion* which expresses the biogeographical context in a very marked way.

The clear similarities exsisting between *Prenantho-Fagetum* and the northern Apennine *Gymniocarpo-Fagetum* or *Roso pendulinae-Fagetum*, emerging both from statistical analyses and from the synoptic table, leaves space for the hypothesis that at least the microthermic Laga beech woods could be included in alliances such as *Geranio nodosi-Fagion* or *Luzulo pedemontanae-Fagion*. The fact that these latter two alliances are endemic to the Apennines is partial

confirmation of what has emerged from a recently-published multidisciplinary study, where it was established that the Apennine *Fagus* populations belong to a single chloroplastic aplotype which was shown to be distinct from that occurring in central European and Balkan *Fagus* populations (Magri et al., 2006). However both the lack of endemic species among the Apennine beech woods and a syndistribution area of *Geranio nodosi-Fagion* and *Luzulo pedemontanae-Fagion* which appears to be rather limited in comparison to those of the other central and south-European beech wood alliances, means that the use of these alliances as references should be avoided for the present, at least.

Once the biogeographical context has been established through the choice of the alliance, other paramethers which are more directly linked to the ecology of the communities start to take on greater importance within the framework of the syntaxonomical scheme. Among these paramethers those concerning the soil are without doubt the most significant. Ellemberg (1996) considers soil ecology to be the main factor in beech forest classification at a regional scale, while according to Olano et al. (1998) pH is the prime factor controlling understorey composition in beech forests. In order to highlight the particular ecology of the acidophilous beech woods developed on the siliceous soils of the Laga mountains, compared to that of basiphilous beech woods developed on the limestone substrates of the rest of the central Apennines, it is necessary to define a new sub-alliance to act as an edapho-lithological vicariant of the basiphilous *Cardamino kitaibeli-Fagenion* occurring on Gran Sasso, Sibillini, Velino-Sirente, Simbruini-Ernici, Catria-Nerone etc. This new sub-alliance, named *Veronico urticifoliae-Fagenion sylvaticae* suball. nov. (Nomenclatural type: *Prenantho purpureae-Fagetum sylvaticae* ass. nov. *typicum*), exhibits a specific characteristic and differential component made up of the following species: *Veronica urticifolia* (c), *Solidago virgaurea* (c), *Luzula sylvatica* (c), *Deschampsia flexuosa* (c), *Festuca heterophylla* (c), *Pyrola minor* (c), *Rosa pendulina* (c), *Vaccinium myrtillus* (c), *Calamagrostis arundinacea* (c), *Oxalis acetosella* L. (c), *Pulmonaria picta* Rouy (c), *Dactylorhiza maculata* subsp. *fuchsii* (c) *Daphne mezereum* L. (d), *Fragaria vesca* L. (d), *Cytisus hirsutus* L. (d), *Hieracium racemosum* (d), *Blechnum spicant* (d), *Orthilia secunda* (L.) House (d), *Veronica officinalis* L. (d), *Lathyrus linifolius* (d), *Pyrola rotundifolia* (d).

Veronico urticifoliae-Fagenion partially overlaps *Geranio nodosi-Fagenion* (it could include the acidophilous and sub-acidophilous aspects), particularly according to the interpretation provided in Ubaldi and Speranza, 1985 and in Ubaldi et al. 1990. The fact that the *Geranio nodosi-Fagenion* was not extended to the central Apennines was explained by the authors as due to floristic impoverishment of the central Apennines beech woods, apparent from the complete absence or sporadicity of some diagnostic species, such as *Adenostyles glabra, Ranunculus platanifolius, Valeriana tripteris, Polygonatum verticillatum,*

Trochiscanthes nodiflora (All.) W.D.J. Koch and *Phyteuma ovatum*. However, according to the tables provided in the present paper only the last two of these species are effectively lacking in the Laga mountains. Nevertheless, the use of *Geranio nodosi-Fagenion* as a reference for the beech woods of Laga mountains appears not so appropriate, both for ecological reasons (*Geranio nodosi-Fagenion* is not limited to acidophilous woodlands but it is mainly composed of neutrophilous and basiphilous ones), and for biogeographical reasons (according to Ubaldi & Speranza, 1985 and Theurillat et al., 1995 this suballiance is to be included in *Fagion sylvaticae* rather than in *Aremonio-Fagion*[10]).

The choice to include *Veronico urticifoliae-Fagenion* in the amphiadriatic alliance *Aremonio-Fagion* makes it necessary to compare the Apennine *Fagus* associations with similar ones occurring on the other side of the Adriatic Sea. A careful look at the eastern Alps and northern Balkans suballiances of *Aremonio-Fagion* would suggest *Veronico urticifoliae-Fagenion* (especially in its microthermic aspects) behaves as a geographical vicariant *Saxifrago rotundifoliae-Fagenion* Marinãek et al. 1993 of the northern Dynarids. In fact this latter suballiance, too, finds its synecological optimum in the upper montane and subalpine belts, and included among its characteristic species are some slightly acidophilous species such as *Adenostyles glabra, Geranium sylvaticum, Luzula sylvatica, Polygonatum verticillatum, Polystichum lonchitis, Ranunculus platanifolius, Saxifraga rotundifolia* L., *Scrophularia scopolii* Hoppe ex Pers., all of which also occur on the Laga mountains.

Comparison between Laga mountain beech woods and acidophilous beech woods of the southern Balkans (Quezel and Contandriopoulos, 1965; Quezel, 1967; Gamisans and Hebrard, 1980; Dzwonko et al., 1999; Dzwonko and Loster, 2000; Bergmeier and Dimopoulos, 2001) reveals similarities which are perhaps even greater, yet despite this there are still some important floristic differences. In the acidophilous beech woods of Macedonia (*Abieti-Fagetum, Luzulo sylvaticae-Fagetum*; *Orthilio secundae-Fagetum*), for example, *Luzula luzulina* and *L. luzuloides* are to be found, whereas both of these are absent from the Laga mountains. The difficulty regarding the syntaxonomical interpretation of the acidophilous beech woods of Macedonia was highlighted in Dzwonko et al. (1999), where the authors, even if they considered these communities to be subassociations of *Luzulo-Fagetum* (the most similar to the Laga beechwoods is certainly *Luzulo-Fagetum vaccinietosum myrtilli*), nevertheless had doubts over whether this type of *Luzulo-Fagetum* could be properly included in the alliance *Luzulo-Fagion*. These doubts were still present in the subsequent *Fagus* wood-

10) This interpretation, however, suggests a further syntaxonomical hypothesis both for the Laga beechwoods and, more in general, for the entire *Fagus* woodlands context of the central Apennines. In fact, due to its acidophilous character and to its floristic and coenological relationships with the northern Apennines beechwoods, *Prenantho-Fagetum* could be included in the suballiance *Geranio nodosi-Fagenion* and in the alliance *Fagion sylvaticae* whereas the other beechwood associations of central Apennines which are developed on limestone substrates could be included in *Cardamino kitaibeli-Fagenion* and in *Aremonio-Fagion*.

lands revision (Dzwonko and Loster, 2000), where in any case the decision was taken to give priority to phytogeographical criteria in the choice of both the sub-alliance (*Doronico columnae-Fagenion*) and the alliance (*Aremonio-Fagion*).

Extending the comparison still further southwards, with the exception of some small areas of the northern Pindhos, the acidophilous beech woodlands of Greece are concentrated in the eastern sectors (mainly on the Rhodopes and other mountain ranges bordering Bulgaria) and are developed on Scists, Micascists and Quartzites. For this reason these woodlands include various species which are strictly south-eastern European, and do not cross the Adriatic (*Soldanella rhodopaea* F.K. Meyer, *Pulmonaria rubra* Schott, *Symphytum ottomanum* Friv., *Lathyrus alpestris* (Waldst. & Kit.) Celak, etc.). Moreover the beech woods of Greece are characterised by some northern diagnostic species such as *Luzula luzulina, Luzula luzuloides, Luzula pilosa, Picea abies, Vaccinium vitis-idaea, Physospermum cornubiense* (L.) DC., whose distribution area in the Balkans extends much further south than it does in the Italian Peninsula, for which reason they are lacking in the central Apennines. Another difference is that *Abies alba* is geographically vicariated by *Abies borisii regis* Mattfeld. As regards syntaxonomy, the acidophilous beechwoods of Greece have been included, albeit with a certain degree of uncertainty, within the *Doronico columnae-Fagenion* and in the alliance *Fagion sylvaticae* (Bergmeier and Dimopoulos, 2001). Over and beyond these floristic differences, however, the most significant feature allowing the beech woods of Laga mountains to be distinctly separated from the acidophilous beech woods of both the Balkans and central Europe in general (see Willner et al., 2004) is that Laga acidophilous beech woods are surprisingly very rich in species. To give just one example, the number of constant species (species with constancy >20%) which Bergmeier and Dimopoulos (2001) report for the Greek *Orthilio-Fagetum* is 18-19. In contrast, in the various aspects of *Prenantho-Fagetum*, this number ranges between 40 and 54.

