Phytocoenologia	37 (2)	269–319	Berlin–Stuttgart, June 20, 2007

Mantle communities of the temperate woodlands of South Central Chile: a phytosociological study of the order Aristotelietalia chilensis

by Javier Amigo, Santiago de Compostela (Spain), Carlos Ramírez, Valdivia (Chile), and Luis G. Quintanilla, Madrid (Spain)

with 6 figures and 10 tables

Abstract. This study deals with the heliophilous shrub communities associated as pre-woodland mantle communities with the wet temperate woodlands of South Central Chile. Previous studies have defined some communities proposed to belong to the order Aristotelietalia chilensis, subordinated to the principal class of the wet temperate woodlands of the Wintero-Nothofagetea; but a lack of data from large areas with potential woodlands in this class has been a significant impediment to effective interpretation of the vegetation series of the temperate regions of Chile. We have analyzed this type of vegetation in Chile between the 36th and 44th parallels, and have also considered some relevés from nearby areas of Argentina. We propose seven associations within the Aristotelietalia chilensis, divided into two alliances:

a) The Berberidion buxifoliae groups those associations showing a certain mediterranean or xerophilous climatic influence, namely 1) Alstroemerio aurantiacae-Aristotelietum chilensis, the most northerly association with strongest mediterranean influence, 2) Rhaphithamno spinosi-Aristotelietum chilensis, the type community of the alliance, 3) Azaro microphyllae-Aristotelietum chilensis ass. nova, the most continental community of the alliance, and 4) Fuchsio magellanicae-Chusqueetum quilae, thermophilous and with distribution restricted to the coastal belt.

b) The Fuchsio magellanicae-Amomyrtion lumae all. nova groups the associations of the typical ultra/hyperhumid Valdivian territory, namely 1) Aristotelio chilensis-Fuchsietum magellanicae, occurring in the lowest-altitude areas, 2) Lomatio ferrugineae-Amomyrtetum lumae ass. nova, more cold-tolerant than the preceding community, and 3) the supratemperate Escallonio alpinae-Fuchsietum magellanicae ass. nova, the most orophilous community occurring in the upper levels of the supratemperate woodlands.

A number of subassociations and variants are proposed to reflect the variability observed within the different associations. We do not consider the alliance Gaultherion phillyreaefoliae to fall within this order, and we leave open the possible status of the alliance Escallonion rubrae, described from Argentinian territory, until more data become available. Each association is related to the woodland communities that it fringes, recognizing that in the syntaxonomy of Chilean woodlands there remain units to be described. Finally, we propose consideration of Aristotelienea chilensis as a subclass rather than an independent class.

DOI: 10.1127/0340-269X/2007/0037-0269 0340-269X/07/0037-0269 $ 12.75

Keywords: mantle vegetation, temperate rain-forest, plant dynamics, Valdivian woodland, *Aristotelia chilensis*, vegetation series.

Introduction

Woodland mantle communities can be defined as heliophilous shrub communities specialized in rapid establishment on forest soils, playing a beneficial dynamic role in the recuperation of openings created by destruction of the canopy cover; these communities typically appear as defensive barriers around the woodland, principally as a result of the conflict between the persistence of the woodland and human exploitation of adjacent land. Plants specialized in constituting these peri-woodland formations show a group of characteristic ecological features (heliophilous woody plants, some lianoid, fast-growing without forming stratified layers) related to the dynamic position they occupy (ELLENBERG 1988). The Neolithic human population of temperate Central European territories, responsible for extensive forest clearance, learnt to use this vegetation – characterized by thorny species often knotted with climbing plants – as seminatural fences to keep livestock off cropland (GROENMAN-VAN WAATERINGE 1975).

The concept of mantle communities first began to be considered following a proposal by TÜXEN (1952) for phytosociological ordination of shrub communities of this type in West Central Europe. Since then, phytosociological analysis of European temperate woodlands has been greatly refined, in ideal conditions allowing us to distinguish two vegetation belts in the progressive transition to woodland recovery: a herbaceous belt with small shrubs, and a scrub belt with larger shrubs. The Sigmatist (BRAUN-BLANQUET) school respectively denominates these belts the *ourlet* ("hemline") belt and *manteau* ("mantle") belt (DELELIS-DUSSOLIER 1973, GÉHU 1999, BOURNERIAS et al. 2001). Many studies have subordinated these communities to the vegetation classes representing mature temperate and submediterranean woodlands, but in more recent syntheses both the herbaceous communities and the high-shrub communities have been considered as independent classes (respectively, the class Trifolio-Geranietea Müller 1962, and the class Rhamno-Prunetea Rivas Goday & Borja 1961) (see RIVAS-MARTÍNEZ et al. 2001).

In the case of the temperate woodlands of Chile, most studies have been done from a forestry perspective; in line with this, the most widely used descriptive/classificatory model of local woodlands is the so-called Forest Types (*Tipos Forestales*) classification of DONOSO (1981), based exclusively on dominant tree species. Similarly, the numerous studies of forest dynamics performed at different latitudes within Chile have provided information on species tolerant or intolerant of shade, and their behavior in ombrophilous woodlands; considerable information is also available on *renovales*, i.e. second-growth woodlands (see for example DONOSO 1998; VEBLEN et al. 1996). But very little attention has been paid to shrub species, except those that can reach arborescent size. Exceptions include several classic studies, notably that of PISANO (1950), which highlights the striking behavior of

the *quilas* (*Chusquea* spp., Bambusoideae, Poaceae), which tend to increase the impenetrability of woodlands and thus hinder forestry exploitation. It is noteworthy that the interpretation of the study of PISANO (op. cit.) by DONOSO (1998: 435) cites shrub species involved in woodland recovery, denominated "minor species" and including *Aristotelia chilensis, Rhaphithamnus spinosus* and *Chusquea quila*, common components of numerous fringe communities (as discussed in greater detail below).

It was a representative of the Central European Sigmatist school who published the first descriptions with phytosociological methodology of the shrub communities related to the rainy-temperate woodlands of Chile, in a monograph on the Chilean vegetation (OBERDORFER 1960). In that study this author created an independent order for forest communities that can act as mantle communities (or as related communities favoured/created by man, notably hedgerows along roadsides or bordering pasture or cropland). Within this order, provisionally denominated Berberidetalia austro-americanae, OBERDORFER created a single alliance (Berberidion buxifoliae) containing three associations: Alstroemerio-Aristotelietum, Rhaphithamno-Aristotelietum and Aristotelio-Fuchsietum magellanicae. The participation in the names of all three associations of *Aristotelia chilensis* (local name *maqui*) highlights the importance of this species of the family Elaeocarpaceae as a fast-growing ornithochorous shrub specialized in the "closure" of openings in the canopy. For this reason, and because mantle communities provide a home for numerous nemoral species that will end up participating in the woodland community itself when natural regenerative dynamism transforms mantle to woodland, the order Berberidetalia proposed by OBERDORFER was placed in the great class corresponding to the non-orophilous rainy-temperate woodlands of South Central Chile, namely the Wintero-Nothofagetea. (Fig. 1)

Subsequently, an extensive study centered on scrubs, in the broad sense, in South Central Chile was published by HILDEBRAND (1983). This author proposed the name Aristotelietalia chilensis instead of Berberidetalia austro-americanae (nomen nudum); apart from recognizing OBERDORFER's three associations, she described several more within this order, and also studied another type of low scrub vegetation with important involvement of Ericaceae, placed in the class Empetro-Pernettyetea. One of the new contributions of HILDEBRAND (op. cit.), the creation of an alliance Gaultherion phillyreaefoliae within the Aristotelietalia, is in our opinion highly questionable, as will be detailed in the Discussion section below.

Later studies with phytosociological criteria have highlighted the close relationships between various woodland-mantle shrub communities and certain types of temperate woodland (RAMÍREZ 1982, BERGER et al. 1986, RAMÍREZ et al. 1989a, 1989b); this form of studying communities, particularly mature woodlands and their most similar dynamic stages, is the best approach for profiling and defining vegetation series, i.e. the basic units of the landscape science known as synphytosociology (RIVAS-MARTÍNEZ 1976, 1994). In this connection, an important practical application of understand-

Fig. 1. Tangled appearance of an Alstroemerio-Aristotelietum chilensis as mantle of oak/coihue woodland (Nothofago obliquae-Perseetum lingue). Malleco, La Araucanía.

ing of shrubby woodland-mantle communities is in biogeography and vegetation mapping. Thus to advance our understanding of the vegetation series of the Chilean temperate zone, we here report an analysis of this type of prewoodland community over a wide area of the Chilean territory.

Study area

The territory studied covers a large part of south central Chile between latitudes 36° 04′ and 44° 37′ S. This area represents about half of the Chilean territory with temperate macrobioclimate, whose limits with the mediterranean bioclimate have been delimited by Amigo & Ramírez (1998) (Fig. 2). The denominations and delimiting criteria of the different bioclimatic belts are based on the proposed global classification of Rivas-Martínez (1993), updated in Rivas-Martínez et al. (1999) and Rivas-Martínez (online), very recently applied to whole Chilean territory by Luebert & Pliscoff (2006). However, due to the strongly oceanic character of the Chilean climate, its bioclimatic units are not strongly defined: the mediterranean/temperate boundary is more a gradual transition, so that we also did prospecting on foot in the humid Mesomediterranean belt in coastal areas and areas of the Andean foothills in the Bío-Bío Region, within the mediterranean bioclimate.

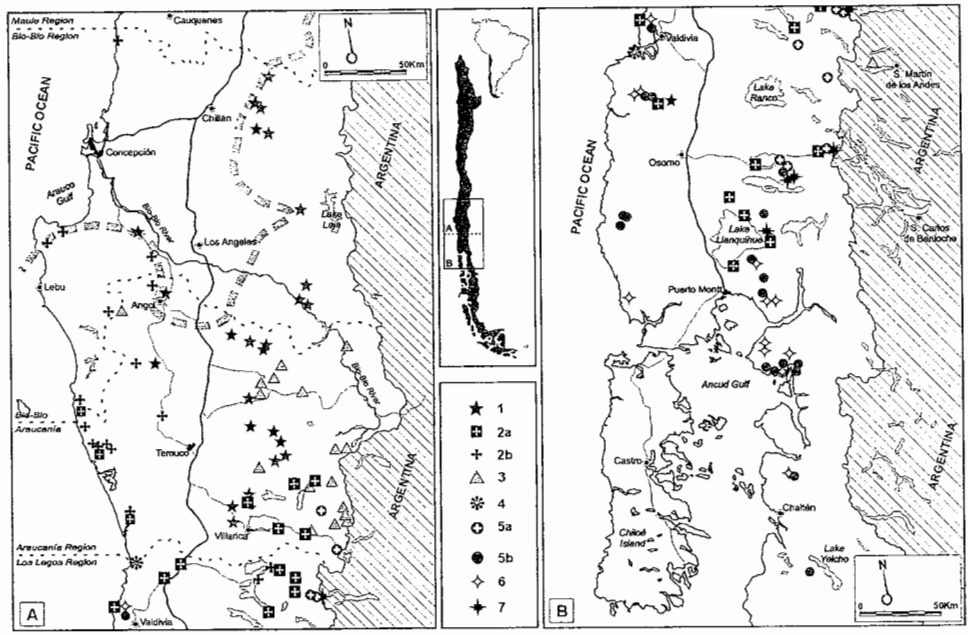

Fig. 2. Map of the South Central territory of Chile, showing locations of our relevés of the different associations (1–7) of Aristotelietalia chilensis (the map does not show three relevés of association 7 obtained at the 44th parallel). Number or number and letter relate associations with legend of Table 1. The thick dotted line on Map A corresponds to the bioclimatic boundary between the mediterranean territory (to the north) and the temperate territory (to the south) proposed by Amigo & Ramírez (1998).

For biogeographical units we follow Costa (2004) based in Rivas-Martínez & Navarro (1994) proposals, who include all of the study territory within the temperate-boreal Valdivian-Magellanic Region, as opposed to the mediterranean-type Meso-Chilean-Patagonian Region. Within this region, most of the areas studied lie within the Valdivian Province, although we also obtained some relevés in Argentina within the Austro-Andean Province. In the biogeographical model of Cabrera & Willink (1973), unlike in the classical model, the entire study area falls within the Subantarctic Province.

Methodology

Sampling and data analysis

Relevés were drawn up following the phytosociological methodology of Braun-Blanquet (1979) as modified by Géhu & Rivas-Martínez (1981), in diverse shrub formations in the immediate vicinity of more or less ma-

ture forest stands (including plantations of introduced tree species), or acting as hedges bounding managed pasture or cropland; in this latter case we selected shrub formations of sufficient height and area to act as habitat for smaller species found in Wintero-Nothofagetea woodlands, justifying their interpretation as prewoodland shrub communities of the territory in question even in territories in which autochthonous woodland is no longer present. We aimed to ensure that relevé areas were representative of prewoodland communities, so they generally ranged between (40) 60 and 100 (200) m^2; we also aimed to consider only strictly woodland-mantle communities, i.e. communities located at the margin of a forest stand, with a thickness of at least 2 metres.

In all cases we aimed to identify the type of woodland "fringed" by the shrub community; or in the case of more human-influenced communities, to define the community representing the potential natural vegetation at that location, on the basis of remaining fragments of semi-natural woodland and biogeographical and altitudinal position. For the characterization of woodland associations we followed the syntaxonomic proposals of Oberdorfer (1960), together with some more recent contributions (Pollmann 2001; Amigo et al. 2004).

In addition to the phytosociological tables giving details of the floristic composition of each of the associations, we have grouped the associations together in a synthetic table showing the floristic composition of the communities that we consider to be included in the order Aristotelietalia chilensis. As an aid to the syntaxonomic analysis, we obtained a hierarchical classification by cluster analysis (nearest-neighbor linkage with squared Euclidean distance as measure of similarity), using the statistics package SPSS (2005). Braun-Blanquet indices of abundance were transformed to numerical values by the method of Van der Maarel (1979).

Taxonomy and nomenclature

We aimed to identify all species present in the area of each relevé, following the nomenclature proposed by Marticorena & Quezada (1985) and Marticorena & Rodríguez (1995, 2001, 2003 and 2005). Some taxonomic uncertainties affecting the content of tables are as follows:

1) The taxon pair *Rubus constrictus/ulmifolius*: we use this term, although accepting its ambiguity; these are the only two specific epithets of non-autochthonous briars listed in Marticorena & Quezada's (1985) catalogue of the Chilean flora. Towards mediterranean region individuals of the series *Discolores* (generally cited as *R. ulmifolius*) tend to predominate, whereas in Valdivian temperate regions most individuals are of the series *Sylvatici* (generally cited as *R. constrictus*). We have obtained relevés from throughout both territories, but did not generally have sufficient information for reliable species-level determination (see Monasterio-Huelin 1998), and have therefore opted for this joint denomination until such time as more detailed information on these species becomes available.

2) The genus *Chusquea*: following the criteria outlined by Matthei (1997), we assume that the major taxa are *C. valdiviana* (in which we include previous reports of *C. quila*) and *C. culeou*. Within the latter we also include numerous reports of *C. argentina*, of very similar appearance and requiring detailed study throughout the Chilean temperate region with the aim of assessing its frequencies with respect to *C. culeou*. Less common, and not always distinguishable from *C. valdiviana*, is *C. uliginosa*. Individuals with characteristics not allowing clear discrimination between *C. valdiviana* and *C. culeou* were recorded as *Chusquea* sp. In some relevés around the temperate-mediterranean boundary, we found individuals assignable to *C. cumingii*, readily distinguished by their smaller size.

3) The genus *Ribes*: this is another genus abundantly present in prewoodland shrub communities, and in view of the lack of current monographic studies it is sometimes very difficult to identify taxa to species level. We denominate as *Ribes grex magellanicus* what appears to be the principal taxon in the supratemperate belt, while in the orotemperate belt other species with smaller and generally more glabrous and glossy leaves are predominant, namely *R. nitidissimum* in clearly nemoral environments and *R. cucullatum* in environments with rather wetter soils. The species *Ribes valdiviense* and *R. trilobum*, which we consider to be dominant in the mesotemperate belt and which can be distinguished from *R. grex magellanicum* by leaf and stipule indumentum characters, were recorded jointly as *Ribes valdiviense/trilobum*, since in most relevés individuals of this shrub lacked flowers and fruits, so that species-level identification was not possible (Reiche 1902). Much less commonly we have also found *Ribes punctatum*, in areas close to the mediterranean region, and thus in possible contact with Lithraeo-Cryptocaryetea; the unmistakable *Ribes integrifolia*, endemic to the Nahuel Buta Cordillera; and *Ribes bicolor* on wetter soils in the Andean foothills of the Araucanía Region, with glandulous indumentum and leaf size precluding confusion with other major taxa.

For syntaxonomy we have followed the rules outlined in the 3rd edition of the Code of Phytosociological Nomenclature (Weber et al. 2000).

Results

In what follows we present about 150 original relevés that we assign to six main associations (among the seven associations that we recognize), all observable as woodland-mantle shrub formations and together constituting the nucleus of the order Aristotelietalia chilensis. The associations cited include three new associations, and three for which we broaden the original definition given by Oberdorfer (1960), recognizing new subassociations or variants to account for internal variability. The seventh association, Fuchsio magellanicae-Chusqueetum quilae, has already been well defined in terms of floristic composition and dynamic position (Hildebrand 1983).