CONCLUSIONS

Owing to the pelitic-arenaceous acid substrates, the Laga mountains beechwoods exhibit coenological characteristics which are markedly different from those of the predominantly basiphilous beech woods of the rest of the central Apennines. In this paper these differences have been expressed in syntaxonomical terms with the proposition of a new microthermic beech wood association, *Prenantho purpureae-Fagetum*, within which three different subassociations have also been defined (*typicum, vaccinietosum e athyrietosum filicis-foeminae*). In floristic and coenological terms *Prenantho-Fagetum* exhibits the greatest similarities (presence of *Fagus-Abies* mixed woods, abundance of *Vaccinium myrtillus, Geranium nodosum, Veronica urticifolia*, and ferns) with certain types of beechwood of the northern Apennines which are developed on the same kind of substrates. The

wide altitudinal range over which the beechwoods are to be found enables a termophilous low-altitude aspect to be identified as well, and this for nomenclatural reasons has been assigned to *Dactylorhizo fuchsii-Fagetum* in the form of the new subassociation, *aremonietosum agrimonioidis*. As regard the reference alliance *Aremonio-Fagion* was chosen because it provides a clear biogeographical indication, highlighting the amphi-adriatic links between the vegetation of the central Apennines and that of the Balkans. Within the *Aremonio-Fagion* the ecological paramethers of the soil have meant that a new suballiance, *Veronico urticifoliae-Fagenion*, needed to be proposed to represent the acidophilous beech woods of the central Apennines. The high degree of floristic richness of the Laga mountains beechwoods, together with the absence of those diagnostic species of the genus *Luzula* which are abundant in the acidophilous beechwoods of central Europe, the southern Alps and the northern Apennines, suggested that any reference to *Luzulo (luzuloidis)-Fagion* or *Luzulo (pedemontanae)-Fagion* should be avoided. Nevertheless, only a revision on a much wider scale, which compared beech wood relevés from central Europe, the Alps, the Balkans and the Apennines, would be capable of clarifying this complex syntaxonomical situation.

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SYNTAXONOMICAL SCHEME

QUERCO-FAGETEA Br.-Bl. and Vlieger in Vlieger 1937

FAGETALIA SYLVATICAE Pawlowsky in Pawlowsky, Sokolowsky and Wallish 1928

AREMONIO-FAGION (Horvat 1938) Torok, Podani and Bohridi 1989

Veronico urticifoliae-Fagenion sylvaticae suball. nov. hoc loco

NOMENCLATURAL TYPE: *Prenantho purpureae-Fagetum sylvaticae* ass. nov. hoc loco subass. *typicum*)

Prenantho pupureae-Fagetum sylvaticae ass. nov. hoc loco

HOLOTYPUS: PHYTOSOC. TAB. 2 REL. 25

[=*Solidagini-Fagetum* Ubaldi, Zanotti, Puppi, Speranza, Corbetta ex Ubaldi 1995 p.p. nom. dub. (Art. 37); *Aquifolio-Fagetum* sensu Longhitano & Ronsisvalle 1974 p.p., non Gentile 1970.; *Abieti-Fagetum* n.n. sensu Longhitano & Ronsisvalle 1974. *Veronico urticifoliae-Fagetum* sensu Feoli & Lagonegro 1982 non Montacchini 1972; *Polysticho-Fagetum* Feoli & Lagonegro 1982 p.p.: nom. inval. (Art. 3o; Art. 5)]

Prenantho pupureae-Fagetum sylvaticae typicum subass. nov. hoc loco

HOLOTYPUS: PHYTOSOC. TAB. 2 REL. 25

Prenantho pupureae-Fagetum sylvaticae vaccinietosum myrtilli subass. nov. hoc loco

HOLOTYPUS: PHYTOSOC. TAB. 3 REL. 5

[=*Dactylorhizo-Fagetum vaccinietosum myrtilli* Ubaldi, Zanotti, Puppi, Speranza, Corbetta 1990 nom. inval. (Art. 5) nom. illeg. (Art. 31); *Solidagini-Fagetum vaccinietosum myrtilli* Ubaldi, Zanotti, Puppi, Speranza, Corbetta ex Ubaldi 1995 nom. dub. (Art. 37); *Aquifolio-Fagetum* sensu Longhitano & Ronsisvalle 1974 p.p., non Gentile 1970.; *Abieti-Fagetum* n.n. sensu Longhitano & Ronsisvalle 1974 p.p.. *Veronico urticifoliae-Fagetum* sensu Feoli & Lagonegro 1982 non Montacchini 1972].

Prenantho pupureae-Fagetum sylvaticae athyrietosum filicis-foeminae subass. nov. hoc loco

HOLOTYPUS: PHYTOSOC. TAB. 4 REL. 16

Dactylorhizo fuchsii-Fagetum sylvaticae (Biondi, Allegrezza, Ballelli, Guitian & Taffetani 1989) Izco & Biondi 1992

[= *Carici-Fagetum sylvaticae* Biondi, Allegrezza, Ballelli, Guitian & Taffetani 1989 nom. illeg. (Art. 31); non *Dactylorhizo fuchsii-Fagetum sylvaticae* Ubaldi, Zanotti, Puppi, Speranza, Corbetta 1990 nom. inval. (Art. 5) et nom. illeg. (Art. 31).

Dactylorhizo fuchsii-Fagetum sylvaticae aremonietosum agrimonioidis subass. nov. hoc loco

HOLOTYPUS: PHYTOSOC. TAB. 1 REL. 6

[*Dactylorhizo-Fagetum* Ubaldi, Zanotti, Puppi, Speranza, Corbetta 1990 nom. inval. (Art. 5) nom. illeg. (Art. 31) p.p.; *Solidagini-Fagetum moehringetosum* Ubaldi, Zanotti, Puppi, Speranza, Corbetta ex Ubaldi 1995 nom. dub. (Art. 37); syntax syn. *Aquifolio-Fagetum* sensu Longhitano & Ronsisvalle 1974 p.p., non Gentile 1970.; *Veronico urticifoliae-Fagetum* sensu Feoli & Lagonegro 1982 non Montacchini 1972 p.p.].

Dactylorhizo fuchsii-Fagetum hieracietosum racemosi (Allegrezza 2002) stat. nov. et comb. nov. hoc loco

Basion: *Hieracio racemosi-Fagetum sylvaticae* Allegrezza 2002;
Holotypus: Rel. 5 Tab. 4 pag. 20 in: Allegrezza M., 2002. Fitosociologia, 40 (1): 2-118.

APPENDIX 1: **List of the sporadic species in the phytosociological tables**

Phytosociological tab. 1
Rel. 1: *Silene dioica* (L.) Clairv. +; **Rel. 3:** *Clinopodium vulgare* L. s.l. +; **Rel. 7:** *Carex flacca* Schreb. +, *Ruscus aculeatus* L. +, *Sesleria italica* (Pamp.) Ujhelyi +; **Rel. 8:** *Allium carinatum* L. subsp. *pulchellum* Bonnier & Layens +; **Rel. 9:** *Cardamine impatiens* L. +; **Rel. 12:** *Campanula glomerata* L. +, *Dactylis glomerata* L. +; **Rel. 14:** *Polypodium vulgare* L.+, **Rel. 15:** *Laserpitium latifolium* L. +; **Rel. 18:** *Carlina corymbosa* L. +, *Teucrium chamaedrys* L. +; **Rel. 19:** *Epipactis microphylla* (Ehrh.) Sw. +, **Rel. 20:** *Hieracium bifidum* Kit. ex Hornem. +.

Phytosociological tab. 2
Rel. 1: *Cytisus scoparius* (L.) Link subsp. *scoparius* +, *Sesleria italica* (Pamp.) Ujhelyi 2; **Rel. 3:** *Stachys sylvatica* L. +; *Prunella vulgaris* L: subsp. *vulgaris* +; **Rel. 11:** *Digitalis ferruginea* L. +; **Rel. 13:** *Brachypodium genuense* (DC.) Roem. & Schult. +, *Cerastium arvense* L. +, *Festuca dimorpha* Guss. +, *Juniperus communis* L. subsp. *nana* Syme +, *Leontodon hispidus* L. +, *Thesium bavarum* Schrank +, *Trifolium pratense* L. subsp. *pratense* +; **Rel. 15:** *Ribes alpinum* L. +, *Astragalus monspessulanus* L. +, *Dactylis glomerata* L. +, *Silene italica* (L.) Pers. subsp. *italica* +; **Rel. 22:** *Hieracium tomentosum* (L.) L. +, *Ranunculus platanifolius* L. 1; **Rel. 24:** *Cardamine impatiens* L. 1; *Arctium lappa* L. +; **Rel. 25:** *Lapsana communis* L. subsp. *communis* +, *Gnaphalium sylvaticum* L. 1; **Rel. 26:** *Lonicera xylosteum* L. +; **Rel. 30:** *Ruscus hypoglossum* L. +; **Rel. 31:** *Equisetum hyemale* L. 1.

Phytosociological tab. 3
Rel. 2: *Campanula glomerata* L. +, *Carex macrolepis* DC. +, *Silene dioica* (L.) Clairv. 1; **Rel. 3:** *Lathraea squamaria* L. +; **Rel. 6:** *Carex flacca* Schreb. +; **Rel. 8:** *Asplenium trichomanes* L. +, *Cystopteris fragilis* (L.) Bernh. +, *Geranium sylvaticum* L. +, *Hieracium amplexicaule* L. +; **Rel. 9:** *Atropa bella-donna* L. +, *Heracleum sphondylium* L. subsp. *sibiricum* (L.) Simonk. +, *Hieracium tomentosum* (L.) L. +, *Saxifraga granulata* L. subsp. *granulata* +; **Rel. 12:** *Lathyrus pratensis* L. +; **Rel. 16:** *Cytisus scoparius* (L.) Link subsp. *scoparius* +, *Gnaphalium sylvaticum* L. +; **Rel. 18:** *Chaerophyllum hirsutum* L. subsp. *hirsutum* +; **Rel. 22:** *Silene nutans* L. +, *Calamagrostis corsica* (Hack.) D. Prain.

Phytosociological tab. 4

Rel. 1: *Campanula micrantha* Bertol. +, *Clinopodium vulgare* L. +; **Rel. 6:** *Campanula glomerata* L. +; **Rel. 7:** *Crataegus laevigata* (Poir.) DC. +, *Digitalis ferruginea* L. +, *Silene dioica* (L.) Clairv. +; **Rel. 10:** *Stachys sylvatica* L. +, *Urtica dioica* L. subsp. *dioica* +, **Rel. 20:** *Saxifraga granulata* L. subsp. *granulata* +; **Rel. 21:** *Laserpitium latifolium* L. +, *Aquilegia vulgaris* auct. Fl. Ital. +; **Rel. 23:** *Ruscus hypoglossum* L. +; **Rel. 24:** *Petasites hybridus* (L.) P. Gaertn., B. Mey. & Scherb. +.

Phytosociological tab. 5

Rel. 1: *Geranium purpureum* Vill. +; **Rel. 2:** *Heracleum sphondylium* L. subsp. *sibiricum* (L.) Simonk. +; **Rel. 3:** *Crataegus laevigata* (Poir.) DC. +, *Prunus spinosa* L. subsp. *spinosa* +; **Rel. 7:** *Thalictrum aquilegiifolium* L. subsp. *aquilegiifolium* +, *Clematis vitalba* L. +; **Rel. 8:** *Silene dioica* (L.) Clairv. 1, *Carex humilis* Leyss. +; **Rel. 9:** *Aconitum lycoctonum* L. emend. Koelle +, *Rumex acetosa* L. subsp. *acetosa* +; **Rel. 12:** *Carex flacca* Schreb. 1, *Lathyrus pratensis* L. +, *Silene nutans* L. +, *Trifolium pratense* L. subsp. *pratense* +; **Rel. 14:** *Laserpitium latifolium* L. +, *Viburnum lantana* L. +; **Rel. 15:** *Chaerophyllum aureum* L. +, *Ruscus hypoglossum* L. +, *Equisetum hyemale* L. 1., *Polystichum x bicknellii* (Christ) Hahne +.

Phytosociological tab. 6 (Synoptic Table)

Col. 1: *Asplenium adianthum-nigrum* III; **Col. 3:** *Rumex conglomeratus* I; **Col. 4:** *Allium carinatum* subsp. *pulchellum* I, *Galium album* I, *Carlina corymbosa* I, *Teucrium chamaedrys* I; **Col. 5:** *Arctium lappa* I, *Astragalus monspessulanum* I, *Cerastium arvense* I, *Chrysosplenium alternifolium* I, *Festuca dimorpha* I, *Leontodon hispidus* I, *Poa alpina* I, *Saxifraga callosa* I, *Saxifraga paniculata* I, *Vicia villosa* I; **Col. 6:** *Lathyrus pratensis* I, *Carex macrolepis* I, *Valeriana montana* I, *Bellis sylvestris* I, *Asperula laevigata* I, *Hieracium amplexicaule* I, **Col. 7:** *Petasites hybridus* I; **Col. 9:** *Doronicum pardalianches* II; **Col. 10:** *Peucedanum ostruthium* II; **Col. 11:** *Carlina acaulis* I, *Festuca capillata* I, *Festuca flavescens* 3, *Festuca ovina* II, *Gentiana cochiana* I, *Helianthemum nummularium* I, *Scabiosa columbaria* I, *Thymus serpyllum* I, *Trifolium alpestre* I, *Vicia cracca* I; **Col. 12:** *Lamium maculatum* I, *Myosotis decumbens* II, *Senecio rupestris* I; **Col. 13:** *Carex caryophyllea* I, *Galium mollugo* II, *Rumex acetosella* I.

APPENDIX 2: **List of the syntaxa quoted in the text**

Abieti-Fagetum n.n.; *Aceri platanoidis-Fagetum* Ubaldi & Speranza ex Ubaldi 1995; *Agrostio tenui-Fagetum* (Ubaldi & Speranza 1985) Arrigoni 1998; *Anemono-Fagetum* (Gentile 1970) Brullo 1983; *Aquifolio-Fagetum* Gentile 1970 nom. illeg.; *Aremonio-Fagion* (Borhidi 1963) Török, Podani &

Bohridi 1989; *Calluno-Ulicetea* Br.-Bl. & Tüxen ex Klika & Hadac 1944; *Cardamino kitaibeli-Fagenion sylvaticae* Biondi, Casavecchia, Pinzi, Allegrezza & Baldoni 2002; *Cardamino kitaibeli-Fagetum sylvaticae* Ubaldi, Puppi, Zanotti, Speranza & Corbetta 1990 ex Ubaldi 1995; *Carici sylvaticae-Fagetum sylvaticae* Biondi, Allegrezza, Ballelli, Guitian & Taffetani 1989 nom. illeg.; *Carpinion orientalis* Horvat 1958; *Dactylorhizo fuchsii-Fagetum sylvaticae* (Biondi, Allegrezza, Ballelli, Guitian & Taffetani 1989) Izco & Biondi 1992 non *Dactylorhizo fuchsii-Fagetum sylvaticae* Ubaldi, Puppi, Zanotti, Speranza & Corbetta 1990 nom. inval.; *Dactylorhizo fuchsii-Fagetum sylvaticae* (Biondi, Allegrezza, Ballelli, Guitian & Taffetani 1989) Izco & Biondi 1992 *aremonietosum agrimonioidis* subass. nov.; *Dactylorhizo fuchsii-Fagetum sylvaticae* (Biondi, Allegrezza, Ballelli, Guitian & Taffetani 1989) Izco & Biondi 1992 *hieracietosum racemosi* subass. nov.; *Doronico columnae-Fagenion mohesiacae* Dzwonko & Loster 2001; *Erytronio dentis canis-Carpinion betuli* Marinãek in Wallnöfer, Mucina & Grass 1993; *Euonymo latifolii-Fagion* Ubaldi 2003; *Fagetalia sylvaticae* Pawl. in Pawl *et al.*, 1928; *Fagion sylvaticae* Luquet 1926; *Galeopsi-Fagetum* Ubaldi 1995; *Geranio nodosi-Fagenion* Gentile ex Ubaldi & Speranza 1985; *Geranio nodosi-Fagion* Gentile 1974 nom. inval.; *Geranio versicoloris-Fagion sylvaticae* Gentile 1970; *Gymnocarpio-Fagetum* Ubaldi & Speranza ex Ubaldi 1995; *Hieracio racemosi-Fagetum* Allegrezza 2002; *Ilici-Fagion* Br.-Bl. 1967; *Lathyro veneti-Fagetum* Biondi, Casavecchia, Pinzi, Allegrezza & Baldoni 2002; *Listero ovatae-Quercetum cerridis* Di Pietro & Tondi 2005; *Luzulo pedemontanae-Fagetum* Oberdorfer & Hofmann 1967; *Luzulo pedemontanae-Fagetum vaccinietosum myrtilli* Oberdorfer & Hofmann 1967; *Luzulo sylvaticae-Fagetum* Ellemberg & Klötzli 1974; *Luzulo-Fagetum* Meusel 1937; *Luzulo-Fagion* Lohmeyer & Tüxen 1954; *Monotropo-Fagetum* Ubaldi & Speranza ex Ubaldi 1995; *Orthilio secundae-Fagetum* (Barbero & Quézel 1976) Bergmeier 1990; *Polysticho-Fagetum* Feoli & Lagonegro 1982 nom. inval.; *Prenantho purpureae-Fagetum athyrietosum filicis-foeminae* subass. nov.; *Prenantho purpureae-Fagetum sylvaticae* ass. nov.; *Prenantho purpureae-Fagetum sylvaticae typicum* subass. nov.; *Prenantho purpureae-Fagetum sylvaticae vaccinietosum myrtilli* subass. nov.; *Quercetalia roboris* Tüxen 1931; *Ranunculo brutii-Fagetum* Bonin 1967; *Roso pendulinae-Fagetum* Arrigoni 1998 nom. nud.; *Roso pendulinae-Fagetum* Rivas-Martínez, Costa & P. Soriano in Rivas-Martínez et al. 2002; *Saniculo-Fagetum* Ubaldi 1995; *Saxifrago rotundifoliae-Fagenion* Marinãek, Mucina, Zupanãiã, Poldini, Dakskobler, Accetto 1993; *Solidagini-Fagetum* Ubaldi, Puppi, Zanotti, Speranza & Corbetta 1990 ex Ubaldi 1995; *Trochiscantho-Fagetum* Gentile 1974; *Veronico urticifoliae-Fagenion sylvaticae* suball. nov.; *Veronico urticifoliae-Fagetum* Montacchini 1972.