To give a broader overview of this order, Table 1 summarizes the characteristics of all the relevés included in this study and corresponding to the

6 associations, as well other relevés of these same associations published previously by the above-mentioned authors OBERDORFER (1960), HILDEBRAND (1983) and HILDEBRAND-VOGEL (1984). Also included in Table 1 are some previously published communities, based on relevés from Chile or Argentina, that have been interpreted in the past as members of the Aristotelietalia chilensis order, or that we consider candidate members of this order pending more detailed studies (see Discussion section).

In what follows we present the floristic characterization, biogeographical interpretation and successional position (i.e. with which woodland types, and thus which vegetation series, is the community in dynamic relation) for each of the 7 associations, emphasizing those aspects which we consider to modify or extend the original description.

Association 1

Alstroemerio aurantiacae-Aristotelietum chilensis, Table 3 (Lectotypus OBERDORFER 1960: Table 33, relevé 141).

This association was defined by OBERDORFER (1960) on the basis of only a few relevés which had little in common apart from an absolute dominance

Table 1: Synopsis of the associations included in Aristotelietalia chilensis. In addition of our own relevés exhibed in this paper (see Tables 3 to 10) and original tables of different previous authors, several columns with communities that could be catalogued inside Aristotelietalia were included. Procedence of the columns: **1A.** Alstroemerio-Aristotelietum chilensis. OBERDORFER 1960 (Tab. 33). **1B.** Alstroemerio-Aristotelietum chilensis Typical. Present paper: Table 3, relevés 1–16. **1C.** Alstroemerio-Aristotelietum chilensis Variant of *Azara microphylla*. Present paper: Table 3, relevés 17–21. **1D.** Alstroemerio-Aristotelietum chilensis Variant of *Peumus boldus*. Present paper: Table 3, relevés 22–26. **2A.** Rhaphithamno-Aristotelietum chilensis subass. aristotelietosum chilensis. Present paper: Table 4, relevés 1–21. **2B.** Rhaphithamno-Aristotelietum chilensis subass. peumetosum boldi. Present paper: Table 5, relevés 1–17. **2C.** Rhaphithamno-Aristotelietum chilensis. OBERDORFER 1960 (Tab. 34, "Optimal Phasen" only, relevé n° 297 excluded). **2D.** Rhaphithamno-Aristotelietum chilensis. HILDEBRAND 1983 (Tab. 2). **3.** Azaro microphyllae-Aristotelietum chilensis. Present paper: Table 6, relevés 1–21. **4.** Fuchsio magellanicae-Chusqueetum quilae. HILDEBRAND 1983. **5C.** Aristotelio-Fuchsietum magellanicae. OBERDORFER 1960 (Tab. 35). **5A.** Aristotelio-Fuchsietum magellanicae subass. aristotelietosum chilensis. Present paper: Table 7, relevés 1–13. **5B.** Aristotelio-Fuchsietum magellanicae subass. amomyrtetosum lumae. Present paper: Table 8, relevés 1–18. **6.** Lomatio ferrugineae-Amomyrtetum lumae. Present paper: Table 9, relevés 1–15. **7.** Escallonio alpinae-Fuchsietum magellanicae. Present paper: Table 10, relevés 1–8. **8.** Escallonio-Gaultherietum phillyreaefoliae. HILDEBRAND 1983 (Tab. 6). **9.** Pernettyo mucronatae-Gaultherietum phillyreaefoliae. HILDEBRAND 1983 (Tab. 7). **10.** Lomatio-Nothofagetum betuloidis. ROIG et al. 1985 (Tab. 45, grupo 59). **11.** Nothofagetum betuloidis variant of *Escallonia serrata*. ROIG et al. 1985 (Tab. 44, grupo 54b). **12.** *Escallonia rubra-Fuchsia magellanica*-Assoziation. ESKUCHE 1969 (Tab VI, 1). **13.** *Escallonia rubra-Myrceugenia nanophylla*-Assoziation. ESKUCHE 1969 (Tab. VI, 2).

Table 1.

Column nr.	1A	1B	1C	1D	2A	2B	2C	2D	3	4	5C	5A	5B	6	7	8	9	10	11	12	13
Number of relevés	7	16	5	5	21	17	7	24	21	11	10	13	18	15	8	7	4	7	4	8	4
Ass./Subass./Var. differentials																					
Sophora macrocarpa	.	II	.	II	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Teline monspessulana	.	II	.	.	.	I	I	.	.	.	.	.	.	.	.	.	II	.	.	.	.
Peumus boldus	.	.	.	V	.	V	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Escallonia pulverulenta	.	.	.	I	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Cryptocarya alba	.	+	.	I	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lithraea caustica	.	.	.	I	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lobelia tupa	.	.	.	.	.	II	I	.	.	II	.	.	.	.	.	.	.	.	.	.	.
Greigia sphacellata	.	.	.	.	.	II	.	I	.	II	.	.	.	.	.	III	.	.	.	.	.
Jovellana violacea	.	.	.	.	+	I	.	+	.	IV	.	.	.	.	.	.	.	.	.	.	.
Pseudopanax valdiviense	.	.	.	.	+	.	.	II	.	II	.	.	.	.	.	.	.	.	.	.	.
Azara microphylla	.	.	V	.	+	.	.	.	V	.	.	.	.	.	.	.	.	.	.	.	.
Prumnopitys andina	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.
Rhamnus diffusus	.	.	.	.	.	.	.	.	.	III	.	.	.	.	.	.	.	.	.	.	.
Amomyrtus meli	.	.	.	.	.	.	.	.	.	.	.	.	I	I	.	.	.	.	.	.	.
Crinodendron hookerianum	.	.	.	.	.	.	.	.	.	.	.	.	I	II	.	.	.	.	.	.	.
Campsidium valdiviense	.	.	.	.	+	.	.	.	.	.	.	+	+	II	.	.	.	.	.	.	.
Myrceugenia chrysocarpa	.	.	.	.	.	.	.	.	.	.	.	.	.	I	III	.	.	.	.	.	.
Escallonia alpina	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V	.	.	.	.	.	.
Ovidia andina	.	.	.	.	.	.	.	.	.	.	.	.	.	.	IV	.	.	.	.	.	.
Berberis trigona	.	.	.	.	.	.	.	.	.	.	.	.	.	+	II	.	.	.	.	.	.
Berberis montana	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.
Drimys andina	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.
Escallonia rosea	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V	.	.	.	.	.
Baccharis elaeoides	.	.	.	.	.	.	II	+	.	.	.	.	.	.	.	III	.	.	.	.	.
Ribes punctatum	.	.	.	.	.	.	I	+	.	.	.	.	.	.	.	IV	.	.	.	.	.
Baccharis concava	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	IV	.	.	.	.	.
Myoschilos oblonga	.	.	II	.	+	I	.	+	+	.	.	.	.	.	.	III	V	.	.	.	.
Baccharis lycioides	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V	.	.	.	.
Baccharis sagitalis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	IV	.	.	.	.
Pernettya mucronata	.	+	I	.	+	.	.	+	.	.	.	.	+	+	I	.	V	IV	I	.	.
Pilgerodendron uviferum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V	IV	.	.
Senecio acanthifolius	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	IV	III	.	.
Philesia magellanica	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	V	III	.	.
Berberis ilicifolia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V	V	.	.
Escallonia serrata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	V	.	.
Lebetanthus myrsinites	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	IV	.	.
Nothofagus antarctica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	I	.	IV
Myrceugenia ovata nanophylla	.	.	.	.	.	.	.	.	I	.	.	+	.	.	.	.	.	.	.	.	V
Berberidion buxifoliae charact.																					
Cissus striata	I	III	III	IV	IV	V	I	III	I	II	I	I	.	.	.	.	.	.	.	I	.
Rosa rubiginosa	III	III	.	IV	I	I	.	.	V	.	+	.	.	.	.	.	.	.	.	.	.
Maytenus boaria	.	II	II	III	II	III	.	.	II	.	.	.	.	.	.	.	.	.	.	.	II
Lomatia hirsuta	.	II	III	.	II	II	II	.	III	.	.	.	+	+	.	.	.	.	.	.	.
Lomatia dentata	.	III	II	.	I	III	.	III	III	I	.	.	.	+	.	.	.	.	.	.	.
Persea lingue	.	IV	V	.	III	I	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.
Aextoxicon punctatum	.	I	.	.	I	II	.	III	+	III	.	.	+	.	.	.	.	.	.	.	.
Fuchsio-Amomyrtion charact.																					
Lophosoria quadripinnata	.	.	.	.	.	.	.	+	.	III	.	IV	IV	IV	II	.	.	.	.	.	.
Amomyrtus luma	.	.	.	.	.	.	I	+	.	.	.	I	V	V	II	III	.	.	.	II	.
Caldcluvia paniculata	.	.	.	.	+	.	I	.	.	.	.	IV	III	III	I	.	.	.	.	.	.
Gunnera tinctoria	.	+	.	.	.	.	.	.	.	.	II	II	III	I	II	.	.	.	.	.	.
Myrceugenia planipes	.	.	.	.	+	.	I	.	.	.	.	I	III	III	.	.	.	.	.	.	.
Lomatia ferruginea	.	.	.	.	+	.	.	.	.	.	.	II	V	V	.	.	.	V	.	.	.
Blechnum penna-marina	.	.	.	.	.	.	I	.	.	.	.	.	+	II	II	.	.	V	I	.	.
Escallonion rubrae charact. ?																					
Escallonia rubra	.	.	.	.	+	.	II	.	+	.	.	I	.	.	II	.	.	.	.	IV	III
Baccharis obovata	.	III	.	.	+	I	.	.	+	.	.	.	.	+	.	.	.	.	.	V	II
Discaria serratifolia	I	.	I	I	+	.	.	.	+	.	.	.	.	.	.	.	III	.	.	IV	IV
Berberis parodi	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V	III

Table 1. (cont.)

Column nr.	1A	1B	1C	1D	2A	2B	2C	2D	3	4	5C	5A	5B	6	7	8	9	10	11	12	13
Aristotelietalia characteristics																					
Rubus constrictus / ulmifolius	V	V	V	V	V	V	III	V	III	V	V	IV	III	I	.	V	V	.	.	.	.
Aristotelia chilensis	V	V	V	V	V	V	IV	V	V	IV	V	V	V	.	.	V	III	.	.	.	.
Berberis darwini	III	I	IV	.	II	.	III	III	III	I	II	+	II	I	II	III	V	.	.	I	II
Gaultheria phillyreifolia	+	I	.	I	III	I	III	+	II	.	I	II	III	II	V	V	V	.	.	II	.
Blechnum hastatum	+	IV	IV	I	V	V	IV	IV	IV	III	I	III	+	I	.	V	V	.	.	I	.
Relbunium hypocarpium	.	III	II	II	II	III	.	IV	II	I	.	II	+	+	.	III	V	.	.	.	.
Fuchsia magellanica	.	.	.	.	III	II	.	II	III	V	V	V	IV	III	V	.	.	.	.	V	.
Baccharis racemosa	V	II	III	II	III	V	II	III	+	.	I	I	.	II	.	.	V	.	.	.	.
Berberis microphylla	III	I	.	.	I	I	V	I	I	.	I	+	II	I	I	.	.	III	.	.	.
Rhaphithamnus spinosus	I	.	I	.	IV	III	V	IV	I	+	.	III	IV	I	.	.	.	.	.	.	.
Boquila trifoliolata	.	II	IV	.	III	III	I	.	II	+	I	II	+	.	.	V	V	.	.	.	.
Muehlenbeckia hastulata	V	IV	.	III	III	V	III	II	+	+	II	II	.	.	.	.	.	.	.	.	.
Ugni molinae	.	.	.	I	II	II	III	III	.	.	.	.	I	.	.	III	V	.	.	.	.
Ribes valdiviense / trilobum	.	I	II	.	I	II	.	.	IV	+	.	III	I	I	.	.	.	.	.	.	.
Alstroemeria aurantiaca	V	I	I	I	I	I	.	.	II	.	.	.	.	.	I	.	.	.	.	.	.
Buddleja globosa	II	I	III	.	II	+	.	.	II	.	II	III	.	+	.	.	.	.	.	.	.
Ovidia pillo-pillo	I	I	III	.	.	.	III	III	II	+	.	.	+	II	.	.	.	.	.	.	.
Ribes grex magellanicum	.	.	.	.	.	.	.	.	I	.	.	I	I	I	V	.	.	.	.	I	II
Baccharis sphaerocephala	.	.	.	.	.	.	.	II	.	.	.	.	I	II	.	I	.	.	.	.	.
Azara integrifolia	.	II	.	V	+	II	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.
Leptocarpha rivularis	.	.	.	II	+	+	I	II	.	.	.	.	.	.	.	.	.	.	.	.	.
Solanum cyrtopodium	.	I	I	.	+	.	.	.	II	.	.	.	.	+	.	.	.	.	.	.	.
Baccharis linearis	.	I	.	I	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Solanum valdiviense	II	.	.	.	+	+	.	.	+	I	+	.	.	.	.	.	.	.	.	.	.
Psoralea glandulosa	.	I	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Lardizabala biternata	.	I	.	I	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Bomarea salsilla	.	+	.	I	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Mutisia grex spinosa	.	+	.	I	+	I	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.
Proustia pyrifolia	.	.	.	I	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Latua pubiflora	.	.	.	.	+	.	.	.	.	.	.	.	I	II	.	.	.	.	.	.	.
Solanum gayanum	.	+	.	.	+	.	.	.	.	.	.	.	+	I	.	.	.	.	.	.	.
Berberis serrato-dentata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.
Wintero-Nothofagetea Class																					
Luma apiculata	I	III	V	II	IV	IV	III	II	II	.	III	II	III	I	.	.	V	.	.	III	.
Embothrium coccineum	.	+	II	.	III	I	.	+	II	.	.	II	IV	IV	III	.	IV	IV	.	I	II
Gevuina avellana	.	III	III	I	II	I	II	+	I	I	.	.	II	.	.	.	.	.	.	.	.
Nothofagus obliqua	V	V	V	I	III	III	I	.	III	.	+	II	.	.	.	.	.	.	.	.	.
Blechnum chilense	.	+	III	.	II	+	.	+	.	II	III	IV	IV	IV	III	.	.	.	.	.	.
Chusquea culeou	.	III	I	I	II	.	.	.	V	.	.	III	.	.	II	.	.	.	.	IV	IV
Chusquea valdiviana	.	.	IV	.	II	III	I	III	.	V	II	II	III	III	.	I	.	.	.	.	.
Azara lanceolata	.	.	I	.	I	.	.	+	.	I	.	V	V	III	IV	.	.	.	.	.	.
Nothofagus dombeyi	.	+	II	.	II	.	II	.	III	.	.	II	I	.	II	.	.	.	.	II	III
Mitraria coccinea	.	.	.	.	I	.	I	.	.	.	.	IV	IV	IV	II	.	.	.	.	.	.
Eucryphia cordifolia	.	+	.	.	III	I	I	+	.	.	.	III	IV	III	.	.	.	.	.	.	.
Drimys winteri	.	+	II	.	+	+	I	.	.	.	.	I	II	IV	I	.	.	V	V	.	.
Dasyphyllum diacanthoides	.	+	.	.	+	+	.	.	II	.	.	II	II	II	I	.	.	.	.	.	.
Lapageria rosea	.	II	.	I	+	II	.	III	+	III	.	.	I	.	.	V	.	.	.	.	.
Uncinia phleoides	.	.	I	I	+	I	I	III	+	V	+	+	.	I	.	.	.	.	.	.	.
Lourelia sempervirens	I	.	I	I	+	II	II	II	I	.	+	.	.	.	.	.	.	.	.	.	.
Nertera granadensis	.	.	.	.	+	.	II	II	+	II	.	II	III	IV	.	.	.	.	.	.	.
Pseudopanax laetevirens	.	.	.	.	+	.	II	.	+	.	.	I	+	II	III	.	.	II	V	.	.
Laureliopsis philippiana	.	.	.	.	+	.	I	.	+	.	.	III	II	III	II	.	.	.	.	.	.
Dioscorea cf. brachyobotria	.	I	.	.	+	.	.	II	I	.	.	II	.	.	.	.	.	.	.	.	.
Nothofagus alpina	.	I	.	.	.	.	.	.	I	.	.	II	+	I	.	.	.	.	.	.	.
Weinmannia trichosperma	.	+	.	.	I	.	.	.	.	.	.	+	II	III	I	.	.	.	.	.	.
Tepualia stipularis	.	.	.	.	.	.	I	.	.	.	.	.	I	II	.	.	.	.	IV	.	.
Blechnum magellanicum	.	.	.	.	.	.	.	.	.	.	.	.	.	II	I	.	.	I	I	.	.
Osmorhiza chilensis	.	.	I	.	.	.	.	.	I	.	.	.	.	.	I	.	.	.	.	.	.
Luzuriaga radicans	.	.	.	.	+	.	.	III	.	I	.	+	+	I	.	.	.	.	.	.	.
Blechnum mochaenum	.	.	.	.	+	.	.	.	I	.	.	II	+	.	II	.	.	.	.	.	.

Table 1. (cont.)

Column nr.	1A	1B	1C	1D	2A	2B	2C	2D	3	4	5C	5A	5B	6	7	8	9	10	11	12	13
Saxegothaea conspicua	.	.	.	.	.	.	.	.	.	.	.	I	+	II	II	.	.	.	.	.	.
Megalastrum spectabile	.	.	.	.	.	.	.	.	.	.	.	II	I	I	.	.	.	.	.	.	.
Hydrangea serratifolia	.	+	.	.	+	.	.	.	+	.	.	II	I	II	.	.	.	.	.	.	.
Desfontainia spinosa	.	.	.	.	.	.	.	.	.	.	.	+	.	.	II	.	.	V	V	.	.
Nothofagus betuloides	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	V	V	.	.
Sophora microphylla	.	.	.	.	.	.	II	II	.	.	.	.	.	.	.	.	.	.	.	.	.
Myrceugenia parvifolia	.	.	.	.	.	.	I	.	.	.	.	.	.	I	.	.	.	.	.	.	.
Polystichum chilense	.	.	.	.	.	.	.	.	+	.	.	I	.	.	I	.	.	.	.	.	.
Asteranthera ovata	.	.	.	.	.	.	.	.	.	.	.	.	.	II	III	.	.	.	.	.	.
Nothofagus nitida	.	.	.	.	.	.	.	.	.	.	.	.	.	II	II	.	.	.	.	.	.
Hydrocotyle poeppigi	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.	.
Hypolepis poeppigi	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.
Luzuriaga polyphylla	.	.	.	.	+	.	.	.	.	.	.	.	+	II	.	.	.	.	.	.	.
Podocarpus nubigena	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.
Blepharocalyx cruckshanksii	.	+	I	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Myrceugenia exsucca	.	.	I	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rubus geoides	.	.	.	.	.	.	.	.	.	.	.	.	+	+	II	.	.	.	.	.	.
Griselinia ruscifolia	.	.	.	.	.	.	.	.	.	.	.	+	.	+	I	.	.	.	.	.	.
Dendroligotrichon dendroides	.	.	.	.	.	.	.	.	.	.	.	.	+	+	I	.	.	.	.	.	.
Dysopsis glechomoides	.	.	.	.	.	.	.	.	.	.	.	+	.	.	I	.	.	.	.	.	.
Polystichum multifidum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.
Companion species																					
Lotus corniculatus + uliginosus	I	I	V	I	IV	II	I	III	III	II	I	II	III	I	I	V	V	.	.	.	.
Acaena ovalifolia	.	I	.	I	+	II	.	III	III	I	.	+	+	I	II	V	III	.	.	.	.
Holcus lanatus	I	II	I	I	III	IV	II	III	III	+	II	+	+	I	.	V	V	.	.	.	.
Agrostis capillaris + castellana	I	IV	I	IV	II	III	II	IV	II	I	.	.	.	+	.	V	V	.	.	.	.
Adiantum chilense	.	.	II	I	II	II	.	.	I	I	.	II	.	.	.	.	.	.	.	I	.
Prunella vulgaris	.	I	.	II	I	I	.	III	II	+	.	.	+	.	.	IV	V	.	.	.	.
Geranium core-core	.	I	I	I	.	I	.	II	+	.	.	.	.	.	.	IV	II	.	.	.	.
Libertia chilensis	.	.	.	.	I	I	.	I	.	I	.	.	.	.	.	II	V	.	.	.	.
Fragaria chiloensis	.	.	I	.	.	.	.	+	.	.	.	.	.	.	I	II	II	.	.	.	II
Hypericum perforatum	.	III	II	II	+	+	.	.	II	.	.	.	.	.	.	.	.	.	.	.	.
Chusquea aff. uliginosa	.	.	.	.	.	.	.	.	.	.	.	I	+	II	II	.	V	.	.	.	.
Acrysione "concolor leaves"	.	.	.	I	.	I	.	.	.	II	.	.	+	.	I	.	.	.	.	.	.
Eryngium paniculatum	.	.	I	II	.	I	.	+	+	.	.	.	.	.	.	.	III	.	.	.	.
Dactylis glomerata	III	+	.	.	I	.	II	.	+	.	I	.	.	.	.	.	.	.	.	.	.
Nassella chilensis	.	I	.	I	.	+	.	.	.	.	.	.	.	.	.	.	IV	.	.	.	.
Viola rubella	.	.	.	.	.	+	I	I	.	I	.	.	.	.	.	.	.	.	.	.	.
Leptostigma arnottianum	.	.	.	.	.	.	.	II	.	.	.	.	.	+	.	I	V	.	.	.	.
Plantago lanceolata	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	II	V	.	.	.	.
Vicia nigricans	.	.	.	.	.	.	.	.	I	.	.	I	.	.	.	.	.	.	.	.	II
Gleichenia quadripartita	.	.	.	.	.	.	.	.	.	.	.	.	+	I	.	.	.	III	V	.	.
Uncinia tenuis	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	V	I	.	.
Pernettya myrtilloides	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	II	III
Acacia dealbata	.	+	I	I	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Azara serrata	.	.	I	I	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.
Ulex europaeus	.	.	I	.	.	+	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Rumohra adiantiformis	.	.	I	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Valeriana cf. lapathifolia	.	.	I	.	.	.	.	.	+	.	.	+	.	.	I	.	.	.	.	.	.
Oxalis rosea	.	.	.	.	+	I	.	+	.	II	.	.	.	.	.	.	.	.	.	.	.
Coriaria ruscifolia	.	.	.	.	+	.	I	.	.	.	.	+	I	.	.	.	.	.	.	.	.
Centella asiatica	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.	.	.	V	.	.	.
Ranunculus repens	.	.	.	.	.	.	.	.	.	.	.	I	+	I	.	.	.	.	.	.	.
Gunnera magellanica	.	.	.	.	.	.	.	.	.	.	.	.	+	.	IV	.	.	II	.	.	.
Maytenus magellanica	.	.	.	.	.	.	.	.	+	.	.	.	.	.	I	.	.	IV	.	.	.
Hymenophyllum tortuosum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	IV	.	.
Marsippospermum grandiflorum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	I	.	.
Luzuriaga marginata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V	I	.	.
Adesmia propinqua	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Tropaeolum ciliatum	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Myrceugenia obtusa	.	.	.	I	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Chusquea cumingi	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

Table 1. (cont.)

Column nr.	1A	1B	1C	1D	2A	2B	2C	2D	3	4	5C	5A	5B	6	7	8	9	10	11	12	13
Podanthus mitiqui	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Alstroemeria cf. hookeri	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Acacia melanoxylon	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Stachys macraei	.	.	I	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.
Prunus avium	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Arrhenatherum elatius	.	.	.	I	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.
Calceolaria dentata	.	+	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Tristerix tetrandrus	.	.	.	.	.	I	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.
Griselinia racemosa	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Equisetum bogotense	.	.	.	.	+	.	.	+	II	.	+	+	.	.	.	.	.	.	.	.	.
Francoa appendiculata	.	.	.	.	.	.	.	+	+	I	.	.	.	.	.	.	.	.	.	.	.
Hymenophyllum plicatum	.	.	.	.	+	.	.	.	.	.	.	.	+	I	.	.	.	.	.	.	.
Acrysione grex yegua	.	.	.	.	.	.	.	.	.	.	.	.	+	I	.	.	.	.	.	.	.
Gleichenia squomulosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.
Festuca aff. spadicea	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.
Rumex acetosella	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	I	II	.	.	.	.
Macrachaenium gracile	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	IV	.	.	.
Uncinia lechleriana	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.
Chiliotrichum diffusum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	.
Hymenophyllum seselifolium	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.
Acaena magellanica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.
Grammitis magellanica	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.
Serpyllopsis caespitosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.
Myrteola nummularia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	III	.	.	.
Lepidothamnus fonkii	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.
Lycopodium confertum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.
Hymenophyllum secundum	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.
Poa borchersii	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.
Colletia spinosissima	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.
Gaultheria tenuifolia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.
Austrocedrus chilensis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II

of *Rubus constrictus*; the constant presence, but with low cover, of *Aristotelia chilensis* and *Nothofagus obliqua*; and the constant presence of the amaryllidacean *Alstroemeria aurantiaca,* a species with a surprisingly dysjunct distribution a) in the mesotemperate coastal territory of the Los Lagos Region, and b) in the higher, colder, more continental areas of the supraorotemperate hills of the Araucanía Region. We propose a reinterpretation of this association, considering it as a community occurring at the fringe of the less ombrophilous woodlands of the Nothofago-Eucryphion: fundamentally oakwoods of the Nothofago obliquae-Perseetum lingue and to lesser extent the *Nothofagus obliqua* and *Nothofagus alpina* woodlands of the Dasyphyllo diacanthoidis-Nothofagetum alpinae. Table 3 shows the floristic variability of this community. Its principal floristic features of this community are a) massive dominance of *Aristotelia chilensis* (local name *maqui*), b) marked presence of *Nothofagus obliqua*, particularly in more natural mantle-position relevés; and c) abundance of scandent and voluble phanerophytes contributing to the community's tangled physiognomy (*Cissus striata, Muehlenbeckia hastulata, Boquila trifoliolata* and of course *Rubus constrictus/ulmifolius*) (Fig. 3). As illustrated in Figure 2, the distribution of this community is the most northerly of the order Aristotelietalia chilensis, extending southwards along the Central Depression and in lower-altitude areas of the Andean foothills.

Table 2. Identification of the 7 associations recognized in Aristotelietalia chilensis on the basis of floristic groups always absent (left column) or normally absent (central column) in each. The right column lists woodland communities in association with which the different mantle communities have been found.

Assoc.	Always lacks ...	Usually lacks ...	Forest communities which are fringed by
1	*Fuchsia magellanica* *Nertera granadensis* *Jovellana violacea*	*Rhaphithamnus spinosus* *Eucryphia cordifolia* *Dasyphyllum diacanthoides*	Nothofago-Perseetum lingue (Dasyphyllo-Nothofagetum alpinae)
2A	*Rhamnus diffusus* *Gunnera tinctoria* *Escallonia pulverulenta*	*Rosa rubiginosa* *Azara microphylla* *Amomyrtus luma*	Nothofago-Eucryphietum cordifoliae Nothofago-Perseetum lingue
2B	*Lophosoria quadripinnata* *Chusquea culeou* *Azara lanceolata*	*Dasyphyllum diacanthoides* *Buddleja globosa* *Berberis darwinii*	Nothofago-Perseetum lingue boldetosum (Lapagerio-Aextoxiconetum punctati)
3	*Persea lingue* *Ugni molinae* *Azara lanceolata* *Weinmannia trichosperma*	*Baccharis racemosa* *Muehlenbeckia hastulata* *Eucryphia cordifolia* *Blechnum chilense*	Dasyphyllo-Nothofagetum alpinae Nothofagetum procerae *"Nothofagus obliqua-Prumnopitys andina"* (Nothofago-Eucryphietum cordifoliae)
4	*Mitraria coccinea* *Nothofagus obliqua* *Amomyrtus luma* *Chusquea culeou*	*Maytenus boaria* *Rosa rubiginosa* *Rhaphithamnus spinosus* *Lomatia hirsuta*	Lapagerio-Aextoxiconetum punctati
5A	*Alstroemeria aurantiaca* *Maytenus boaria* *Lomatia dentata* *Azara microphylla*	*Persea lingue* *Campsidium valdiviense* *Rosa rubiginosa* *Amomyrtus luma*	Nothofago-Eucryphietum cordifoliae
5B	*Cissus striata* *Rosa rubiginosa* *Chusquea culeou* *Muehlenbeckia hastulata*	*Baccharis racemosa* *Aextoxicon punctatum* *Nothofagus obliqua* *Campsidium valdiviense*	Nothofagetum procerae "Coastal Range" Laurelio-Weinmannietum trichospermae
6	*Aristotelia chilensis* *Chusquea culeou* *Ugni molinae* *Nothofagus obliqua*	*Relbunium hypocarpium* *Aextoxicon punctatum* *Lapageria rosea* *Berberis trigona*	Laurelio-Weinmannietum trichospermae Luzuriago-Nothofagetum nitidae
7	*Aristotelia chilensis* *Rhaphithamnus spinosus* *Rosa rubiginosa* *Myrceugenia planipes*	*Ribes valdiviense/trilobum* *Crinodendron hookerianum* *Relbunium hypocarpium* *Eucryphia cordifolia*	Chrysosplenio-Nothofagetum dombeyi (Nothofagetum betuloidis "northernly")

Internal variability of Association 1

Within this rather broad association we have distinguished two variants that represent the transitions that occur towards the other two communities with which it maintains contact over a large geographical area. The *Azara*

Fig. 3. Dense Alstroemerio-Aristotelietum chilensis shrub as mantle of an oak woodland (Nothofago obliquae-Perseetum lingue) at its boundary with an area of human-maintained pasture. Ñuble, Bío-Bío.

microphylla Variant (Table 3, relevés 17–21), defined by the presence of this species of *Azara* and marking the transition to the somewhat more continental association of the meso- and supratemperate belts that we denominate Azaro microphyllae-Aristotelietum chilensis (see below, Association 3). The *Peumus boldus* Variant (Table 3, relevés 22–26) we interpret as a reflection of a marked mediterranean influence enabling the participation of this sclerophyllous species in the *maqui* scrub, together with other species of the class Lithraeo-Cryptocaryetea (*Cryptocarya alba, Escallonia pulverulenta, Azara integrifolia, Lithraea caustica*); this variant is widely represented in non-coastal areas of transition between the temperate and mediterranean climate, along the length of the sinuous boundary between the two regions (see Amigo & Ramírez 1998), and is eventually replaced by Lomatio hirsutae-Lithraeetum causticae on passing from temperate woodlands to meso- and supramediterranean wet deciduous woodlands of the Bomareo salsillae-Nothofagetum glaucae (Amigo et al. 2000). The more southerly presences of this variant are located in areas of the Central Depression in the Los Lagos Region, where the rainshadow of the Coastal Cordillera favours the presence of *Peumus boldus* woodland as potential vegetation (see Ramírez et al. 1990).

Table 3. Alstroemerio aurantiacae-Aristotelietum chilensis Oberdorfer 1960.

Order n°	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
Relevé field number	65	75	131	121	122	124	125	126	127	128	129	130	123	56	171	226	63	62	61	112	74	120	49	29	119	172
Altitude (m a.s.l.)	450	200	260	700	840	610	410	720	750	700	490	560	470	900	590	790	570	540	240	390	600	340	60	100	560	440
Slope (°)	5	45	5	25	<5	35	0	15	10	10	45	45	10	15	30	5	0	45	35	30	5	0	5	35	<5	0
Aspect	S	N	E	E	S	S	-	S	SW	W	SW	W	N	N	SW	W	-	W	S	NE	NE	-	SE	NE	W	-
Cover (%)	100	100	100	100	90	100	100	100	95	80	100	95	95	100	95	90	85	95	95	95	90	100	85	100	100	100
Vegetation hight (m)	1-5	2-8	5-7	2-6	2-5	5-6	4-5	2-5	2-8	1-3	3-5	2-5	3-6	2-5	2-7	1-4	0-6	2-8	1-4	1-4	2-5	2-5	1-6	2-6	4-7	2-7
Plot area (m^2)	60	150	80	45	50	40	60	50	75	50	50	60	60	60	100	100	90	75	120	60	60	60	80	50	100	50
N° of species	21	14	12	14	18	13	18	22	22	18	21	22	11	10	23	24	23	24	26	23	19	17	19	25	16	12
Ass., All. & Ord. species																										
Aristotelia chilensis	4	5	5	4	4	5	5	5	5	4	2	4	5	5	4	2	3	4	5	5	4	3	1	3	4	4
Rubus constrictus / ulmifolius	1	1	3	4	1	2	1	+	2	2	1	1	4	1	1	+	1	2	1	3	2	4	3	1	4	3
Nothofagus obliqua	.	2	+	1	2	.	1	+	+	+	.	2	1	+	1	2	2	2	3	1	+	.	.	.	2	.
Blechnum hastatum	1	1	1	.	.	+	+	+	1	.	1	1	.	.	1	1	1	1	1	1	.	.	.	1	.	.
Cissus striata	.	3	4	.	.	1	2	1	.	.	1	.	.	+	.	+	.	1	.	2	2	+	1	1	+	.
Muehlenbeckia hastulata	1	.	3	2	2	2	2	.	.	1	.	2	1	2	.	1	.	.	.	.	.	2	.	3	2	1
Rosa rubiginosa	1	.	.	.	1	1	+	+	1	.	+	+	.	.	1	1	.	.	.	.	.	.	.	.	+	2
Relbunium hypocarpium	.	.	.	.	+	.	.	+	1	.	+	.	+	.	.	.	.	.	1	+	.	.	+	+	.	.
Maytenus boaria	.	1	.	1	.	.	.	.	.	.	+	+	.	.	.	+	1	+	1	.	.	.	.	1	+	3
Lomatia hirsuta	3	.	.	1	3	.	.	1	.	.	+	.	.	.	+	+	2	+	+	.	.	.	.	1	.	.
Lomatia dentata	1	.	.	.	.	.	.	.	+	.	.	+	.	.	1	1	+	.	.	1	.	.	.	.	.	.
Azara integrifolia	.	+	.	.	.	.	.	.	.	.	1	.	.	1	1	.	.	.	.	.	.	1	1	1	2	1
Boquila trifoliolata	+	.	.	.	.	.	2	.	+	.	.	1	.	.	+	.	+	+	.	+	1	.	.	.	.	.
Sophora macrocarpa	.	.	.	+	.	r	.	.	.	2	2	2	1	.	.	.	.	+	.	.	.	r	.	.	+	.
Baccharis racemosa	.	.	2	.	.	.	+	.	1	+	.	.	.	.	.	.	.	.	+	1	.	.	.	1	.	.
Baccharis obovata	+	.	.	.	.	.	1	1	.	1	.	+	.	+	+	.	.	+	.	.	1	.	.	.	.	.
Buddleja globosa	+	.	.	.	.	.	.	.	.	3	.	1	.	.	.	.	.	+	.	1	+	.	.	.	.	.
Berberis darwini	.	.	.	.	.	.	.	+	+	.	.	.	.	.	1	.	+	1	+	+	.	.	.	.	.	.
Alstroemeria aurantiaca	.	.	.	.	.	.	.	1	+	+	.	.	.	+	.	.	.	2	.	.	.	.	.	+	.	.
Teline monspessulana	.	.	+	1	1	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.
Ovidia pillo-pillo	.	.	.	.	.	.	.	1	2	.	.	.	.	+	.	.	.	+	+	.	1	.	.	.	.	.
Gaultheria phillyreifolia	2	.	.	.	.	.	.	+	1	.	.	.	.	.	.	.	.	+	.	.	.	.	.	1	.	.
Ribes valdivianse / triflobum	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.
Lardizabala biternata	.	.	.	.	.	1	.	.	.	+	.	.	.	.	.	1	.	.	.	.	.	.	.	1	.	.
Baccharis linearis	.	.	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.
Solanum cyrtopodium	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.
Mutisia gr. spinosa	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.
Psoralea glandulosa	.	.	.	.	.	.	.	.	.	.	.	.	2	2	.	.	.	.	.	.	.	4	.	.	.	.
Berberis microphylla	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Discaria serratifolia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	+	.	.
Azara serrata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	1
Azara microphylla Variant																										
Azara microphylla	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	1	1	1	+	.	.	.	.	.
Myoschilos oblonga	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	1	.	.	.	.	.	.	.