APPENDIX 3: **Place and date of the relevés**

Phytosociological tab. 1: ***Dactylorhizo fuchsii-Fagetum sylvaticae aremonietosum agrimonioidis***

Rel 1- Tre Monti, Ortolano, nearby Vomano river (Nerito-TE) 22/08/2006; **Rel 2-3:** Vena Rossa, Ortolano, nearby Vomano river (Nerito-TE) 22/08/2006; **Rel 4:** Iacci Marino, nearby Vomano river (Nerito-TE) 22/08/2006; **Rel. 5-6-7:** Rocca delle Vene, S. Leo (Campotosto - AQ), 22/08/2006; **Rel. 8-9:** Colle Veticchiaro, Maularo, towards Volpara Falls, (Acquasanta, AP), 07/09/2005; **Rel. 10-11:** Fosso di Faoio, Collefrattale, lower parts of S. Gerbone wood (Acquasanta - AP) 01/09/2005; **Rel. 12:** Bosco Solagnone, Ceppo (Rocca S. Maria - TE), 01/09/2005; **Rel. 13; 17:** Monte Communitore, (Arquata del Tronto, AP), 29/08/2005; **Rel. 14:** Coste dei Prati, nearby Vomano river (Nerito - TE) 08/09/2006; **Rel. 15-16:** Zingano, F.te Mare Gelato (Crognaleto - TE), 06/09/2006. **Rel. 18-19-20-21:** C.le Micedi & M. Bilanciere (Cortino - TE), 06/09/2006.

Phytosociological tab. 2: ***Prenantho purpureae-Fagetum sylvaticae typicum***

Rel 1-2 F.sso dell'Acero-F.sso della Lagnetta, Cesacastina (Nerito-TE) 22/08/2006; **Rel 3-4:** Centocascate, Cesacastina, (Crognaleto - TE), 22/08/2006; **Rel 5:** Colle della Pietra, Cesacastina, (Crognaleto - TE), 22/08/2006; **Rel. 6-7:** C.lle dei Poggiani, M. Mascioni (Campotosto - AQ), 06/09/2005; **Rel. 8:** Valle del Chiarino (Arquata del Tronto - AP), 27/08/2005; **Rel. 9-10:** Monte Communitore, (Arquata del Tronto, AP), 29/08/2005; **Rel. 11-12:** Agro Nero, Pannicaro Lakes (Accumoli - RI), 27/08/2005; **Rel. 13-14; 27:** F.sso Gorzano, (Amatrice, RI), 23/08/2004; **Rel. 15-16** Balzi Classette, after Piani di Fonte (Amatrice, RI), 01/08/2004; **Rel. 17-18:** F.sso Selva Grande, (Amatrice, RI), 01/08/2004. **Rel. 19-20-21; 28:** Bosco della Langamella, Ceppo on the path towards Lago dell'Orso (Rocca S. Maria - TE), 25/07/2005. **Rel. 22:** F.sso Gorzano, (Amatrice, RI), 12/08/2004; **Rel. 23:** pathway towards Stazzo di Facile on M. Lo Zoppo, Preta (Amatrice, RI), 26/08/2004; **Rel. 24-25:** Macchie Piane, NW slopes of Pizzo di Sevo (Amatrice, RI), 28/08/2006; **Rel. 26:** Sacro Cuore, Capricchia (Amatrice, RI), 28/08/2003; **Rel. 29-30-31:** Bosco della Martese, Rio della Valle Castellana, Ceppo (Rocca S. Maria - TE), 01/09/2005.

Phytosociological tab. 3: ***Prenantho purpureae-Fagetum sylvaticae vaccinietosum myrtilli***

Rel 1: Centocascate, Cesacastina, (Crognaleto - TE), 22/08/2006; **Rel 2:** Monte Communitore, (Arquata del Tronto, AP), 29/08/2005; **Rel 3:** F.sso Gorzano, (Amatrice, RI), 23/08/2004; **Rel. 4-5-6-7:** Bosco della Martese, Ceppo (Rocca S. Maria - TE), 25/07/2005; **Rel. 8:** Bosco della Martese, F.sso

Valle Castellana (Rocca S. Maria - TE), 24/07/2005; **Rel 9**: F.sso Gorzano, (Amatrice, RI), 12/08/2004; **Rel. 10-11**: pathway towards Stazzo di Facile on M. Lo Zoppo, Preta (Amatrice, RI), 26/08/2004; **Rel. 12-13**: Macchie Piane, NW slopes of Pizzo di Sevo (Amatrice, RI), 28/08/2006; **Rel. 14-15-16**: Valle della Corte (Acquasanta, AP), 05/07/2003; **Rel. 17-18** : Bosco della Martese, Ceppo (Rocca S. Maria - TE), 01/09/2005; **Rel. 19**: Bosco della Martese, Rio della Valle Castellana, Ceppo (Rocca S. Maria - TE), 01/09/2005; **Rel. 20-21-22**: Bosco della Martese, Fsso del Baciletto (Rocca S. Maria - TE), 22/07/2005.

Phytosociological tab. 4: ***Prenantho purpureae-Fagetum sylvaticae athyrietosum filicis-foeminae***

Rel 1: Il Coppo, Rio Fucino (Campotosto - AQ), 22/08/2006; **Rel 2-3**: Valle della Corte (Acquasanta, AP), 05/07/2003; **Rel 4-5**: Valle del Chiarino, Macera della Morte, (Arquata del Tronto - AP), 27/08/2005; **Rel. 6**: Monte Communitore, (Arquata del Tronto, AP), 29/08/2005; **Rel. 7-14**: Agro Nero, Pannicaro Lakes (Accumoli - RI), 26-27/08/2005; **Rel 15-17**: F.sso di Selva Grande, (Amatrice, RI), 01/08/2005; **Rel. 18-19**: Bosco della Martese, Ceppo (Rocca S. Maria - TE), 25/07/2005; **Rel. 20**: F.sso Gorzano, (Amatrice, RI), 11/08/2004; **Rel. 21-22** M. Lo Zoppo, F.sso Malopasso, Preta (Amatrice, RI), 27/08/2004; **Rel. 23-24-25** : Bosco della Martese, Ceppo (Rocca S. Maria - TE), 13/07/2005; **Rel. 23**: Bosco della Martese, Rio della Valle Castellana, Ceppo (Rocca S. Maria - TE), 01/09/2005.

Phytosociological tab. 5: Impoverished and intermediate *Fagus sylvatica* woodlands

Rel 1: Tignoso, Cesacastina, (Crognaleto - TE), 22/08/2006; **Rel 2**: Centocascate, Cesacastina, (Crognaleto - TE), 22/08/2006; **Rel. 3**: Colle Leone, Mascioni, in the vicinity of Lake Campotosto, (Campotosto - AQ), 06/09/2005; **Rel. 4**: Le Serre, Mascioni, in the vicinity of Lake Campotosto, (Campotosto - AQ), 06/09/2005 ; **Rel. 5-6**: Bosco Solagnone, Ceppo (Rocca S. Maria - TE), 01/09/2005; **Rel. 7- 8-9-10-11**: Piana di Conte, Il Poggio and Vene Rosse, Monte Communitore, (Arquata del Tronto, AP), 29/08/2005; **Rel. 12**: Bosco della Langamella, Ceppo (Rocca S. Maria - TE) 25/07/2005; **Rel. 13**: Fosso Castellano, Ceppo (Rocca S. Maria - TE) 25/07/2005; **Rel. 14**: C.lle Zoppo, Fosso Malepasso, Preta (Amatrice - RI) 26/08/2006; **Rel. 15**: Diga del Rio Fucino in the vicinity of Lake Campotosto (Campotosto - AQ), 05/09/2005.

APPENDIX 4:

Species occurring in the beech woods phytosociological tables of Longhitano & Ronsisvalle (1974) and absent in those of the present paper: *Acinos arvensis* (Lam.) Dandy; *Agrimonia eupatoria* L.; *Alnus viridis* (Chaix) DC. subsp. *viridis*;

Asplenium adiantum-nigrum L. subsp. *adiantum-nigrum*; *Bellis perennis* L.; *Bistorta vivipara* (L.) Delarbre; *Bromus sterilis* L.; *Calystegia sepium* (L.) R. Br. subsp. *sepium*; *Campanula rotundifolia* L. subsp. *rotundifolia*; *Cardamine pentaphyllos* (L.) Krantz; *Carex echinata* Murray; *Cruciata laevipes* Opiz; *Festuca paniculata* (L.) Schinz & Thell. subsp. *paniculata*; *Festuca pratensis* Hudson; *Galium aparine* L.; *Galium verum* L. subsp. *verum*; *Genista tinctoria* L.; *Hylotelephium anacampseros* (L.) H.Ohba; *Hypericum perforatum* L.; *Knautia arvensis* (L.) Coult.; *Melampyrum sylvaticum* L. subsp. *sylvaticum*; *Myosotis discolor* Pers. subsp. *discolor*; *Platanthera bifolia* (L.) Rchb.; *Ranunculus montanus* Willd.; *Rumex acetosella* L.; *Rumex obtusifolius* L.; *Scrophularia nodosa* L.; *Serapias lingua* L.; *Tanacetum parthenium* (L.) Sch. Bip.; *Teucrium siculum* (Raf.) Guss. subsp. *euganeum* (Vis.) Tornad.; *Valeriana officinalis* L.; *Veronica chamaedrys* L.

Species occurring in the beech woods phytosociological tables of the present paper and absent in those of Longhitano & Ronsisvalle (1974): *Acer pseudoplatanus* L.; *Aconitum lycoctonum* L. emend. Koelle; *Actaea spicata* L.; *Adoxa moschatellina* L. subsp. *moschatellina*; *Aegopodium podagraria* L.; *Allium carinatum* L. subsp. *pulchellum* Bonnier & Layens; *Anemone nemorosa* L.; *Anthriscus sylvestris* (L.) Hoffm.; *Arctium lappa* L.; *Asperula laevigata* L.; *Asperula taurina* L. subsp. *taurina*; *Asplenium trichomanes* L.; *Astragalus monspessulanum* L.; *Atropa bella-donna* L.; *Bellis sylvestris* Cirillo; *Blechnum spicant* (L.) Roth; *Brachypodium genuense* (DC.) Roem. & Schult.; *Calamagrostis corsica* (Hack.) D. Prain; *Campanula micrantha* Bertol.; *Campanula latifolia* L.; *Campanula persicifolia* L.; *Cardamine chelidonia* L.; *Cardamine impatiens* L.; *Cardamine kitaibelii* Bech.; *Carex flacca* Schreb.; *Carex humilis* Leyss.; *Carex macrolepis* DC.; *Carex pilosa* Scop.; *Carpinus betulus* L.; *Cephalanthera damasonium* (Mill.) Druce; *Cerastium arvense* L.; *Chaerophyllum hirsutum* L. subsp. *hirsutum*; *Chaerophyllum hirsutum* L. subsp. *magellense* (Ten.) Pignatti; *Chaerophyllum temulum* L.; *Chrysosplenium alternifolium* L.; *Clinopodium vulgare* L.; *Cornus sanguinea* L.; *Crataegus laevigata* (Poir.) DC.; *Cruciata glabra* (L.) Ehrend.; *Cyclamen hederifolium* Aiton subsp. *hederifolium*; *Deschampsia flexuosa* (L.) Trin.; *Digitalis ferruginea* L.; *Dryopteris affinis* (Lowe) Fraser-Jenk. subsp. *borrerii* (Newman) Fraser-Jenk.; *Epipactis baumanniorum* Soldano & F. Conti; *Epipactis microphylla* (Ehrh.) Sw.; *Epipactis muelleri* Godfery; *Equisetum hyemale* L.; *Euonymus latifolius* (L.) Mill.; *Euphorbia dulcis* L.; *Festuca altissima* All.; *Festuca dimorpha* Guss.; *Festuca heterophylla* Lam.; *Galium mollugo* L. subsp. *erectum* Syme; *Geranium purpureum* Vill.; *Geranium sylvaticum* L.; *Gnaphalium sylvaticum* L.; *Gymnocarpium dryopteris* (L.) Newman; *Helleborus bocconei* Ten.; *Hieracium amplexicaule* L.; *Hieracium bifidum* Kit. ex Hornem.; *Hieracium racemosum* Waldst. & Kit. ex Willd. subsp. *crinitum* (SM,) Zahn; *Hieracium racemosum* Waldst. & Kit. ex Willd. subsp. *sublateriflorum* Zahn; *Hieracium racemosum* Waldst. & Kit. ex Willd. subsp. *virgaurea* (Cosson)

Zahn; *Hieracium racemosum* Waldst. & Kit. ex Willd. subsp. *racemosum*; *Hieracium tomentosum* L.; *Hordelymus europaeus* (L.) Harz; *Hypericum montanum* L.; *Impatiens noli-tangere* L.; *Juniperus communis* L. subsp. *nana* Syme; *Knautia drymeia* Heuff. subsp. *centrifrons* (Borbàs) Ehrend.; *Lamium galeobdolon* L. s.l.; *Laserpitium latifolium* L.; *Lathraea squamaria* L.; *Lathyrus linifolius* (Reichard) Bässler; *Lathyrus venetus* (Mill.) Wohlf.; *Leontodon hispidus* L.; *Lilium bulbiferum* L. subsp. *croceum* (Chaix) Jan; *Lilium martagon* L.; *Lonicera xylosteum* L.; *Luzula forsteri* (Sm.) DC.; *Malus sylvestris* (L.) Mill.; *Melampyrum italicum* Soó; *Mercurialis perennis* L.; *Myosotis sylvatica* Hoffm.; *Petasites hybridus* (L.) P. Gaertn., B. Mey & Schreb.; *Peucedanum oreoselinum* (L.) Moench; *Peucedanum verticillare* (L.) Mert. & W.D.J. Koch; *Platanthera chlorantha* (Custer) Rchb.; *Poa alpina* L.; *Polygonatum odoratum* (Mill.) Druce; *Polygonatum verticillatum* (L.) All.; *Polystichum lonchitis* (L.) Roth; *Polystichum setiferum* (Forssk.) T. Moore ex Woyn.; *Polystichum x bichnellii* (Christ) Hahne; *Potentilla micrantha* Ramond ex DC.; *Prunella vulgaris* L.; *Prunus spinosa* L. subsp. *spinosa*; *Pyrola rotundifolia* L.; *Pyrola media* Sw.; *Ranunculus platanifolius* L.; *Ribes alpinum* L.; *Ribes uva-crispa* L.; *Rosa arvensis* Huds.; *Rosa pendulina* L.; *Rumex acetosa* L. subsp. *acetosa*; *Rumex alpestris* Jacq.; *Salix caprea* L.; *Sambucus nigra* L.; *Saxifraga callosa* Sm. subsp. *callosa*; *Saxifraga granulata* L. subsp. *granulata*; *Saxifraga paniculata* Mill.; *Scrophularia scopolii* Hoppe ex Pers.; *Senecio ovatus* (P. Gaertn., B. Mey. & Scherb.) Willd.; *Sesleria autumnalis* (Scop.) F.W. Schultz; *Sesleria italica* (Pamp.) Ujhelyi; *Silene dioica* (L.) Clairv.; *Silene italica* (L.) Pers. subsp. italica; *Silene nutans* L.; *Stachys sylvatica* L.; *Stellaria holostea* L. subsp. *holostea*; *Symphytum tuberosum* L. subsp. *angustifolium* (A. Kern.) Nyman; *Tamus communis* L.; *Thesium bavarum* Schrank; *Tilia platyphyllos* Scop.; *Trifolium pratense* L.; *Ulmus glabra* Huds.; *Valeriana montana* L.; *Valeriana tripteris* L. subsp. *tripteris*; *Veronica officinalis* L.; *Vicia sepium* L.; *Viola alba* Besser subsp. *dehnhardtii* (Ten.) W. Becker; *Viola odorata* L.