Table 3. (cont.)

Relevé field number	65	75	131	121	122	124	125	126	127	128	129	130	123	56	171	226	63	62	61	112	74	120	49	29	119	172
***Peumus boldus* Variant**																						+	2	4	1	2
Peumus boldus																							2	1		
Cryptocarya alba						+																	1			
Wintero-Nothofagetea Class																										
Luma apiculata	1	+				1	1		+		+			+	+	1		+	+	+	1			+		
Persea lingue		+	+				1	+	2	1	+	1			2	2	+	+	+	1	+					
Gevuina avellana				+				2	2		+	1			2	3	+	+		1					+	
Chusquea culeou				1	+			+	+	+	4	2			2					2		2				
Lapageria rosea						+	1	1				1											2			
Blechnum chilense	1																		2	+	1			1		
Chusquea valdiviana																	2	2	2		3					
Embothrium coccineum	1								r								1	+								
Nothofagus dombeyi																	1		+							
Drimys winteri											+								r		+					
Myrceugenia exsucca		+																			1					
Nothofagus alpina								2							3											
Dioscorea gr. *brachybotria*									+						+											
Aextoxicon punctatum										+	+								r							
Blepharocalyx cruckshanksii											+															
Bomarea salsilla											+													r		
Uncinia phleoides																			1					1		
Laurelia sempervirens																				+				+		
Companion species																										
Agrostis capillaris			1	1	1	+	1		1	2	1	+	1		1				1			1	2		1	
Hypericum perforatum				+	1		+	+	1	1					+	1		+	+	+		+	1			
Lotus uliginosus / corniculatus		+	+							2								1	+		1					
Holcus lanatus		1	+		+																					
Prunella vulgaris				+			+					1			1						1	+	1			
Acaena ovalifolia								+											+				+			
Nassella chilensis	+														2											
Adesmia propinqua				1								1												+		
Eryngium paniculatum					+					+					1							+				
Adiantum chilense																	+						1			
Parnassia mucronata	1																	3		+				+		
Ulex europaeus			-																							
Tropaeolum ciliatum		+	+					+	+																	
Dactylis glomerata													1													
Alstroemeria hookeriana					+											1										
Leptocampla rivularis																								1		

Both in the typical version of the association and the *Peumus boldus* Variant we find *Teline monspessulana*, a European species that has invaded with great success these mantle communities, especially when they occur as boundary or wayside hedges in the lower mesotemperate belt, as frequently seen along the Central Depression in the proximities of the Pan-American Highway. In view of this trend we occasionally see dense populations of this broom species like those used to define the association named Aristotelio-Telinetum monspessulani (HILDEBRAND 1983). We consider that communities of this type should be interpreted simply as a "*Teline monspessulana* facies" of the associations that act as woodland mantles in this territory, whether Alstroemerio-Aristotelietum or Rhaphithamno-Aristotelietum (see below).

Association 2

Rhaphithamno spinosi-Aristotelietum chilensis, Tables 4 and 5 (Lectotypus Oberdorfer 1960, Table 34, relevé 258).

This is an association with a wide geographical range which we have selected as nomenclatural type of the alliance Berberidion buxifoliae. Although its original description included some relevés of stages that can be considered deviant in that they correspond to formations dominated by the alien species *Ulex europaeus* and *Rubus constrictus*, which tend to "choke out" local woody species (the *Ulex*-stadium of OBERDORFER 1960), the optimal phase permits recognition of a community in which numerous woody and scandent species participate. HILDEBRAND (1983) collated about 24 relevés of this association, though all were from low-altitude areas close to the coast, in the administrative province of Valdivia. This study presented on the one hand a mature version of the association with presence of somewhat thermophilous species of the Nothofago-Eucryphion, such as *Lapageria rosea, Cissus striata, Aextoxicon punctatum, Pseudopanax valdiviense* and *Laurelia sempervirens*; on the other hand it proposed splitting those communities dominated by invasive woody species of OBERDORFER's *Ulex*-stadium into an independent association denominated Rubo-Ulicetum europaei. We consider it more reasonable to interpret communities like this as degraded or hyper-disturbed facies which in the absence of major human influence would probably be occupied by Rhaphithamno-Aristotelietum.

Our current concept of this association is summarized in Tables 4 and 5, and is basically in agreement with those of the two German authors cited. Its natural position is as a mantle community of woodlands of the alliance Nothofago-Eucryphion. It is largely linked to wetter versions of Nothofago obliquae-Perseetum lingue oakwoods, in line with the pronounced presence of *Nothofagus obliqua* in the relevés; but the range of situations in which we have identified this community leads us to additionally associate it with zones of potential vegetation close to the Lapagerio-Aextoxiconetum (the option preferred by HILDEBRAND op. cit.) and others clearly of the Nothofago dombeyi-Eucryphietum; it can thus

Table 4. Rhaphithamno spinosi-Aristotelietum chilensis Oberdorfer 1960.

Order nº	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Relevé field number	43	118	111	91	40	42	104	105	83	9	80	92	93	25	72	82	97	173	180	181	182
Altitude (m a.s.l.)	10	360	450	200	8	15	80	590	170	450	350	170	160	490	250	240	90	440	480	530	690
Slope (°)	5	<5	10	0	0	10	45	5	0	<5	5	<5	10	15	15	40	60	0	5	<5	5
Aspect	S	E	E	-	-	NE	E	NW	-	-	N	E	W	NW	NE	NW	NE	-	S	S	E
Cover (%)	90	85	100	80	100	100	100	90	95	95	95	100	100	100	100	95	100	100	95	95	95
Vegetation hight (m)	1-3	2-8	2-8	1-4	1-5	1-4	2-4	1-2	2-7	2-6	1-6	2-7	1-5	2-8	1-7	1-4	2-7	2-7	3-5	3-6	2-5
Plot area (m^2)	70	75	75	90	120	75	90	40	120	75	90	80	60	60	70	60	60	60	40	60	60
Nº of species	18	18	17	19	18	23	20	19	24	18	22	14	22	24	19	18	16	19	14	18	18
Ass., All. & Ord. species																					
Aristotelia chilensis	5	4	5	+	4	3	5	3	3	4	4	5	3	5	4	5	2	4	4	3	4
Rubus constrictus / ulmifolius	1	1	2	3	2	1	2	+	1	1	2	2	1	1	1	1	1	r	3	2	1
Blechnum hastatum	1	+	2	.	1	2	+	+	1	1	2	1	1	1	1	1	1	1	1	2	1
Rhaphithamnus spinosus	+	1	.	.	.	.	.	+	3	1	3	.	3	+	.	.	3	1	+	1	3
Cissus striata	1	1	+	.	1	1	3	.	+	+	.	1	1	.	2	1	3	.	.	.	.
Boquila trifoliolata	.	1	.	.	1	1	1	1	1	1	+	.	1	.	.	+	.	.	.	1	.
Baccharis racemosa	3	1	.	+	2	2	1	.	.	.	.	.	.	1	1	1	.	.	.	r	.
Gaultheria phillyreifolia	.	+	.	.	.	1	+	.	.	.	+	.	.	2	+	2	1	.	+	+	.
Fuchsia magellanica	1	.	1	.	1	.	+	.	.	+	.	1	.	1	1	1	.	1	.	.	.
Muehlenbeckia hastulata	2	.	1	.	4	2	2	.	.	+	.	.	.	+	+	.	2	.	.	.	.
Ugni molinae	.	.	.	.	.	3	+	4	.	.	.	.	5	+	.	.	2	.	.	1	.
Relbunium hypocarpium	+	.	.	.	.	1	.	1	.	+	+	.	1	.	+	.	.	.	.	.	.
Berberis darwinii	.	.	.	1	.	.	.	1	1	.	.	.	+	.	.	.	.	.	.	+	1
Buddleja globosa	.	.	+	2	.	.	.	.	.	.	.	+	.	+	.	2	+	.	.	.	.
Maytenus boaria	.	.	.	2	1	1	3	+	+	.	.	.	.	.	.	.	.	.	.	.	.
Lomatia hirsuta	.	3	.	.	.	.	.	1	.	.	.	+	.	+	.	.	.	.	.	+	.
Rosa rubiginosa	.	r	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	1	1
Berberis microphylla	.	.	.	1	+	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.
Lomatia dentata	.	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3	.
Alstroemeria aurantiaca	.	.	.	1	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Ribes valdiviense / trilobum	.	.	.	1	.	.	.	.	.	.	+	.	.	1	.	.	.	.	.	.	.
Corynabutilon vitifolium	.	.	.	1	.	.	.	.	.	.	.	3	.	.	.	.	.	.	.	.	.
Solanum cyrtopodium	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
Solanum valdiviense	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Baccharis obovata	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.
Myoschilos oblonga	.	.	.	.	.	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.
Colletia spinosa	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	+	.
Wintero-Nothofagetea Class																					
Luma apiculata	.	.	+	.	+	2	+	.	2	2	+	.	2	.	.	+	.	1	2	1	3

Relevé field number	43	118	111	91	40	42	104	105	83	9	80	92	93	25	72	82	97	173	180	181	182
Eucryphia cordifolia	.	1	.	.	.	.	.	1	+	.	1	+	+	2	2	1	4	+	r	.	.
Embothrium coccineum	.	.	.	4	2	3	+	.	+	.	+	2	.	2	2	1	.	.	.	.	.
Nothofagus obliqua	+	1	1	.	.	.	+	.	1	.	1	.	.	+	.	.	.	.	1	.	+
Persea lingue	.	.	+	.	.	+	+	.	.	.	1	.	2	1	2	+	.	.	.	4	.
Blechnum chilense	.	.	.	1	.	2	.	.	2	.	.	+	r	2	1	.	.	1	.	.	.
Chusquea valdiviana	.	.	+	.	+	.	.	.	5	.	.	1	.	.	.	.	5	4	.	.	.
Nothofagus dombeyi	.	.	.	.	.	+	.	1	.	.	.	.	.	+	.	.	.	r	+	.	.
Gevuina avellana	.	.	.	.	.	.	+	4	.	+	2	.	.	.	.	.	.	+	.	.	.
Chusquea culeou	.	.	.	.	.	.	.	.	.	4	1^0	.	.	+	.	.	.	.	2	.	+
Aextoxicon punctatum	.	.	.	.	.	.	.	.	.	1	+	.	+	.	.	.	+	.	.	.	.
Azara lanceolata	.	.	.	.	.	.	.	.	.	+	+	.	.	+	.	.	.	2	.	.	.
Weinmannia trichosperma	.	.	.	.	.	.	.	+	+	.	.	.	.	+	.	.	.	.	.	.	.
Mitraria coccinea	.	.	.	.	.	.	.	.	1	.	+	.	.	.	.	.	.	1	.	.	.
Laurelia sempervirens	.	2	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Luzuriaga radicans	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	1	.	.	.
Blechnum mochaenum	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.
Dasyphyllum diacanthoides	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	+
Myrceugenia planipes	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	+
Companion species																					
Lotus uliginosus + corniculatus	1	2	1	1	1	.	1	.	1	.	1	1	+	.	.	1	1	.	.	.	1
Holcus lanatus	1	.	1	+	1	+	1	.	1	.	.	.	.	.	+	.	.	+	.	.	+
Agrostis capillaris	.	.	1	.	.	+	.	.	.	.	.	.	.	.	.	.	1	.	1	1	1
Adiantum chilense	1	.	.	.	.	.	.	.	.	.	.	.	+	+	1	+	.	.	.	.	.
Dactylis glomerata	1	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.
Libertia chilensis	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+
Prunella vulgaris	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	1	.	1
Pernettya mucronata	.	.	.	.	.	.	.	1	.	.	.	.	r	.	.	.	.	.	.	.	.
Oxalis rosea	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.

Table 5. Rhaphithamno spinosi-Aristotelietum chilensis subassociation peumetosum boldi subass. nova.

Order nº	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Relevé field number	33	30	34	50	51	79	73	31	38	36	37	52	32	57	35	53	229
Altitude (m a.s.l.)	5	6	80	390	360	140	250	6	50	140	110	100	60	60	130	40	110
Slope (°)	<5	<5	30	45	10	15	50	45	10	<5	45	<5	30	5	<5	20	0
Aspect	N	S	W	SW	SW	NW	N	W	E	E	NW	E	N	S	W	E	-
Cover (%)	100	100	95	95	95	85	95	100	85	90	95	95	95	100	90	90	100
Vegetation hight (m)	2-5	1-7	1-6	2-8	1-5	1-7	1-7	2-5	1-5	1-5	1-7	2-4	1-5	1-6	1-5	2-6	2-4
Plot area (m^2)	100	50	200	70	75	60	70	90	60	70	120	100	150	60	120	75	80
Nº of species	24	22	22	25	23	22	24	21	18	21	14	19	23	12	29	27	20
Ass., All. & Ord. species																	
Aristotelia chilensis	4	3	4	3	3	4	5	5	3	3	5	5	1	5	5	5	5
Rubus constrictus / ulmifolius	1	1	1	+	2	1	2	1	2	2	2	2	1	2	1	+	1
Blechnum hastatum	1	1	1	1	+	2	1	1	1	1	.	+	2	1	1	1	1
Muehlenbeckia hastulata	2	3	1	2	1	1	1	2	2	.	2	1	1	2	1	1	4
Cissus striata	1	1	1	1	1	1	2	2	1	.	1	2	+	1	.	1	2
Baccharis racemosa	1	+	1	.	.	+	1	1	+	1	.	2	1	2	1	+	+
Retbunium hypocarpium	+	.	+	.	.	+	+	.	1	.	.	+	.	+	+	1	.
Rhaphithamnus spinosus	2	.	2	1	1	.	+	.	.	2	.	.	.	.	1	+	.
Boquila trifoliolata	1	.	2	1	.	.	+	1	.	1	.	.	.	.	1	.	.
Lomatia dentata	.	+	.	1	2	1	+	.	.	3	.	.	.	.	.	+	.
Maytenus boaria	.	1	.	.	+	+	+	+	+	.	.	.	1	.	.	.	.
Ugni molinae	.	.	1	.	.	1	+	.	.	+	.	.	3	.	1	.	.
Fuchsia magellanica	1	2	2	.	.	.	.	1	.	.	.	.	.	.	.	+	.
Ribes valdiviense / trilobum	+	.	.	.	.	.	.	+	.	r	.	.	.	.	.	.	1
Lomatia hirsuta	.	.	.	+	.	1	+	.	.	.	.	.	.	.	.	+	.
Berberis microphylla	.	+	.	.	.	.	.	.	.	1	.	.	.	.	+	.	.
Alstroemeria aurantiaca	.	+	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.
Gaultheria phillyreifolia	.	.	2	.	.	.	.	.	.	.	.	.	3	.	.	.	.
Rosa rubiginosa	.	.	.	.	1	1	.	.	.	.	.	.	.	.	.	.	.
Mutisia gr. spinosa	.	.	.	.	.	.	.	.	.	2	.	.	.	.	1	.	.
Baccharis obovata	.	.	.	.	.	.	.	.	.	.	.	.	+	.	2	.	.
Myoschilos oblonga	+	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Differentials subass. peumetosum																	
Peumus boldus	1	+	2	2	1	1	2	1	1	2	+	1	2	1	2	2	1
Escallonia pulverulenta	.	.	1	1	1	.	.	.	.	.	.	1	3	.	.	.	2
Greigia sphacellata	+	2	+	1	+	.	.	.	.	.	.	.	.	.	.	.	.
Lobelia tupa	.	.	.	+	.	.	.	.	.	.	.	+	.	.	1	1	+
Azara integrifolia	.	.	.	.	.	.	+	.	.	+	.	+	+	.	.	.	1

be expected to be widely distributed in the hyperhumid mesotemperate belt. In terms of floristic comparison we stress some marked differences with respect to the Alstroemerio-Aristotelietum (see above, Association 1), principally the frequency of shrubs indicating a requirement for humid conditions, such as *Rhaphithamnus spinosus* and *Fuchsia magellanica*.