Phytosociological tab. 6 - Synoptic table

column n.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
numbers of relevés per column	5	6	11	21	31	22	26	9	12	5	21	13	17	8	5
Dactylorhizo-Fagetum															
Dactylorhiza maculata subsp. fuchsii	2	3	4	1	2	2	1	.	2	.	.	.	.	.	4
Hepatica nobilis	.	3	2	3	2	2	1	1	.	.	3	.	.	.	.
Pteridium aquilinum	5	5	4	3	2	.	.	.	.	.	1	.	3	3	.
Carex sylvatica	.	.	4	2	2	1	1	.	1	.	.	.	.	.	2
Hedera helix	3	4	5	3	.	.	.	.	.	.	1	.	2	.	.
Aegopodium podagraria	.	.	3	3	1	.	3	1	.	.	.	.	.	.	.
Dactylorhizo-Fagetum aremonietosum															
Acer pseudoplatanus	.	.	.	3	2	1	1	1	1	2	1	1	.	.	2
Daphne laureola	2	3	.	5	2	2	.	2	.	.	.	.	.	.	4
Euphorbia amygdaloides	.	2	.	4	3	2	2	1	.	.	.	.	.	.	.
Acer opalus subsp. obtusatum	1	2	3	4	.	1	.	.	.	.	.	.	.	.	.
Polygonatum multiflorum	.	.	.	2	1	.	.	.	.	1	.	3	4	.	.
termophilous differentials															
Lonicera xylosteum	1	2	2	1	1	.	.	.	.	.	1	.	.	.	.
Lathyrus venetus	2	1	3	3	.	.	.	1	.	.	.	.	.	.	.
Polystichum setiferum	.	.	4	2	.	.	.	2	.	.	.	.	.	.	2
Cyclamen hederifolium	1	2	1	3	.	.	.	.	.	.	.	.	.	.	.
Tamus communis	4	1	4	2	.	.	.	.	.	.	.	.	.	.	.
Crataegus monogyna	3	.	4	2	.	.	.	1	.	.	.	.	.	.	.
Acer campestre	2	1	3	3	.	.	.	.	.	.	.	.	.	.	.
Corylus avellana	.	.	1	2	.	.	.	.	.	.	2	.	1	.	.
Clematis vitalba	.	.	4	2	.	.	.	1	.	.	.	.	.	.	.
Carpinus betulus	.	.	2	1	.	.	.	.	.	.	.	.	.	.	.
Fraxinus ornus	.	.	2	2	.	.	.	.	.	.	.	.	.	.	.
Prenantho purpureae -Fagetum typicum															
Prenanthes purpurea	.	.	2	1	4	5	4	.	4	2	2	5	4	4	5
Adenostyles glabra	.	.	.	1	4	3	5	3	.	1	.	5	1	.	4

column nr.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
numbers of relevés per column	5	6	11	21	31	22	26	9	12	5	21	13	17	8	5
Genista germanica	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
Genista tinctoria	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Melampyrum sylvaticum	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
Phyteuma betonicifolium	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
Potentilla erecta	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
Holcus mollis	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Luzula campestris	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Luzula pedemontana	.	.	.	.	.	.	.	.	.	.	.	.	.	4	.
Quercus petraea	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.
Quercetalia pubescenti-petraeae, Quercetalia ilicis															
Viola alba subsp. dehnhardtii	2	.	2	1	.	.	.	1	.	.	.	.	1	.	.
Silene nutans	.	.	.	.	1	1	1	.	.	.	.	.	.	1	.
Silene italica subsp. italica	5	2	.	.	1	.	.	.	.	.	.	.	1	.	.
Cyclamen repandum	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.
Quercus pubescens	4	2	.	.	.	.	.	.	.	.	1	.	.	.	.
Polygonatum odoratum	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.
Digitalis ferruginea	.	.	.	.	1	.	1	.	.	.	.	.	.	.	.
Peucedanum oreoselinum	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.
Quercus ilex	3	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Epipactis microphylla	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.
Sorbus domestica	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
Cornus mas	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
Ruscus aculeatus	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Helleborus foetidus subsp. foetidus	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
Impatiens noli-tangere	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.
Arabis turrita	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
Brachypodium pinnatum	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
Carex olbiensis	5	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Phytosociological tab. 6 - Synoptic table

column n.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	column nr.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
numbers of relevés per column	5	6	11	21	31	22	26	9	12	5	21	13	17	8	5	**numbers of relevés per column**	5	6	11	21	31	22	26	9	12	5	21	13	17	8	5
Pyrola minor	.	.	.	.	2	2	1	.	3	5	.	2	2	.	3	Ranunculus bulbosus	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
Veronica urticifolia	.	.	.	1	5	5	4	.	4	.	5	.	.	4	.	Sesleria autumnalis	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.
Cirsium erisithales	.	.	.	.	2	2	2	.	.	.	.	.	.	.	.	**Querco-Fagetea**															
Hieracium bifidum	.	.	.	.	2	1	1	.	.	.	.	.	.	.	.	Lactuca muralis	5	5	3	3	3	1	2	3	3	3	1	3	4	.	3
Carex pilosa	.	.	.	.	2	1	2	.	.	.	.	.	.	.	.	Rubus hirtus	5	4	.	5	5	3	4	5	4	.	.	4	5	.	4
Prenantho purpureae -Fagetum vaccinietosum																Cardamine bulbifera	.	.	2	1	1	1	3	5	3	2	.	2	2	.	.
Vaccinium myrtillus	.	.	.	.	2	5	1	.	4	5	3	.	.	2	3	Ajuga reptans	1	1	4	2	2	2	2	2	.	.	.	1	1	.	.
Blechnum spicant	.	.	.	.	.	1	1	.	.	.	.	.	.	2	.	Sorbus aria	1	1	.	1	1	2	1	1	.	.	1	.	1	2	.
Campanula micrantha	.	.	.	.	2	3	1	.	.	.	.	.	.	.	.	Hieracium murorum	.	.	4	1	4	5	3	2	5	.	3	4	4	.	.
Melampyrum italicum	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	Epipactis helleborine	.	.	2	1	2	1	1	1	.	2	.	1	3	.	.
Pyrola rotundifolia	.	.	.	.	.	2	.	.	.	.	.	.	.	.	.	Ranunculus lanuginosus	.	1	2	1	2	1	2	4	1	.	.	.	.	.	.
Prenantho purpureae -Fagetum athyrietosum filicis-foeminae																Campanula trachelium	.	.	2	2	2	.	1	1	.	.	1	2	1	.	.
Dryopteris filix-mas	.	.	2	1	3	2	5	3	5	.	.	4	2	.	3	Carex digitata	1	2	1	3	.	1	1	.	.	1	.	.	.	.	5
Athyrium filix-femina	.	.	.	.	2	2	5	1	5	2	.	2	.	.	4	Brachypodium sylvaticum	.	.	3	2	2	1	1	.	.	.	1	.	1	.	.
Polystichum aculeatum	.	.	.	1	3	3	5	.	4	.	.	.	.	.	2	Cruciata glabra	5	3	2	1	1	1	1	.	.	.	.	.	.	.	.
Dryopteris affinis subsp. borrerii	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	Potentilla micrantha	.	.	1	3	2	1	1	.	2	.	.	.	.	.	.
Gymnocarpium dryopteris	.	.	.	.	.	.	1	.	5	.	.	.	.	.	.	Rosa arvensis	1	1	.	3	1	.	1	1	.	.	.	.	.	.	.
Veronico urticifoliae-Fagenion sylvaticae																Laburnum anagyroides	.	.	2	1	1	1	.	1	.	.	2	.	.	.	.
Solidago virgaurea	4	3	4	4	3	4	2	.	4	4	4	3	2	1	5	Digitalis lutea subsp. australis	4	2	.	1	2	1	.	.	.	.	.	.	1	.	.
Festuca heterophylla	5	5	3	3	3	4	1	2	.	4	.	.	1	.	5	Quercus cerris	3	.	4	1	1	.	.	.	.	.	1	.	.	.	3
Fragaria vesca	5	3	1	2	1	1	.	3	3	.	2	2	4	.	.	Hieracium sylvaticum	5	5	.	.	.	.	.	.	.	3	.	.	.	5	5
Oxalis acetosella	.	.	.	1	1	2	3	.	5	2	2	4	1	.	3	Geum urbanum	.	.	.	1	1	.	1	1	.	.	.	.	.	.	.
Luzula sylvatica	3	5	2	3	2	3	.	1	.	4	.	.	.	.	.	Mercurialis perennis	.	.	.	1	.	.	.	2	.	.	1	.	1	.	.
Veronica officinalis	2	.	.	.	1	1	1	.	1	.	.	.	1	1	4	Chaerophyllum temulum	.	.	.	2	1	1	1	.	.	.	.	.	.	.	.
Hieracium racemosum s.l.	5	5	.	2	1	2	1	.	.	.	2	.	.	.	5	Campanula persicifolia	.	.	.	1	1	1	1	.	.	.	.	.	.	.	.
Daphne mezereum	.	.	.	.	2	2	2	.	3	4	.	.	.	.	2	Luzula forsteri	5	2	.	1	1	.	.	.	.	.	.	.	.	.	.
Deschampsia flexuosa	.	.	.	.	1	2	1	.	.	.	1	.	.	5	4	Cephalanthera longifolia	5	5	.	1	.	.	.	2	.	.	.	.	.	.	.
Pulmonaria picta	.	.	3	2	3	2	2	.	2	.	.	.	.	.	.	Platanthera bifolia	.	.	2	.	.	.	.	.	.	.	.	2	1	3	.
Lathyrus linifolius	.	.	.	.	1	1	1	.	.	.	1	.	1	1	.	Prunus avium	.	.	2	1	1	.	.	.	.	.	.	.	1	.	.

Phytosociological tab. 6 - Synoptic table

column n.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	column nr.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
numbers of relevés per column	5	6	11	21	31	22	26	9	12	5	21	13	17	8	5	**numbers of relevés per column**	5	6	11	21	31	22	26	9	12	5	21	13	17	8	5
Rosa pendulina	.	.	.	1	2	4	2	.	.	4	.	.	.	.	.	Salix caprea	.	.	.	1	1	1	1	.	.	.	.	.	.	.	.
Orthilia secunda	.	.	.	.	2	3	1	.	.	1	.	.	.	.	.	Lilium bulbiferum subsp. croceum	.	.	2	2	.	.	1	.	.	.	.	.	.	.	.
Calamagrostis arundinacea	.	.	.	.	1	1	.	.	.	.	.	1	.	.	.	Myosotis sylvatica	.	.	.	.	1	.	.	2	3	.	.	.	.	.	.
Cytisus hirsutus	.	.	.	2	.	1	.	.	.	.	.	.	.	.	.	Sambucus nigra	.	.	.	1	.	.	.	.	1	.	.	.	1	.	.
Aremonio Fagion																**Hypericum montanum**	.	.	1	.	1	.	.	.	.	.	1	.	.	.	.
Geranium nodosum	.	.	5	3	2	3	4	4	3	2	3	.	.	.	5	Platanthera chlorantha	3	2	.	.	1	.	.	.	.	.	.	.	.	.	.
Saxifraga rotundifolia	.	.	.	2	2	3	3	4	5	3	.	1	.	.	5	Helleborus bocconei	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.
Cardamine kitaibeli	.	.	.	.	1	1	1	4	.	.	.	2	1	.	.	Vicia sepium	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.
Valeriana tripteris	.	.	.	.	1	1	2	.	1	.	.	2	.	.	2	Symphytum tuberosum	.	.	.	1	.	.	.	.	.	.	1	.	.	.	.
Aremonia agrimonoides	.	.	.	4	5	3	4	.	.	.	.	.	.	.	4	Ostrya carpinifolia	.	.	.	2	.	1	.	.	.	.	.	.	.	.	.
Cardamine enneaphyllos	.	.	.	.	1	1	2	4	.	.	.	.	.	.	.	Hieracium virgaurea	.	.	.	.	.	.	.	.	.	.	1	2	.	.	.
Euonymus latifolius	.	.	.	1	1	.	1	.	.	.	.	.	.	.	.	Laburnum alpinum	.	.	.	.	.	.	.	.	.	.	.	.	1	3	.
Calamintha grandiflora	.	.	.	.	.	.	.	.	1	.	1	.	.	.	.	Ranunculus nemorosus	.	.	.	.	.	.	.	.	.	.	1	1	.	.	.
Anemone trifolia	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	Cardamine graeca	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
Rhamnus alpina subsp. fallax	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	Melittis melissophyllum	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
Doronicum columnae	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	Poa sylvicola	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
Carpinion betuli, Tilio Acerion s.l. Alno-Ulmion																Listera ovata	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.
Primula vulgaris	1	2	1	5	2	2	1	1	.	.	1	.	.	.	.	Epipactis muelleri	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.
Polypodium vulgare	4	2	.	.	1	1	1	1	.	.	2	.	.	.	.	Anthriscus sylvestris	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.
Populus tremula	.	.	.	1	1	1	1	.	.	.	1	.	1	.	.	Peucedanum verticillare	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Lilium martagon	.	.	.	1	1	1	1	2	.	.	.	.	.	.	.	Stachys officinalis	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
Castanea sativa	5	.	.	2	.	.	.	.	.	.	2	.	2	2	.	Acer opalus subsp. opalus	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
Lonicera caprifolium	1	1	2	1	.	.	.	.	.	.	.	.	.	.	.	Anemone apennina	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Salvia glutinosa	.	.	1	2	1	.	1	.	.	.	.	.	.	.	.	Sorbus torminalis	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Laserpitium latifolium	.	.	.	1	1	1	1	.	.	.	.	.	.	.	.	**Rhamno-Prunetea**															
Ruscus hypoglossum	.	.	2	.	1	1	1	.	.	.	.	.	.	.	.	Juniperus communis	3	.	1	2	1	1	.	.	.	1	1	.	1	.	.
Knautia drymeia subsp. centrifrons	.	.	.	1	1	1	.	.	.	.	.	.	.	.	.	Crataegus laevigata	2	2	.	1	.	.	1	.	.	.	.	.	.	.	.
Galium aristatum	.	.	.	.	.	.	.	.	.	1	.	.	.	1	5	Cornus sanguinea	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.

Phytosociological tab. 6 - Synoptic table

column n.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	column nr.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
numbers of relevés per column	5	6	11	21	31	22	26	9	12	5	21	13	17	8	5	**numbers of relevés per column**	5	6	11	21	31	22	26	9	12	5	21	13	17	8	5
Acer platanoides	.	.	.	1	.	.	1	1	.	.	.	.	.	.	.	Viburnum lantana	.	.	.	.	1	.	.	.	.	.	1	.	.	.	.
Campanula latifolia	.	.	.	.	.	1	1	.	.	.	.	.	.	.	.	Hippocrepis emerus subsp. emeroides	4	2	.	.	.	.	.	.	.	.	.	.	.	.	.
Bromus racemosus	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	Rubus ulmifolius	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.
Stellaria holostea	.	.	.	.	.	.	1	2	.	.	.	.	.	.	.	Lonicera nigra	.	.	.	.	.	.	.	.	.	.	.	2	1	.	.
Ulmus glabra	.	.	1	.	1	.	.	.	.	.	.	.	.	.	.	Pyracantha coccinea	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
Dryopteris dilatata	.	.	.	.	.	.	.	.	2	.	.	2	.	.	.	Prunus spinosa	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.
Scrophularia nodosa L.	.	.	.	.	.	.	.	1	.	.	.	.	1	.	.	Ribes uva-crispa	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Viola odorata	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	Ribes alpinum	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Loncomelos pyrenaicus	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	Cotoneaster integerrimus	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
Arisarum proboscideum	.	.	2	.	.	.	.	.	.	.	.	.	.	.	.	Hippocrepis emerus subsp. emerus	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
Galanthus nivalis	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	Rosa canina	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Pulmonaria apennina	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	Rubus saxatilis	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
Pulmonaria vallarsae	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	Ribes petraeum	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.
Tilia platyphyllos	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	**Vaccinio-Piceetea, Pino-Juniperetea, Erico-Pinetea**															
Aruncus dioicus	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	Monotropa hypopitys	.	.	.	1	1	1	.	.	.	2	.	2	3	.	.
Betula pendula	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	Corallorhiza trifida	.	.	.	.	1	.	1	.	3	2	.	.	1	.	.
Tilia cordata	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	Picea abies	.	.	.	.	.	.	.	.	1	1	.	.	.	.	.
Asperula taurina	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	Calamagrostis varia	.	.	.	.	.	1	.	.	.	.	.	.	.	.	2
Phegopteris connectilis	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	Epipactis atrorubens	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
Alnus incana	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	Juniperus alpina	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Fagetalia sylvaticae																Alnus viridis	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
Fagus sylvatica	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	Arctostaphylos uva-ursi	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
Viola reichenbachiana	5	5	5	5	5	4	4	5	3	.	.	5	5	.	4	Larix decidua	.	.	.	.	.	.	.	.	.	.	3	.	.	.	.
Sanicula europaea	1	3	5	5	3	2	3	2	.	1	.	4	1	.	4	Pinus sylvestris	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
Melica uniflora	5	5	5	5	2	2	1	1	.	.	.	.	1	1	4	Rhododendron ferrugineus	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.
Galium odoratum	.	.	3	1	3	3	4	2	1	.	.	5	3	.	3	Vaccinium vitis-idaea	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
Sorbus aucuparia	.	.	.	1	2	4	2	.	.	2	1	2	1	2	4	Listera cordata	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.
Euphorbia dulcis	1	1	3	1	.	.	1	1	1	.	1	1	1	.	.	Luzula sieberi	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.
Poa nemoralis	.	.	1	2	4	2	2	1	3	.	2	.	.	2	.	Vaccinium uliginosum	.	.	.	.	.	.	.	.	.	3	.	.	.	.	.