Internal variability of Association 2

We have considered it necessary to distinguish a new subassociation, Rhaphithamno spinosi-Aristotelietum chilensis subassociation peumetosum boldi subass. nova (Holotypus relevé 34, Table 5, order no. 3), characterized by the presence of *Peumus boldus* (local name *boldo*), in general not reaching tree height, in addition to various other shrubs with mediterranean optima including *Escallonia pulverulenta* and *Azara integrifolia*. The composition of this new subassociation is documented in Table 5.

We interpret this community as replacing more thermophilous woodlands, tolerant of lower precipitation, within the alliance Nothofago-Eucryphion, namely the oakwood association Nothofago obliquae-Perseetum lingue subassociation boldetosum. This is an oakwood community with *boldo* that represents the potential vegetation of the slopes of the Coastal Cordillera and the mediterranean-temperate transition territory. Its shrub mantle, the Rhaphithamno-Aristotelietum peumetosum boldi, is especially frequent in the low coastal areas that extend between the mouths of the Rivers Bío-Bío and Toltén (Fig. 2), though in certain situations its presence is favoured by locally edaphoxerophilous conditions, as in sandy-gravelly fluvial deposits. As differential species of this subassociation expressing this coastal hyperoceanic tendency we would highlight *Greigia sphacellata, Lobelia tupa* and *Jovellana violacea*. How-

Table 5. (cont.)

Relevé field number	33	30	34	50	51	79	73	31	38	36	37	52	32	57	35	53	229
Jovellana violacea	.	.	.	.	.	.	.	.	.	1	.	.	.	+	.	1	.
Cryptocarya alba	.	.	.	1	.	.	.	.	.	.	2	.	.	.	.	.	.
Teline monspessulana	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	1	.
Wintero-Nothofagetea Class																	
Luma apiculata	2	+	.	+	4	3	+	r	.	2	.	1	r	.	2	1	1
Nothofagus obliqua	1	2	.	+	+	2	+	.	1	.	.	.	2	r	.	+	.
Chusquea valdiviana	3	2	2	1	.	1	.	.	1	.	2	.	.	.	1	.	.
Lapageria rosea	+	+	.	1	.	.	.	.	.	.	.	.	+	.	+	1	.
Aextoxicon punctatum	.	+	.	+	.	.	1	.	.	+	.	.	.	.	+	.	.
Laurelia sempervirens	+	.	.	.	.	.	2	.	.	.	2	.	.	.	.	+	.
Bomarea salsilla	.	.	.	+	.	.	.	1	1	.	.	.	.	.	.	1	.
Embothrium coccineum	.	.	1	.	.	+	.	.	.	.	.	.	.	.	+	.	.
Persea lingue	.	.	.	2	.	.	1	.	.	.	2	.	.	.	.	.	.
Gevuina avellana	.	.	.	.	.	.	+	.	.	+	.	.	.	.	+	.	.
Eucryphia cordifolia	.	.	r	.	.	.	.	.	.	.	.	.	.	.	+	.	.
Uncinia phleoides	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1
Companion species																	
Holcus lanatus	1	+	+	.	1	.	1	+	1	1	.	+	1	1	1	+	.
Agrostis capillaris	.	.	.	1	1	2	.	.	1	.	1	1	1	.	1	+	1
Lotus uliginosus	+	1	.	.	+	.	.	+	.	.	.	.	.	1	+	.	.
Adiantum chilense	.	.	.	1	.	.	+	1	+	.	.	.	.	.	.	.	.
Acaena ovalifolia	.	.	.	+	+	.	.	.	+	.	.	+	.	.	.	.	.
Prunella vulgaris	.	.	.	.	.	1	.	.	.	1	.	.	.	.	1	.	.
Eryngium paniculatum	.	.	.	.	.	.	.	.	.	.	.	+	1	.	+	.	.
Calceolaria gr. dentata	.	.	.	.	.	.	.	.	.	.	.	.	r	+	.	.	+
Tristerix tetrandrus	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Libertia chilensis	.	+	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.
Acrysione sp.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Chusquea cumingi	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	1
Baccharis linearis	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	.
Proustia pyrifolia	.	.	.	.	.	4	.	.	.	.	.	.	+	.	.	.	.
Oxalis rosea	.	.	.	.	.	.	2	.	1	.	.	.	.	.	.	.	.
Geranium core-core	.	.	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.
Podanthus mitiqui	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	1	.

ever, we have also noted some presences of this community in edaphoxerophilous positions at the sunny margins of some lakes in Valdivia Province.

HILDEBRAND (1983) reports within the Rhaphithamno-Aristotelietum a subassociation ovidietosum pillo-pillo, on the basis of the presence of shrubs like *Ovidia pillo-pillo, Lomatia dentata* and *Berberis darwinii*. However, we consider that this floristic grouping probably has no real ecological, bioclimatic or successional significance, and that the species cited by this author (except perhaps *Ovidia pillo-pillo*) normally form part of the typical association. The *Peumus boldus* variant recognized by HILDEBRAND (op. cit.) within the subassociation ovidietosum pillo-pillo can be interpreted as an extreme position within the subassociation we denominate peumetosum boldi.

Association 3

Azaro microphyllae-Aristotelietum chilensis ass. nova, Table 6 (Holotypus relevé 109, Table 6, order no. 5).

We consider as a new association the shrub formations whose composition is shown in Table 6. These are woodland-mantle scrubs present within a clearly defined biogeographical region, with a degree of mediterranean influence in the summer climate, unlike the Rhaphithamno-Aristotelietum, and with clearly continental influence distinguishing them from the Alstroemerio-Aristotelietum.

This association is characterized floristically by the constant presence of *Azara microphylla*, which typically becomes more abundant with increasing continental character. Many of the woody species present in this association are also seen in associations 1 and 2 (such as *Aristotelia chilensis, Gaultheria phillyreifolia, Lomatia dentata* and *L. hirsuta*), but by contrast with these associations thermophilous species (e.g. *Baccharis racemosa, Ugni molinae, Muehlenbeckia hastulata* and *Persea lingue*) are practically never present. The high frequency of *Rosa rubiginosa* and *Chusquea culeou*, in addition to presences like *Dasyphyllum diacanthoides*, are important differences with respect to the Rhaphithamno-Aristotelietum.

Likewise *Azara microphylla, Ribes valdiviense/trilobum* and the abovementioned *Dasyphyllum diacanthoides* serve to differentiate this association from the Alstroemerio-Aristotelietum, in addition to the frequent *Berberis darwinii*, almost never present in this latter association. Although of low frequency, we consider significant in samples of Azaro microphyllae-Aristotelietum the presence of the woody species *Prumnopitys andina* and *Myrceugenia ovata* var. *nanophylla*. The type of oak woodland with *Prumnopitys andina*, characteristic of Andean valleys showing continental character but not excessively low temperatures (altitude no more than 1000 m) in the region of La Araucanía, is a tree community that has not been described phytosociologically and that includes within its successional dynamics a mantle community of the Azaro microphyllae-Aristotelietum chilensis.

Table 6. Azaro microphyllae-Aristotelietum chilensis ass. nova.

Order n°	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Relevé field number	71	13	67	108	109	110	107	70	68	134	135	136	137	138	139	140	174	175	66	132	199
Altitude (m a.s.l.)	820	1070	1020	460	600	850	600	830	620	770	850	790	540	940	820	700	580	670	310	440	950
Slope (°)	10	15	5	30	15	25	10	35	40	45	20	10	45	25	5	15	30	10	10	45	10
Aspect	S	NW	SW	S	E	E	N	W	N	SE	N	NW	SE	S	E	E	S	S	N	SE	N
Cover (%)	90	85	90	90	80	85	85	100	90	80	90	95	90	100	100	95	90	100	95	100	95
Vegetation hight (m)	1-6	2-5	1-6	1-6	1-4	1-5	0-3	2-5	1-5	2-6	2-6	3-4	2-4	2-5	2-6	2-4	2-6	3-7	1-3	2-4	2-5
Plot area (m^2)	120	75	75	40	60	50	50	120	60	150	75	60	40	50	45	45	120	75	100	80	100
N° of species	15	10	19	22	25	15	21	20	15	24	18	13	21	15	18	15	23	23	18	21	30
Ass., All. & Ord. species																					
Aristotelia chilensis	3	4	1	3	3	5	3	2	4	3	2	4	2	3	5	4	2	5	4	5	+
Azara microphylla	1	2	2	+	2	2	2	1	1	1	+	+	1	+	+	1	2	1	+	1	3
Rosa rubiginosa	3	.	.	2	1	2	+	+	1	1	+	2	.	r	1	2	1	+	+	+	.
Blechnum hastatum	+	.	.	2	3	1	2	1	.	.	1	+	1	.	1	1	3	1	1	1	2
Ribes valdiviense / trilobum	+	.	1	+	+	r	+	+	.	1	.	+	r	.	+	1	+	.	.	r	+
Rubus constrictus / ulmifolius	1	.	+	.	.	+	+	2	2	1	1	1	.	.	.	.	.	.	4	2	.
Berberis darwinii	.	.	+	.	.	+	2	.	.	+	1	.	.	.	.	1	+	+	+	.	1
Lomatia hirsuta	.	.	.	+	+	.	1	.	2	2	+	.	.	.	.	.	1	+	+	+	3
Lomatia dentata	+	2	2	1	1	.	r	+	.	.	.	.	.	1	.	.	r	.	.	.	+
Fuchsia magellanica	.	.	.	1	+	.	1	.	.	.	+	+	.	.	+	.	.	+	.	.	.
Alstroemeria aurantiaca	1	.	.	.	.	+	.	+	.	+	.	.	.	.	+	.	.	1	.	.	.
Buddleja globosa	.	r	+	.	.	.	.	1	.	.	.	+	.	.	1	.	.	.	1	.	1
Relbunium hypocarpium	.	.	.	.	+	.	.	.	.	1	1	.	+	.	.	.	+	+	.	.	1
Gaultheria phillyreifolia	.	.	1	.	.	.	3	.	.	.	1	.	.	+	.	.	+	+	.	.	+
Boquila trifoliolata	.	.	1	.	1	+	1	.	.	.	.	.	+	.	+	.	.	.	.	.	.
Solanum cyrtopodium	.	.	.	.	+	+	.	.	.	.	.	.	.	+	.	.	.	.	.	2	.
Ovidia pillo-pillo	.	.	.	.	.	.	.	2	1	.	.	.	.	.	+	.	.	.	1	+	+
Maytenus boaria	.	.	.	.	.	.	r	.	1	.	.	.	.	.	.	.	.	.	+	3	+
Rhaphithamnus spinosus	.	.	.	1	.	.	4	.	.	+	.	.	1	.	.	.	3	.	.	.	.
Ribes gr. magellanicum	.	1	.	.	.	.	.	.	.	+	.	.	.	2	.	.	.	1	.	.	.
Prumnopitys andina	.	.	.	.	.	r	.	.	.	.	.	.	.	.	+	1	.	.	.	.	.
Myrceugenia ovata nanophylla	.	.	.	.	+	+	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.
Cissus striata	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	+	.	.	.	.
Berberis microphylla	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	1	r	1	.	.
Berberis valdiviana	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
Baccharis obovata	.	.	+	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.
Tropaeolum speciosum	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.
Baccharis racemosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
Solanum krauseanum	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.

Table 6. (cont.)

Relevé field number	71	13	67	108	109	110	107	70	68	134	135	136	137	138	139	140	174	175	66	132	199
Wintero-Nothofagetea Class																					
Chusquea culeou	1	2	2	4	3	1	1	4	.	3	4	+	3	4	.	+	3	1	.	1	3
Nothofagus dombeyi	.	.	+	+	+	.	1	.	.	.	+	.	.	1	.	.	1	3	.	.	.
Nothofagus obliqua	.	.	.	.	+	1	.	.	.	2	.	.	.	.	2	1	.	.	+	1	+
Dasyphyllum diacanthoides	.	2	2	2	3	.	.	.	.	.	3	.	3	.	.	.	1	.	.	.	.
Luma apiculata	.	.	1	1	2	.	1	.	1	.	.	.	1	.	.	.	.	.	.	.	.
Embothrium coccineum	4	.	.	.	.	.	r	.	.	.	+	.	.	.	.	.	.	.	+	1	3
Gevuina avellana	.	.	4	.	.	.	+	3	+	.	.	.	.	.	.	.	.	.	.	.	.
Osmorhiza chilensis	.	.	.	.	.	.	2	.	.	+	.	.	.	1	.	.	1	.	.	.	.
Nothofagus alpina	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	.	.	.
Laurelia sempervirens	.	.	.	.	.	.	.	2	.	.	.	.	2	.	.	.	.	.	+	+	.
Dioscorea cf. brachybotria	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	+	.	.	.	+	.
Vicia nigricans	+	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	1	.	.	.
Blechnum mochaenum	.	.	.	1	.	.	.	.	.	.	.	.	1	+	.	.	.	.	.	.	.
Maytenus magellanica	.	+	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	.	.
Elytropus chilensis	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+
Nertera granadensis	.	.	.	.	.	.	+	.	.	.	.	.	.	+	.	.	.	.	.	.	.
Companion species																					
Holcus lanatus	1	.	.	1	1	.	.	.	1	+	.	1	1	.	.	1	1	+	1	.	.
Acaena ovalifolia	.	.	.	.	.	.	.	.	+	1	.	1	1	.	+	.	.	+	.	1	.
Lotus uliginosus / corniculatus	.	.	.	1	1	.	.	.	1	.	+	1	1	1	1	.	.	.	1	.	.
Agrostis capillaris	.	.	.	.	.	1	.	.	.	.	1	1	.	.	1	.	.	.	.	.	.
Hypericum perforatum	1	.	.	.	.	.	.	+	.	1	.	1	.	.	.	.	.	.	.	1	.
Prunella vulgaris	.	.	.	.	1	.	.	.	.	+	.	1	1	.	.	.	.	.	.	.	.
Adiantum chilense	.	.	.	1	.	.	.	.	.	.	.	.	1	.	+	.	.	.	.	.	.
Valeriana lapathifolia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	.	r	.
Geranium core-core	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	.
Arrhenatherum elatius	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.
Myrceugenia ovata ovata	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Stachys macraei	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	1	+
Azara integrifolia	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	+	.	.
Elymus andinus	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	1	.	.	.

Fig. 4. Strip of Azaro microphyllae-Aristotelietum chilensis fringing a well-conserved stand of Nothofagus obliqua-N. alpina woodland (Nothofagetum procerae). Lanín National Park, Neuquén, Argentina.

As a consequence of human influences, the Azaro microphyllae-Aristotelietum participates as a successional stage in various types of woodland, ranging from relatively thermophilous formations such as Dasyphyllo diacanthoidis-Nothofagetum alpinae (marginally also Nothofago dombeyi-Eucryphietum cordifoliae) to more continental formations such as the above-mentioned "*Nothofagus obliqua-Prumnopitys andina* woodland" or the so-called Nothofagetum procerae, dominated by *Nothofagus alpina* with *Nothofagus dombeyi*.

We associate the presence of Azaro microphyllae-Aristotelietum, which we have detected in Argentina, near Lake Lacar, with this latter woodland community; although in this part of the eastern Andean Range an association denominated Nothofagetum dombeyi-alpinae has been described, first as an invalid name by Conticello et al. (1996), but later revindicated and validated by Eskuche (1999). In our opinion the distinction between Nothofagetum procerae and Nothofagetum dombeyi-alpinae was not sufficiently supported by the relevés published (Eskuche 1999; Pollmann 2001), and in any case woodlands clearly assignable to the Nothofagetum procerae certainly exist in Argentina, as supported by the presence of the same mantle community (Fig. 4).

Association 4

Fuchsio magellanicae-Chusqueetum quilae (see HILDEBRAND 1983: Table 4).

This is a shrub community dominated by *quila* (local name of *Chusquea valdiviana*, traditionally interpreted as *C. quila*), although taller shrubs such as *Aristotelia chilensis* and *Fuchsia magellanica* may also be present. It was described as a version of the Aristotelio-Fuchsietum magellanicae (Association 5, see below) occurring in hyperhumid Valdivian coastal areas, since it can only be documented with relevés from two coastal locations (Queule and Corral) just to the north and south of the estuary of the River Valdivia. This is a successional association replacing the hyperhumid thermophilous woodlands which reaches its ecological optimum in non-insular coastal areas of the Los Lagos Region, and which has traditionally been one of the types of Valdivian woodland that has been subject to most severe deforestation pressure.

The thermophilous character and relationship with Lapagerio-Aextoxiconetum punctati is reflected by the presence of lianoid species like *Lapageria rosea, Pseudopanax valdiviense* and *Cissus striata*, and the hyperoceanic character due to the closeness of the coast is highlighted by the presence of *Jovellana punctata* and *Greigia sphacellata*.

Although we consider it erroneous to interpret as belonging to this association all *quila*-dominated scrubs in the Valdivian biogeographical region, we nevertheless consider that Fuchsio magellanicae-Chusqueetum quilae is valid as a successional stage of a specific type of woodland within a specific territory: the lower altitudinal belts of the Coastal Cordillera in the administrative provinces of Valdivia and Osorno (and probably reaching the province of Llanquihue), but always in the coastal region and associated with the destruction of Lapagerio roseae-Aextoxiconetum punctati woodlands, dominated by *Aextoxicon punctatum*.

Association 5

Aristotelio chilensis-Fuchsietum magellanicae, Table 7 (Lectotypus Oberdorfer 1960, Table 35, relevé 204).

This is another association described by OBERDORFER, with a clearly higher water requirement than Rhaphithamno-Aristotelietum, and thus with a more southern distribution than the associations listed so far; relevés of this association are shown in Table 7. Its optimal ecological position is fringing the hyperhumid woodlands that constitute the transition between the alliances Nothofago-Eucryphion and Nothofago-Winterion. In the potential territory of Nothofago dombeyi-Eucryphietum cordifoliae (Nothofago-Eucryphion) this association can frequently be found close to or in contact with Rhaphithamno-Aristotelietum, but in these situations the Aristotelio-Fuchsietum is always an indicator of more or less markedly edaphohygrophilous positions (see OBERDORFER, op. cit.: 130, Figure 33); in addition, isolated stands of this

Table 7. Aristotelio chilensis-Fuchsietum magellanicae Oberdorfer 1960.

Order n°	1	2	3	4	5	6	7	8	9	10	11	12	13
Relevé field number	**19**	**26**	**27**	**81**	**85**	**20**	**10**	**115**	**84**	**86**	**176**	**116**	**188**
Altitude (m a.s.l.)	520	400	460	490	380	610	640	500	760	480	690	830	60
Slope (°)	15	25	35	10	30	20	5	15	35	20	60	40	5
Aspect	W	SW	S	S	S	W	E	SW	S	NE	S	SW	W
Cover (%)	100	100	100	100	100	100	90	100	80	100	100	100	100
Vegetation hight (m)	2-4	2-4	1-4	1-6	3-8	2-6	1-3	2-7	1-4	2-6	2-5	2-4	3-6
Plot area (m^2)	80	100	100	60	90	80	40	80	80	90	150	50	100
N° of species	19	21	15	23	26	26	19	20	22	17	17	16	19
Ass., All. & Ord. species													
Fuchsia magellanica	5	1	5	5	3	4	3	3	3	5	4	3	3
Aristotelia chilensis	3	5	3	3	4	4	2	4	1	2	1	.	3
Azara lanceolata	+	+	.	1	+	+	r	1	3	1	+	1	.
Rubus constrictus / ulmifolius	1	1	1	2	1	1	1	1	.	.	.	.	3
Lophosoria quadripinnata	1	2	+	.	+	2	.	.	.	3	2	.	2
Caldcluvia paniculata	.	+	+	r	1	+	.	.	.	+	1	.	+
Blechnum hastatum	+	1	1	1	1	1	1	.	.	.	.	.	.
Buddleja globosa	3	2	2	.	1	2	.	.	.	+	r	.	.
Rhaphithamnus spinosus	.	+	.	1	1	.	.	2	.	+	.	.	2
Lomatia ferruginea	.	.	.	.	+	+	.	.	+	.	.	+	+
Gaultheria phyllyreifolia	.	.	.	.	+	.	+	.	+	.	+	1	.
Gunnera tinctoria	.	.	1	+	.	.	.	.	.	.	4	.	1
Boquila trifoliolata	.	.	.	1	.	1	+	.	.	.	.	.	.
Muehlenbeckia hastulata	1	1	.	.	.	1	.	.	.	.	.	.	.
Relbunium hypocarpium	.	.	.	.	+	+	+	.	.	.	.	.	.
Baccharis racemosa	+	+	.	.	.	.	.	.	.	.	.	.	.
Cissus striata	.	.	.	+	+	.	.	.	.	.	.	.	.
Escallonia rubra	.	.	.	+	+	.	.	.	.	.	.	.	.
Amomyrtus luma	.	.	.	.	.	+	.	.	.	.	.	.	+
Myrceugenia planipes	.	.	.	.	.	.	.	3	.	+	.	.	.
Wintero-Nothofagetea Class													
Mitraria coccinea	.	1	.	+	+	2	+	2	1	1	1	1	.
Blechnum chilense	+	1	1	2	3	.	.	.	.	3	1	.	2
Chusquea culeou	.	2	.	+	.	1	4	.	2	.	1	4	.
Eucryphia cordifolia	.	+	.	+	+	+	.	.	.	+	.	.	2
Laureliopsis philippiana	.	.	.	.	r	1	.	+	1	1	.	+	.
Ribes valdiviense / trilobum	+	.	.	+	.	+	+	.	+	.	.	1	.
Embothrium coccineum	.	.	.	1	1	+	.	.	.	.	3	.	3
Blechnum mochaenum	.	+	.	.	.	+	+	1	1	.	.	.	.
Nothofagus obliqua	.	1	+	1	.	+	+	.	.	.	.	.	.
Nothofagus dombeyi	.	+	+	.	.	.	.	.	+	.	.	2	.
Luma apiculata	.	.	.	.	1	.	.	.	.	+	+	.	3
Hydrangea serratifolia	.	.	.	.	+	.	.	.	1	+	+	.	.
Dasyphyllum diacanthoides	.	.	.	.	.	+	2	.	3	.	.	1	.
Nothofagus alpina	1	.	.	.	.	.	1	.	+	.	.	+	.
Chusquea valdiviana	+	.	.	.	.	3	.	+	.	.	.	.	+
Megalastrum spectabile	.	.	.	+	.	.	.	+	+	1	.	.	.
Nertera granadensis	.	.	.	.	1	+	.	1	.	.	.	.	.
Dioscorea gr. brachyobotria	.	.	.	.	+	.	.	+	.	+	.	.	.
Ribes gr. magellanicum	.	.	.	.	.	.	.	.	.	.	1	.	+
Saxegothaea conspicua	.	.	.	.	.	.	.	.	1	.	.	+	.
Pseudopanax laetevirens	.	.	.	.	.	.	.	.	+	.	.	+	.
Vicia nigricans	1	.	.	.	.	1	.	.	.	.	.	.	.
Drimys winteri	.	.	.	.	.	+	.	.	.	.	.	.	1
Companion species													
Lotus uliginosus	+	.	1	.	+	.	+	.	.	.	.	.	2
Adiantum chilense	.	+	+	1	.	.	+	.	.	.	.	.	.
Chusquea prob. uliginosa	.	.	.	.	3	.	.	.	.	2	.	.	.
Ranunculus repens	2	.	.	2	.	.	.	.	.	.	.	.	.
Polystichum chilense	.	.	.	+	.	.	.	.	1	.	.	.	.

association can also be found scattered in the territory otherwise dominated by the Alstroemerio-Aristotelietum.

Floristically, this association is characterized by the dominance of the two name-giving shrub species: *Aristotelia chilensis* and *Fuchsia magellanica*, with *Azara lanceolata* also present with lower cover. Other shrub-size species indicating a hyperhumid condition may include *Lophosoria quadripinnata, Buddleja globosa* and *Caldcluvia paniculata*; also frequent are two species that OBERDORFER (op. cit.) considered as differentials of the association, namely *Gunnera tinctoria* and *Blechnum chilense*. However, we consider that these species become more abundant with increasing soil moisture and associated conditions. Another fern that in OBERDORFER's view is a differential species, *Hypolepis poeppigii*, is in our opinion no more than of casual presence. It is worth noting that many thermophilous species of Nothofago-Eucryphion are practically never present in Aristotelio-Fuchsietum, including *Persea lingue, Laurelia sempervirens, Aextoxicon punctatum, Lapageria rosea* and *Maytenus boaria*.

Internal variability of Association 5

The most important variant is what we denominate Aristotelio chilensis-Fuchsietum magellanicae subassociation amomyrtetosum lumae subass. nova (Holotypus relevé 95, Table 8, order no. 15), of which we present 20 relevés in Table 8. This is a community in which, in addition to *Aristotelia chilensis* or *Fuchsia magellanica* which may remain dominant, a series of species of arborescent Myrtaceae and Proteaceae (which also participate abundantly in Association 6) are abundantly present. These species are particularly prominent as mantle communities of Nothofago-Winterion woodlands (specifically, Laurelio-Weinmannietum trichospermae woodlands); the most important differential species are *Amomyrtus luma, A. meli, Myrceugenia planipes* and *Lomatia ferruginea*, as well as *Embothrium coccineum* with a much higher presence than in the typical subassociation.

This very broadly defined subassociation, which we have found from the 39th parallel close to the city of Valdivia in the north, to a short distance south of Chaitén (south of the 43rd parallel), can be considered to represent the imbrication or contact between the mesotemperate and hyperhumid Aristotelio-Fuchsietum magellanicae and the likewise widespread supratemperate and hyper/ultrahyperhumid Lomatio ferrugineae-Amomyrtetum lumae (Association 6). The massive presence and high frequence of *Aristotelia chilensis* and the thermophilous species *Ugni molinae* indicates that this community is affected by winter frosts only for a short period; the absence of these species indicates longer, more severe winters, and thus supratemperate climatic conditions.

Table 8. Aristotelio chilensis-Fuchsietum magellanicae subassociation amomyrtetosum lumae subass. nova.

Order n°	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Relevé field number	7	230	94	101	117	113	1	114	189	190	191	100	103	87	95	211	212	228	231	232
Altitude (m a.s.l.)	600	410	350	100	380	340	590	560	40	60	100	290	330	520	410	70	140	30	610	180
Slope (°)	15	5	10	10	5	10	10	5	5	0	5	<5	15	45	5	<5	5	5	10	0
Aspect	NE	NE	SW	S	S	SE	E	E	E	-	S	N	S	S	NW	ENE	W	SW	NW	-
Cover (%)	90	95	100	95	100	95	100	95	100	100	100	100	100	100	100	100	100	100	95	100
Vegetation hight (m)		2-7	2-8	1-5	2-7	1-5	2-5	2-6	3-7	4-7	2-8	2-8	2-5	1-7	2-8	2-5	3-8	2-9	1-6	1-5
Plot area (m^2)	50	150	75	60	75	50	75	60	75	60	100	60	80	90	60	100	75	75	100	60
N° of species	19	24	23	28	19	19	19	17	21	26	20	23	27	20	27	19	20	17	18	20
Ass., All. & Ord. species																				
Aristotelia chilensis	2	2	4	3	4	4	1	4	3	3	2	5	2	+	1	2	.	r	+	+
Azara lanceolata	+	+	+	.	+	2	+	+	.	1	.	1	+	+	1	1	2	1	3	r
Rhaphithamnus spinosus	1	2	1	+	.	+	3	+	1	1	.	2	.	.	2	+	+	2	3	.
Fuchsia magellanica	+	.	.	1	+	.	.	.	3	2	3	4	3	3	5	3	3	1	2	3
Blechnum chilense	.	.	1	2	1	.	+	.	1	+	1	1	4	2	2	2	2	.	.	+
Rubus constrictus / ulmifolius	1	+	1	2	1	.	.	.	+	+	+	+	+	.	+	+	.	.	+	.
Gaultheria phillyreifolia	4	+	+	4	3	.	.	.	.	.	1	+	3	+	.	.	+	.	.	.
Gunnera tinctoria	.	.	.	+	.	.	.	.	1	+	1	1	+	.	1	1	1	.	.	2
Berberis darwinii	1	1	+	.	.	.	.	.	.	.	.	.	1	+	1	.	.	.	1	.
Blechnum penna-marina	.	1	.	2	.	.	.	.	.	1	1	1	.	.	.	1	.	1	.	.
Berberis microphylla	.	.	.	+	.	.	.	.	1	.	+	.	.	.	.	.	.	1	.	r
Ribes valdivianse / trilobum	.	.	.	.	+	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.
Ugni molinae	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ribes gr. magellanicum	.	.	.	1	.	.	.	.	.	1	+	.	.	.	.	.	1	.	.	1
Baccharis sphaerocephala	.	.	1	.	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.
Boquila trifoliolata	.	.	.	.	.	.	2	.	.	.	.	+	.	.	.	.	.	.	.	.
Ovidia pillo-pillo	+	3	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Blechnum hastatum	+	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Differentials subass. amomyrtetosum																				
Amomyrtus luma	2	4	4	1	+	1	2	2	1	3	3	1	1	1	1	2	2	2	2	4
Lomatia ferruginea	1	1	1	1	2	1	1	3	+	.	+	.	+	+	+	+	1	.	r	+
Lophosoria quadripinnata	.	+	2	+	3	1	.	2	3	+	3	+	1	2	.	4	1	.	.	+
Caldcluvia paniculata	.	.	1	1	.	2	.	.	1	+	.	1	2	4	2	+	3	.	.	.
Myrceugenia planipes	.	.	1	.	1	.	1	.	2	+	1	1	+	.	+	.	.	4	.	.
Laureliopsis philippiana	.	.	.	.	.	r	2	+	.	.	.	.	.	.	1	.	.	1	2	+
Weinmannia trichosperma	.	.	.	r	1	.	.	.	.	.	.	.	1	.	r	.	+	.	.	.
Amomyrtus meli	.	1	.	.	+	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Latua pubiflora	.	.	.	.	.	.	+	1	.	.	.	.	.	.	.	.	.	.	+	.

Table 8. (cont.)

Relevé field number	7	230	94	101	117	113	1	114	189	190	191	100	103	87	95	211	212	228	231	234
Wintero-Nothofagetea Class																				
Eucryphia cordifolia	2	.	2	1	3	.	1	+	+	.	3	.	1	+	1	1	3	.	.	.
Embothrium coccineum	1	1	1	1	1	.	.	.	1	.	3	.	3	2	+	1	2	.	.	1
Mitraria coccinea	.	.	1	.	1	3	1	1	.	2	.	1	.	1	1	.	1	+	1	1
Luma apiculata	.	.	+	4	.	.	.	.	3	+	1	1	3	1	1	2	1	.	.	+
Chusquea valdiviana	.	1	.	.	.	.	4	2	1	1	1	.	+	.	3	1	.	.	+	4
Nertera granadensis	.	.	.	.	.	.	1	1	.	1	1	.	1	1	2	.	2	+	1	.
Drimys winteri	.	.	.	+	1	.	.	+	1	.	.	.	.	.	.	.	r	2	.	1
Gevuina avellana	2	.	1	+	.	1	1	.	.	.	.	.	3	.	.	.	.	.	.	.
Dasyphyllum diacanthoides	3	.	+	.	.	.	.	.	.	.	.	.	.	+	+	.	.	.	2	.
Lapageria rosea	.	+	.	.	1	1	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Nothofagus dombeyi	+	.	+	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1
Tepualia stipularis	.	.	.	+	.	.	.	.	.	.	+	.	+	.	.	.	.	.	.	.
Crinodendron hookerianum	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	1	.	.	.	.
Hydrangea serratifolia	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	+	+	.	.
Megalastrum spectabile	.	+	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Nothofagus alpina	1	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	.	.
Aextoxicon punctatum	.	.	r	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Dendroligotrichon dendroides	.	.	.	.	1	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
Elytropus chilensis	.	.	.	.	.	+	.	.	.	+	.	.	.	.	.	.	.	.	.	.
Luzuriaga polyphylla	.	.	.	.	.	.	+	.	.	.	.	.	.	.	1	.	.	.	.	.
Pseudopanax laetevirens	.	.	.	.	.	.	.	+	.	.	.	.	.	2	.	.	.	.	.	.
Campsidium valdiviense	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	1
Companion species																				
Lotus uliginosus	.	.	1	+	.	.	.	.	1	1	2	+	1	.	1	1	.	+	.	.
Coriaria ruscifolia	.	.	+	+	.	.	.	.	1	.	.	+	.	.	.	.	.	.	.	.
Centella asiatica	.	3	.	+	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Acrysione "concolor leaves"	.	.	.	.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	.	+
Ranunculus repens	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.	1	.	.
Prunella vulgaris	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	+	.	.
Acaena ovalifolia	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.	.	1	.
Gleichenia quadripartita	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	+	.	.	.	.

Association 6

Lomatio ferrugineae-Amomyrtetum lumae ass. nova, Table 9 (Holotypus relevé 99, Table 9, order no. 7).

We propose this new association as a prewoodland or mantle shrub community that is widely distributed in supratemperate and hyperhumid areas. It is dominated by shrubs that can reach a considerable size, notably *Amomyrtus luma, Myrceugenia planipes* and *Lomatia ferruginea*, in addition to diverse fern species that require high ambient moisture levels and are thus common in the interior of Valdivian woodlands (*Lophosoria quadripinnata, Blechnum magellanicum, Megalastrum spectabile*); also common are other shrub species such as *Crinodendron hookerianum, Caldcluvia paniculata* and *Baccharis sphaerocephala*, while the abundant presence of *Drimys win-*

Table 9. Lomatio ferrugineae-Amomyrtetum lumae ass. nova.