Phytosociological tab. 6 - Synoptic table

column n.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	column nr.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
numbers of relevés per column	5	6	11	21	31	22	26	9	12	5	21	13	17	8	5	numbers of relevés per column	5	6	11	21	31	22	26	9	12	5	21	13	17	8	5
Abies alba	.	.	.	2	1	2	1	.	2	3	1	.	3	.	5	Veronica austriaca	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.
Geranium robertianum	.	.	2	2	1	.	2	3	.	.	1	2	4	.	.	"Galio-Urticetea; Trifolio-Geranietea, Epilobietea ngustifolii"																
Taxus baccata	1	1	.	1	1	1	1	4	.	.	.	.	.	.	.	Epilobium montanum	.	.	1	.	2	1	3	5	3	.	.	2	2	.	2
Ilex aquifolium	3	4	.	1	1	1	1	.	.	.	.	.	.	2	.	Rubus idaeus	.	.	.	.	1	2	1	.	1	1	1	1	1	.	.
Senecio ovatus	.	.	.	.	1	1	1	1	.	.	.	3	4	.	2	Aquilegia vulgaris	.	.	.	1	1	1	1	.	.	.	.	3	3	.	.
Veronica montana	.	.	4	1	1	1	2	3	.	.	.	.	.	.	.	Silene dioica	.	.	.	1	1	1	1	.	.	.	.	2	2	.	.
Neottia nidus-avis	.	.	.	1	2	1	1	.	.	.	.	2	3	.	.	Heracleum sphondylium	.	.	.	1	2	1	1	.	.	.	.	.	.	.	.
Stellaria nemorum	.	.	.	.	.	1	2	1	2	.	.	2	1	.	.	Campanula glomerata	.	.	.	1	.	1	1	.	.	.	.	.	.	.	.
Moehringia trinervia	.	.	3	.	.	.	1	1	.	.	.	1	2	.	.	Clinopodium vulgare	.	.	.	1	.	.	1	.	.	.	.	1	.	.	.
Polystichum lonchitis	.	.	.	.	1	1	1	.	3	1	.	.	.	.	.	Urtica dioica	.	.	.	1	.	.	1	.	2	.	.	.	.	.	.
Anemone nemorosa	.	.	.	1	.	.	.	1	3	.	.	4	5	.	.	Chaerophyllum hirsutum	.	.	.	.	1	1	1	.	.	.	.	.	.	.	.
Lathyrus vernus	.	.	.	.	3	3	3	.	.	1	1	.	.	.	.	Rumex acetosa	.	.	.	.	1	.	1	.	.	.	.	.	.	.	.
Paris quadrifolia	.	.	.	1	.	.	3	1	1	.	.	1	.	.	.	Rumex alpestris	.	.	.	.	.	.	1	2	.	.	.	.	.	.	.
Cephalanthera rubra	2	.	.	1	1	.	1	1	.	.	.	.	.	.	.	Cardamine impatiens	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.
Festuca altissima	.	.	.	.	1	2	1	.	.	.	.	2	.	.	5	Circaea lutetiana	.	.	2	.	.	.	.	.	.	.	.	1	.	.	.
Actaea spicata	.	.	.	1	2	.	2	.	.	.	.	.	1	.	.	Stachys sylvatica	.	.	.	.	1	.	1	.	.	.	.	.	.	.	.
Milium effusum	.	.	.	.	1	1	2	1	.	.	.	.	.	.	.	Thesium bavarum	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.
Arum maculatum	.	.	1	1	.	.	.	1	.	.	.	.	1	.	.	Stellaria media	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Scrophularia scopolii	.	.	.	.	1	.	1	1	1	.	.	.	.	.	.	Epilobium angustifolium	.	.	.	.	.	.	.	.	.	.	.	2	1	.	.
Polygonatum verticillatum	.	.	.	.	.	1	1	.	.	3	.	.	.	.	.	Thalictrum aquilegiifolium	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Galium rotundifolium	.	.	.	.	1	1	.	.	1	.	.	.	.	.	.	Galium aparine	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
Cephalanthera damasonium	.	.	1	1	1	.	.	.	.	.	.	.	.	.	.	Geranium sylvaticum	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.
Lamium galeobdolon	.	.	.	1	.	.	.	.	2	1	.	.	.	.	.	Smyrnium perfoliatum	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.
Cardamine heptaphylla	.	.	.	.	.	.	.	2	.	.	.	.	.	.	2	Sambucus ebulus L.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Adoxa moschatellina	.	.	.	.	1	.	.	1	.	.	.	.	.	.	.	Trifolium medium subsp. medium	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.
Gnaphalium sylvaticum	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	Streptopus amplexifolius	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.
Moehringia muscosa	.	.	.	.	.	.	.	.	.	1	1	.	.	.	.	Atropa belladonna	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.
Ranunculus platanifolius	.	.	.	.	1	.	.	.	.	2	.	.	.	.	.	Filipendula ulmaria	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.
Anemone ranunculoides	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	**other species**															

Phytosociological tab. 6 - Synoptic table

column n.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	**column nr.**	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
numbers of relevés per column	5	6	11	21	31	22	26	9	12	5	21	13	17	8	5	**numbers of relevés per column**	5	6	11	21	31	22	26	9	12	5	21	13	17	8	5
Hordelymus europaeus	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	Dactylis glomerata	.	.	.	1	1	1	.	.	.	1	.	.	.	.	
Anthriscus nemorosa	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	Equisetum hyemale	.	.	.	.	1	1	1	.	.	.	.	.	.	.	
Majanthemum bifolium	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	Saxifraga granulata	.	.	.	.	1	1	1	.	.	.	.	.	.	.	
Viola biflora	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	Hieracium glaucinum	.	.	.	.	1	1	1	.	.	.	.	.	.	.	
Allium ursinum	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	Sesleria italica	.	.	.	1	1	1	.	.	.	.	.	.	.	.	
Corydalis cava	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	Carex flacca	.	.	1	1	.	1	.	.	.	.	.	.	.	.	
Scilla bifolia	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	Cystopteris fragilis	.	.	.	.	.	1	.	1	.	1	.	.	.	.	
Trochiscanthes nodiflora	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	Asplenium trichomanes s.l.	.	.	.	1	.	1	.	.	.	.	1	.	.	.	
Quercetalia roboris, Cytisetea scopario-striati, Calluno Ulicetea																Equisetum arvense	.	.	.	1	1	.	.	.	.	.	1	.	.	.	
Luzula nivea	.	.	.	.	.	.	.	.	5	1	5	.	.	4	5	Hypericum perforatum	.	.	.	.	.	.	.	.	.	.	1	1	1	.	.
Phyteuma scorzonerifolium	.	.	.	.	.	.	.	.	2	.	.	1	2	3	.	Epipactis baumanniorum	.	.	.	.	1	.	1	.	.	.	.	.	.	.	
Agrostis tenuis	.	.	.	.	.	1	.	.	.	.	1	2	3	.	.	Lathraea squamaria	.	.	.	.	1	1	.	.	.	.	.	.	.	.	
Cytisus scoparius	.	.	.	.	1	1	.	.	.	.	.	.	3	.	.	Hieracium tomentosum	.	.	.	.	1	1	.	.	.	.	.	.	.	.	
Erica arborea	5	1	.	.	.	2	.	.	.	.	.	.	.	.	.	Brachypodium genuense	.	.	.	.	1	1	.	.	.	.	.	.	.	.	
Dactylorhiza maculata subsp. maculata	.	.	.	.	.	.	.	1	.	.	1	.	.	.	.	Veratrum nigrum	.	.	1	.	.	.	.	1	.	.	.	.	.	.	
Hyperico androsaemum	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	Trifolium pratense	.	.	.	.	1	.	.	.	.	.	1	.	.	.	
Melampyrum pratense	.	.	.	.	.	.	.	.	.	.	1	.	.	1	.	Lapsana communis subsp. communis	.	.	.	.	1	.	.	.	.	.	.	.	1	.	
Teucrium scorodonia	.	.	.	.	.	.	.	.	.	.	1	.	.	1	.	Prunella vulgaris	.	.	.	.	1	.	.	.	.	.	1	.	.	.	
Luzula pilosa	.	.	.	.	.	.	.	.	.	.	.	4	3	.	.	Veratrum album	.	.	.	.	.	.	.	.	1	2	.	.	.	.	
Anthoxanthum odoratum	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	Festuca rubra	.	.	.	.	.	.	.	.	.	.	.	2	4	.	.
Phyteuma ovatum subsp. ovatum	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	Galium verum	.	.	.	.	.	.	.	.	.	.	.	1	4	.	.
Calluna vulgaris	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	**constant species (frq. > 20%)**	42	34	52	49	52	46	40	31	39	29	20	39	34	19	43