Order n°	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Relevé field number	5	192	235	3	4	98	99	102	183	184	185	186	187	233	234
Altitude (m a.s.l.)	660	670	905	750	640	470	330	320	210	220	160	200	520	140	160
Slope (°)	5	0	5	5	5	10	10	5	<5	5	15	5	10	5	<5
Aspect	W	-	SSE	NE	SW	N	S	SE	N	SE	W	E	E	N	E
Cover (%)	80	100	90	75	95	100	100	100	100	100	100	90	95	100	100
Vegetation hight (m)	3-7	-	1-5	-	3-7	1-4	2-4	1-4	2-8	3-9	2-6	2-4	6-8	3-9	2-5
Plot area (m^2)	60	40	75	60	50	60	120	100	100	80	100	120	100	60	60
N° of species	18	16	23	18	19	27	26	24	25	25	22	27	28	18	23
Ass., All. & Ord. species															
Amomyrtus luma	2	1	1	2	4	5	5	4	2	4	4	4	4	1	4
Lomatia ferruginea	2	.	.	1	2	1	1	1	2	1	1	1	1	1	1
Lophosoria quadripinnata	.	1	1	.	.	1	2	1	2	.	3	+	+	4	2
Blechnum chilense	.	.	.	.	.	1	2	1	3	+	1	1	+	1	1
Myrceugenia planipes	.	.	.	1	+	2	1	2	.	2	.	+	1	.	+
Caldcluvia paniculata	.	.	.	.	.	.	+	+	1	+	1	+	+	2	1
Fuchsia magellanica	.	3	r	.	.	+	.	+	.	+	.	.	.	2	1
Azara lanceolata	.	.	.	+	.	+	+	+	.	.	.	.	+	2	+
Gaultheria phillyreifolia	4	3	+	+	.	+	+	.	.	.	.	.	.	.	.
Blechnum penna-marina	.	.	.	.	.	1	+	1	.	2	.	.	.	+	1
Crinodendron hookerianum	.	+	.	.	.	+	+	.	1	.	+	.	.	.	.
Baccharis sphaerocephala	.	.	2	.	.	+	.	3	.	.	.	1	1	.	.
Baccharis racemosa	+	.	.	r	1	.	.	.	.	.	.	.	r	.	.
Latua pubiflora	+	1	.	3	1	.	.	.	.	.	.	.	.	.	.
Ovidia pillo-pillo	1	.	3	.	2	.	.	.	.	.	.	.	2	.	.
Berberis darwinii	1	.	.	.	1	3	.	.	.	.	.	.	.	.	.
Amomyrtus meli	.	.	.	.	+	.	.	.	.	.	.	+	1	.	.
Rhaphithamnus spinosus	.	.	.	.	.	1	.	.	.	.	.	2	.	.	1
Solanum gayanum	.	.	.	.	.	.	.	1	.	+	.	2	.	.	.
Myrceugenia parvifolia	.	.	.	.	.	.	.	.	2	+	.	.	+	.	.
Rubus constrictus	.	.	.	.	.	.	.	.	.	+	.	1	.	.	+
Myrceugenia chrysocarpa	.	.	+	.	+	.	.	.	.	.	.	.	.	.	.
Berberis microphylla	.	.	.	.	+	.	.	1	.	.	.	.	.	.	.
Ribes valdiviense / trilobum	.	.	.	.	+	.	.	+	.	.	.	.	.	.	.
Blechnum hastatum	.	.	.	.	+	.	.	.	.	.	.	.	+	.	.
Gunnera tinctoria	.	.	.	.	.	.	.	.	.	.	.	.	.	2	r
Wintero-Nothofagetea Class															
Mitraria coccinea	.	+	+	.	+	1	1	2	3	1	2	2	+	.	+
Embothrium coccineum	1	.	.	.	.	+	2	1	+	1	.	1	+	3	1

Table 9. (cont.)

Relevé field number	5	192	235	3	4	98	99	102	183	184	185	186	187	233	234
Drimys winteri	.	2	1	1	.	.	+	1	1	3	1	r	4	.	.
Nertera granadensis	.	.	.	.	.	2	1	1	2	2	1	1	2	1	2
Weinmannia trichosperma	+	+	.	1	+	.	.	.	+	+	+	+	.	1	.
Chusquea valdiviana	+	.	4	3	+	.	.	.	4	.	1	+	.	3	1
Laureliopsis philippiana	.	.	+	1	2	+	1	1	.	+	.	2	+	.	.
Eucryphia cordifolia	+	.	.	.	.	.	1	.	+	+	.	2	.	1	2
Saxegothaea conspicua	+	.	+	.	1	+	1	.	+	.	.	.	.	.	.
Dasyphyllum diacanthoides	+	.	.	2	1	1	.	+	.	.	.	.	+	.	.
Nothofagus nitida	.	4	1	.	.	+	1	.	.	.	+	.	.	r	.
Campsidium valdiviense	.	+	.	.	.	1	+	.	1	.	.	.	.	+	.
Asteranthera ovata	.	1	.	.	.	.	2	.	+	1	2	.	.	.	.
Blechnum magellanicum	.	.	+	.	.	.	.	.	+	1	+	.	.	.	.
Hydrangea serratifolia	.	.	.	+	.	+	+	.	.	.	.	.	.	.	+
Pseudopanax laetevirens	.	.	.	+	.	.	+	.	1	.	+	.	.	.	.
Tepualia stipularis	.	.	.	.	.	.	+	.	1	.	1	.	.	.	1
Luzuriaga polyphylla	.	.	.	.	.	.	.	.	1	1	+	.	1	.	.
Megalastrum spectabile	.	.	.	.	.	.	.	+	.	1	.	.	+	.	.
Nothofagus alpina	+	.	+	+	.	.	.	.	.	.	.	.	.	.	.
Ribes gr. magellanicum	.	+	+	.	.	.	.	.	.	.	.	.	.	+	.
Luma apiculata	.	.	r	.	.	.	.	.	.	.	.	2	.	.	2
Luzuriaga radicans	.	.	.	.	+	.	.	.	.	1	.	.	+	.	.
Uncinia phleoides	.	.	.	.	.	.	.	.	+	+	.	1	.	.	.
Philesia magellanica	.	.	.	.	.	.	.	.	+	.	1	.	.	.	.
Podocarpus nubigena	.	.	.	.	.	.	.	.	.	.	+	.	+	.	.
Companion species															
Chusquea cf. macrostachya	.	1	.	.	.	2	1	2	.	.	.	.	.	.	.
Acrysione grex yegua	.	1	+	1	.	.	.	.	.	.	.	.	.	.	.
Holcus lanatus	.	.	.	.	.	+	.	+	.	.	.	+	.	.	.
Hymenophyllum plicatum	.	.	.	.	.	.	.	.	1	1	.	1	.	.	.
Ranunculus repens	.	.	.	.	.	1	.	1	.	.	.	.	.	.	.
Lotus uliginosus	.	.	.	.	.	1	.	.	.	.	.	2	.	.	1
Gleichenia quadripartita	.	.	.	.	.	.	1	.	.	.	+	.	.	.	1
Uncinia tenuis	.	.	.	.	.	.	+	.	.	.	.	.	+	.	.
Acaena ovalifolia	.	.	2	.	.	.	.	1	.	.	.	.	.	.	.

teri, and the large sizes it reaches, indicate that this is the principal "woodland scar-forming" species of this community. Also noteworthy are certain epiphytes not found on mesotemperate shrubs, such as *Campsidium valdiviense* and *Asteranthera ovata*, while ferns such as *Blechnum chilense* and *Blechnum penna-marina* indicate that soil moisture content is often high.

This association is widely distributed from the Coastal Cordillera to the Andes (Fig. 2), in the altitudinal belts whose climax vegetation may be any of diverse types of Valdivian woodland, but notably Laurelio-Weinmannietum trichospermae or Luzuriago-Nothofagetum nitidae. This is indicated by the frequent occurrence of tree species like *Laureliopsis philippiana, Saxegothaea conspicua, Weinmannia trichosperma* and *Nothofagus nitida*. Its distribution reflects its requirement for high ambient moisture levels and oceanic influence, so that it may discriminate between the region's two great biogeographical provinces, i.e. the Valdivian Province to the west of the Andes with Lomatio-Amomyrtetum, and the Austro-Andean Province covering the orotemperate Andean territories and adjacent supratemperate territories in Argentina, with Wintero-Nothofagetea woodlands but without Lomatio-Amomyrtetum.

Association 7

Escallonio alpinae-Fuchsietum magellanicae ass. nova, Table 10 (Holotypus relevé 222, Table 10, order no. 7).

This association is the most orophilous mantle community that we have encountered around Valdivian woodlands; it occurs in diverse non-edaphohygrophilous situations but at higher altitudinal levels than the supratemperate belt, though lower than the orotemperate belt potentially occupied by *Nothofagus pumilio* woodlands. Alongside shrubs also present in the above-described associations, such as *Fuchsia magellanica, Azara lanceolata* and *Embothrium coccineum*, we also find other species characteristic of high Andean levels, including *Escallonia alpina, Ovidia andina, Myrceugenia chrysocarpa* and *Berberis trigona*.

An association denominated Escallonietum alpinae has been described from the volcanic peaks of the La Araucanía and Los Lagos Regions, presided by *Escallonia alpina* and accompanied by diverse shrub species including *Ovidia andina* and *Berberis montana*, but above all chamaephytes and hemicryptophytes of the supraforestal class Quinchamalio-Pernettyetea (Freiberg 1985). This is a clearly defined community that can in no way be confused with our Association 7; but given the shrub biotype of *Escallonia alpina*, it seems obvious that this species' ecological optimum lies within our Association 7, and more generally within the group of peri-forest shrub communities represented by the order Aristotelietalia chilensis. We have found this community fringing both Chrysosplenio-Nothofagetum dombeyi woodlands and woodlands of the Luzuriago-Nothofagetum nitidae, although in the vicinity of orotemperate formations of *Nothofagus pumilio* or *N. betuloides* (see for example relevé 223, Table 10).

Discussion

Syntaxonomic placement

The group of associations we have outlined above constitute the core of the order Aristotelietalia chilensis. The affinities between the different associations can also be appreciated in Figures 5 and 6, which show a hierarchical classification of the communities of Table 1, excluding for this analysis only the species present in each column with frequency index "+" (i.e. present in < 10% of relevés). The dendrogram in Figure 5 was obtained only with those columns of Table 1 corresponding to our relevés included in this paper, but additionally including the Association 4 (Fuchsio-Chusqueetum) of Hildebrand's table (1983), the only data published to date for this association. In contrast, Figure 6 is a dendrogram showing the

Table 10. Escallonio alpinae-Fuchsietum magellanicae ass. nova.

Order n°	1	2	3	4	5	6	7	8
Relevé field number	**88**	**89**	**90**	**178**	**179**	**221**	**222**	**223**
Altitude (m a.s.l.)	910	720	740	970	1080	580	500	660
Slope (°)	15	15	5	30	30	5	10	10
Aspect	S	N	W	NE	W	SW	S	N
Cover (%)	90	95	100	100	100	100	100	100
Vegetation hight (m)	1-3	1-4	-	1-4	1-2	1-3	1-4	2-4
Plot area (m^2)	60	60	70	100	50	100	90	100
N° of species	18	19	19	19	13	19	20	14
Ass., All. & Ord. species								
Fuchsia magellanica	4	1	4	1	1	1	5	4
Escallonia alpina	+	3	1	1	4	1	+	3
Gaultheria phillyreifolia	+	2	2	2	3	1	1	.
Ribes gr. magellanicum	2	.	1	1	1	3	1	2
Azara lanceolata	3	1	1	+	.	.	1	+
Ovidia andina	.	+	.	.	2	4	+	3
Asteranthera ovata	1	.	1	.	.	1	3	.
Myrceugenia chrysocarpa	.	.	.	+	.	1	1	+
Escallonia rubra	.	+	1	+	.	.	.	.
Berberis trigona	.	.	+	2	+	.	.	.
Blechnum penna-marina	.	.	+	2	.	.	.	1
Drimys andina	.	.	.	.	+	1	1	.
Berberis darwinii	.	1	1	.	.	.	.	.
Amomyrtus luma	.	+	+	.	.	.	.	.
Lophosoria quadripinnata	.	1	2	.	.	.	.	.
Berberis montana	.	.	.	+	+	.	.	.
Rubus geoides	.	.	+	.	.	.	1	.
Gunnera tinctoria	.	.	.	.	.	+	+	.
Berberis serrato-dentata	.	.	.	.	.	+	.	r
Wintero-Nothofagetea Class								.
Blechnum chilense	+	.	1	+	.	.	+	.
Embothrium coccineum	.	2	.	+	.	+	1	.
Pseudopanax laetevirens	.	+	.	.	.	+	+	+
Saxegothaea conspicua	1	1	+	.	.	.	.	.
Nothofagus dombeyi	+	.	2	4	.	.	.	.
Chusquea culeou	3	.	.	2	1	.	.	.
Desfontainia spinosa	.	.	.	.	2	+	+	.
Mitraria coccinea	1	1	.	.	.	.	.	.
Nothofagus nitida	.	+	.	.	.	.	1	.
Laureliopsis philippiana	1	.	1	.	.	.	.	.
Blechnum mochaenum	+	.	+	.	.	.	.	.
Companion species							.	.
Gunnera magellanica	.	.	.	1	1	2	1	1
Acaena ovalifolia	.	.	.	1	+	.	.	1
Chusquea prob. uliginosa	.	4	4	.	.	.	.	.
Pernettya myrtilloides	.	.	.	3	2	.	.	.

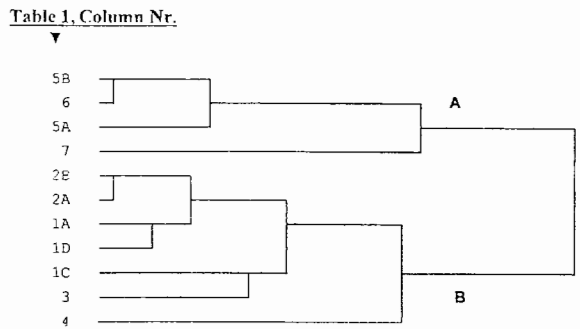

Fig. 5. Dendrogram showing the results of hierarchical clustering of the associations of Aristotelietalia chilensis based on our relevés (Tables 3 to 10) and the only existing table of *Fuchsio-Chusqueetum quilae* (HILDEBRAND 1983). Column numbers, see Table 1.

relationships between all columns in our Table 1, and thus considering the communities defined by the various authors.

From the dendrogram in Figure 5 two subgroups of associations can be clearly identified:

1) A first subgroup, branch B, comprises the Associations 1, 2, 3 and 4. This group, characterized by the presence of submediterranean species (*Rosa rubiginosa, Maytenus boaria, Lomatia hirsuta*) and often somewhat thermophilous species (*Cissus striata, Persea lingue, Aextoxicon punctatum*), is that we identify with the alliance Berberidion buxifoliae (lectotypus ass. Rhaphithamno spinosi-Aristotelietum chilensis). Despite the fact that *Berberis microphylla* (= *Berberis buxifolia*) is a species with scant representation in these shrub communities, and not especially frequent in the order Aristotelietalia chilensis as a whole, we consider it reasonable to maintain the name proposed by OBERDORFER (1960), and also to maintain the principal group of associations with which it was designed.

Within this alliance, Association 4 occupies a clearly deviant position (Fuchsio magellanicae-Chusqueetum quilae); in addition to corresponding to somewhat more human-influenced situations than those represented by the other associations of this alliance, it occurs like the other associations in thermophilous habitats, but without any manifestation whatsoever of mediterranean influence. It does not seem to be justifiable to split away a new suballiance simply to place this transitional association, so that we prefer to maintain its current position as a marginal Berberidion buxifoliae.

2) A second subgroup, branch A in Fig. 5, corresponds to that we propose as the new alliance Fuchsio magellanicae-Amomyrtion lumae all. nova (holotypus Lomatio ferrugineae-Amomyrtetum lumae) and shows a floristic composition with clearly ombrophilous character, not thermophilous, somewhat edaphohygrophilous. Its characteristic species (*Caldcluvia paniculata, Lomatia ferruginea, Amomyrtus luma, Myrceuge-*

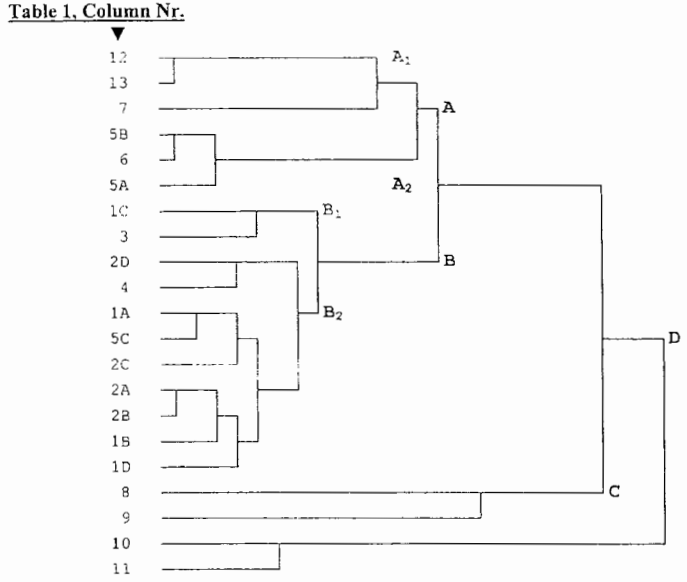

Fig. 6: Dendrogram showing hierarchical clustering of all associations than we recognize within Aristotelietalia chilensis, as well some others that could be catalogued, at some extent, in the same order.

nia planipes, Lophosoria quadripinnata, Fuchsia magellanica) imbricate in such a way with hyperhumid Valdivian woodlands that many of its species have traditionally been interpreted as indicative of disturbances or clearings in these woodlands; this interpretation is consistent with the concept proposed here of a phytosociological unit of first-stage scrub substitutions of the Laurelietalia philippianae woodlands.

The dendrogram shown in Figure 6 (a hierarchical cluster analysis of all the communities compiled in Table 1) is in line with the grouping shown in Figure 5, though evidently with some new branches:

Branch A, Fig. 6. This branch groups on the one hand the associations Aristotelio-Fuchsietum and Lomatio-Amomyrtetum (branch A2) and on the other the two associations described from Argentina as members of the alliance Escallonion rubrae proposed by ESKUCHE (1969), which we discuss below. Interestingly, our association Escallonio alpinae-Fuchsietum is located between the two groups, together with the Argentinian communities (branch A1) with which it shares supratemperate bioclimatic position and a greater degree of continentality than the associations of branch A2.

Branch B, Fig. 6. This branch includes all the communities belonging to the Berberidion buxifoliae alliance, although with differing affinities. Branch B1 includes communities with greater continentality, namely

Azaro microphyllae-Aristotelietum (association 3) and the *Azara microphylla* variant (1C) of the Alstroemerio-Aristotelietum, which represents a transition between this association and the previous one. In contrast, the grouping of communities in branch B2 appears to be more a reflection of the affinities of the describing authors than of the communities *per se*. Branch B2 includes the columns corresponding to the relevés of OBERDORFER (1960) that served as a basis for the description of the 3 associations recognized by this author in Aristotelietalia chilensis, namely 1A (Alstroemerio-Aristotelietum), 2C (Rhaphithamno-Aristotelietum) and 5C (Aristotelio-Fuchsietum, belonging to the alliance Fuchsio-Amomyrtion). On the other hand column 2D, corresponding to Rhaphithamno-Aristotelietum from HILDEBRAND (1983), is more closely grouped with Fuchsio-Chusqueetum (column 4), described by the same author, than with other columns also corresponding to Rhaphithamno-Aristotelietum, such as 2A and 2B. We consider these anomalies to reflect a frequent problem in phytosociological research whenever there are few relevés for communities spread over wide territories. This is why we suggest that there is a frequent need to reinterpret previously described associations; why for the present study we performed sampling over a wide area with the aim of collecting numerous and accurate relevés; and why we have been careful in our selection of lectotypes from among the relevés of OBERDORFER's original tables. This author's original table for Rhaphithamno-Aristotelietum was rather heterogeneous, since unlike Aristotelietalia this community has few characteristic species of the alliance (see first page of Table 1). Probably for this reason HILDEBRAND (1983) offered her own interpetation of this association, with numerous relevés unfortunately obtained only from Valdivia Province; this probably explains why, in the dendrogram, her version of Rhaphithamno-Aristotelietum (2D) is placed close to her association Fuchsio-Chusqueetum, described exclusively on the basis of relevés obtained from coastal areas close to Valdivia.

Branches C and D, Fig. 6. The scant affinity between columns 8–11 and the rest would suggest that these communities cannot be readily placed in the order Aristotelietalia; however, some of these columns may correspond to communities that, with more detailed study, might in fact be assignable to this order, as we will discuss in the next section.

Limits of the order Aristotelietalia chilensis

Given the dynamic relationships of this order with the Wintero-Nothofagetea woodlands, it is reasonable to define it as endemic to the Valdivian-Magellanic Region. The order's slight penetrations into the Meso-Chilean-Patagonian Region can be attributed to the permeability of the frontier between these two regions, with woodlands of temperate origin inserted in Chilean mediterranean territory dominated by sclerophyllous woodland (ARMESTO et al. 1995; ARROYO et al. 1995). The presence of numerous species characteristic of Valdivian woodlands in the mediterranean territory

(Troncoso & San Martín 1988), and the interesting wet mesomediterranean woodlands of the Wintero-Nothofagetea in the Maule Region, with mantle communities in which there is a clear participation of species of Aristotelietalia (Amigo et al. 2000), lead us to think that this order, at its northernmost limits, may present some manifestations beyond those described in the present study.

In territories south of the 49th parallel, i.e. entering the Magellanic-Antarctic Subregion, woodland-mantle scrubs are much more floristically impoverished than those of the Valdivian Subregion, as occurs with the woodlands. Previous reports (Roivainen 1954; Roig et al. 1985) have indicated the presence of scrub communities with clearly Magellanic species such as *Berberis ilicifolia* and *Escallonia serrata*, often accompanied by shrubs like *Fuchsia magellanica, Embothrium coccineum, Berberis microphylla* or *Lomatia ferruginea*; these combinations recall formations assignable to Aristotelietalia chilensis. However, the floristic compositions reported by these authors typically show some overlap with *Nothofagus betuloides* woodlands, and we are not aware of any relevés that clearly distinguish heliophilous communities with *Berberis* and *Escallonia* from authentic woodland communities. In fact the two communities selected to represent the composition of possible formations of Aristotelietalia (columns 10 and 11, Table 1) were both originally given names with the termination "Nothofagetum betuloidis". From the data of Roig et al. (1985) we have selected those formations with lowest tree cover, but as shown in Table 1 the presence of *Nothofagus betuloides* and *Pilgerodendron uviferum* is practically constant, so that it cannot be argued that these relevés are a good example of a mantle community. The formations described as matorrals in the vegetation of the Magellanic latitudes are typically dominated by low shrubs like *Pernettya mucronata, Chiliotrichum diffusum, Empetrum nigrum* and *Gunnera magellanica*, generally in the class Empetro-Pernettyetea, although sometimes clearly peat-associated and with massive entry of species of Myrteolo-Sphagnetea (Roig et al. op. cit.; Gajardo 1994). Some very recently described shrub communities (Eskuche 2006) have been proposed as members of an order Chiliotrichetalia but have not been assigned to any particular class, although they occupy an intermediate position between Wintero-Nothofagetea and Empetro-Pernettyetea. In the absence of more precise phytosociological information we recognize the existence of communities of Aristotelietalia, at least in the Magellanic Province, related of course to the Nothofagion betuloidis.

Another boundary that remains to be delimited is that with the woodland-mantle communities of the Argentinian rainy temperate woodlands; the presence of communities of Aristotelietalia is a fact confirmed by the presence of Azaro microphyllae-Aristotelietum chilensis (see Association 3 above). Since Hildebrand-Vogel (1984) in an article about her concept of the order Aristotelietalia included the proposal of Eskuche (1969) as Escallonion rubrae, we have included in our Table 1 two of the three associations proposed by Eskuche (op. cit.) in this alliance, rejecting the third as it was only described on the basis of a single relevé. As we

have already stated, this possible alliance shows affinities with our association 7 within Fuchsio-Amomyrtion lumae (see Branch A1, Fig. 6); however, the species proposed as characteristic species of Escallonion rubrae do not show in Table 1 a high degree of fidelity to this syntaxon, and there are also problems of identity [namely *Berberis parodii* (Landrum 1999), *Baccharis obovata* (Hellwig 1990), and *Discaria serratifolia* (Tortosa 1983)]. Thus we consider it prudent to maintain the alliance Escallonion rubrae as a syntaxon pending more detailed studies of this type of mantle community in Argentina.

Finally, it remains to comment on the matorrals defined by Hildebrand (1983) within the unit that she denominated Gaultherion phillyreaefoliae and that she likewise assigned to the order Aristotelietalia chilensis. To this alliance correspond the two communities described by Hildebrand (1983) and included in Table 1 (columns 8 and 9). In our opinion this type of matorral corresponds to more degraded stages of the woodland vegetation (except the peculiar community denominated Griselinio jodinifoliae-Pernettyetum poeppigii, endemic to Valdivian coastal areas and interpretable as a permanent community acting as the climax vegetation on cliffs with strong winds and sea-spray). The predominance in these communities of low-growing Ericaceae (of the genera *Gaultheria* and *Pernettya*), together with various *Baccharis* species (*B. lycioides, B. elaeoides, B. concava*) suggests that this community would be more appropriately placed within the class Empetro-Pernettyetea. Certainly the associations Escallonio roseae-Gaultherietum and Pernettyo mucronatae-Gaultherietum seem to occupy an intermediate position between the typical class of "Chilean heaths", often edaphohygrophilous, and shrubs of the woodland mantle; but we consider that the presence in these associations of species characteristic of Aristotelietalia is a reflection of superimposition of the two successive seral stages, in ecological and successional terms corresponding to different vegetation units.

Aristotelietalia or Aristotelietea?

In view of the above, we can offer a more global picture of what might fall within the concept of Aristotelietalia chilensis. Although some communities remain to be studied within the Magellanic regions and temperate Argentina, it seems clear that this syntaxon comprising preforestal shrub vegetation can be readily interpreted as an approximate vicariant of the European class Rhamno-Prunetea. In line with this, the creation of a class Aristotelietea chilensis would seem a logical next step, certainly in the future when we have a more comprehensive and detailed knowledge of the vegetation of temperate southern South America. In our opinion a significant conceptual advance offered by this updated revision of Aristotelietalia is that this syntaxon is broadened to include not only preforestal shrub formations with nano- and microphanerophytes, but also communities with larger phanerophytes (8–15 m), traditionally considered as components of *renovales* (the Chilean forester's term for second-growth

woodland). The concept initially designed by OBERDORFER (1960), though recognizing the importance of rather large shrubs, like *Aristotelia chilensis* and *Rhaphithamnus spinosus*, appeared to concede more importance to more clearly heliophilous species like those of the genera *Berberis, Escallonia* and *Azara*; in fact, this author proposed the name Berberidetalia austroamericanae for the order. A similar line was taken by HILDEBRAND (1983), who studied matorral associations and focused on clearly heliophilous communities, in which the frequency of Ericaceae and *Baccharis* species in our opinion suggests not so much woodland-fringe/mantle communities, but rather substitution communities arising after deforestation or other anthropic disturbance. This perhaps explains her proposal of association status for the dense formations dominated by neophytic legumes like *Ulex europaeus* and *Teline monspessulana*, abundant in the wet temperate regions of Chile.

The broadening of the concept of Aristotelietalia proposed in the present study highlights the roles of other autochthonous woody groups more closely linked to woodlands and their regeneration, like the various Myrtaceae and Proteaceae (*Lomatia, Amomyrtus, Myrceugenia*, etc.). At present all associations assigned to this syntaxon are mantle communities of the class Wintero-Nothofagetea, and we thus consider it simpler to maintain it within this class, at least for the time being. However, it can certainly be considered to have subclass status, namely Aristotelienea chilensis subclasis nova [Typus nominis Aristotelietalia chilensis (Oberd. 1960) Hildebrand 1983]. In this way we can syntaxonomically separate the mantle communities from remaining woodland syntaxa of the class Wintero-Nothofagenea.

Nevertheless, if more detailed future study of Andean and Argentinian woodland communities indicates that associations that might be included within Aristotelienea are linked successionally to supraorotemperate woodland communities of the class Nothofagetea pumilionis-antarcticae, then in our view this would be a clear argument for consideration of this syntaxon as an independent class Aristotelietea chilensis.

As a résumé, hierarchical relationships of the syntaxa cited in the text (excluding European vegetation units) are presented:

Wintero-Nothofagetea Oberd. 1960
 Wintero-Nothofagenea
  Laurelietalia philippianae Oberd. 1960
   Nothofago-Eucryphion Oberd. 1960
    + Bomareo salsillae-Nothofagetum glaucae Amigo, San Martín & Quintanilla 2000
    + Lapagerio roseae-Aextoxiconetum punctati Oberd. 1960
    + Nothofago obliquae-Perseetum lingue Oberd. 1960
    + Dasyphyllo diacanthoidis-Nothofagetum alpinae (Frank & Finckh) Pollmann 2001
    + Nothofago dombeyi-Eucryphietum cordifoliae Oberd. 1960
    + Nothofagetum procerae Oberd. 1960

  Wintero-Nothofagetalia Roig, Dollenz & Méndez 1985
   Nothofago-Winterion Oberd. 1960
    + Laurelio philippianae-Weinmannietum trichospermae Oberd. 1960
    + Luzuriago polyphyllae-Nothofagetum nitidae Amigo, Ramírez & Quintanilla 2004
   Nothofagion betuloidis (Oberd. 1960) Roig, Dollenz & Méndez 1985
    + Nothofagetum betuloidis Oberd. 1960
  Berberido trigonae-Nothofagetalia dombeyi Pollmann 2001
   Myrceugenio-Nothofagion dombeyi (Eskuche 1999) Pollmann 2001
    + Chrysosplenio valdivici-Nothofagetum dombeyi Oberd. 1960 prov.
Aristotelienea chilensis subcl. nova
 Aristotelietalia chilensis (Oberd. 1960) Hildebrand 1983
  Berberidion buxifoliae Oberd. 1960
   + Alstroemerio aurantiacae-Aristotelietum chilensis Oberd. 1960
   + Rhaphithamno spinosi-Aristotelietum chilensis Oberd. 1960
   + Azaro microphyllae-Aristotelietum chilensis ass. nova
   + Fuchsio magellanicae-Chusqueetum quilae Hildebrand 1983
  Fuchsio magellanicae-Amomyrtion lumae all. nova
   + Aristotelio chilensis-Fuchsietum magellanicae Oberd. 1960
   + Lomatio ferrugineae-Amomyrtetum lumae ass. nova
   + Escallonio alpinae-Fuchsietum magellanicae ass. nova
  Escallonion rubrae Eskuche 1969?
   + *Escallonia rubra-Fuchsia magellanica*-Assoziation Eskuche 1969
   + *Escallonia rubra-Myrceugenia nanophylla*-Assoziation Eskuche 1969

(whitout especific class)
 Chiliotrichetalia (Roig, Dollenz & Méndez 1985) Eskuche 2006

Lithraeo-Cryptocaryetea Oberd. 1960
 Cryptocaryetalia (Schmithüsen 1954) Oberd. 1960
  Cryptocaryion (Schmithüsen 1954) Oberd. 1960
   + Lomatio hirsutae-Lithraeetum causticae Amigo, San Martín & Quintanilla 2000
Nothofagetea pumilionis-antarcticae Oberd. 1960
Empetro-Pernettyetea Oberd. 1960
Myrteolo-Sphagnetea Oberd. 1960
Quinchamalio-Pernettyetea Freiberg 1985

Acknowledgements. We thank the staff of the Instituto de Botánica of the Austral University of Valdivia for extensive help and support; Luis Gómez ORELLANA for the drawing in Figure 2, and the Xunta de Galicia and University of Santiago for partially financing the stay of the Spanish authors in Chile.

References

Amigo, J. & Ramírez, C. (1998): A bioclimatic classification of Chile: woodland communities in the temperate zone. – Plant Ecol. **136**: 9–26.

Amigo, J., Ramírez, C. & Quintanilla, L. G. (2004): The Nothofagus nitida (Phil.) Krasser woodlands of southern Chile in the northern half of their range; phytosociological position. – Acta Bot. Gallica **151**(1): 3–31.

Amigo, J., San Martín, J. & Quintanilla, L. G. (2000): Estudio fitosociológico de los bosques de Nothofagus glauca (Phil.) Krasser del Centro-Sur de Chile. – Phytocoenologia **30**(2): 193–221.

Armesto, J. J., León, P. & Arroyo, M. T. K. (1995): Los bosques templados del sur de Chile y Argentina: una isla biogeográfica. – In: Armesto J. J., Villagrán C. & Arroyo M. T. K. (eds.): Ecología de los bosques nativos de Chile, pp. 23–28. – Ed. Universitaria, Santiago.

Arroyo, M. T. K., Cavieres, L., Peñaloza, A., Riveros, M. & Faggi, A. M. (1995): Relaciones fitogeográficas y patrones regionales de riqueza de especies en la flora del bosque lluvioso templado de Sudamérica. – In: Armesto, J. J., Villagrán, C. & Arroyo, M. T. K. (eds.): Ecología de los bosques nativos de Chile, pp. 71–99. – Ed. Universitaria, Santiago.

Berger, E., Figueroa, H. & Ramírez, C. (1986): Diferenciación entre asociaciones vegetales primitivas y secundarias en la Décima Región de Chile. – II Encuentro Científico sobre Medio Ambiente, Versiones Abreviadas **1**: 71–75.

Bournerias, M., Arnal, G. & Bock, Ch. (2001): Guide des groupements végétaux de la region parisienne. – Ed. Belin, Paris. 640 pp.

Braun-Blanquet, J. (1979): Fitosociología. Bases para el estudio de las comunidades vegetales. – H. Blume Ediciones, Barcelona. 820 pp.

Cabrera, A. L. & Willink, A. (1973): Biogeografía de América Latina. – Secretaría General de la Organización de los Estados Americanos. 117 pp.

Conticello, L., Gandullo, R., Bustamante, A. & Tartaglia, C. (1996): Fitosociología de los bosques caducifolios del norte del Departamento Lácar y sur de Huilliches de la provincia de Neuquén (Argentina). – Bosque **17**(2): 27–43.

Costa, M. (2004): Biogeografía. – In: Izco J. (ed.): Botánica, 2nd edition, pp. 795–852. – McGraw-Hill, Bogotá

Delelis-Dussolier, A. (1973): Contribution à l'étude des haies, des fourrés préforestiers et des manteaux sylvatiques de France. – Thèse, Université de Lille. 143 pp.

Donoso, C. (1981): Tipos forestales de los bosques nativos de Chile. – Corporación Nacional Forestal (CONAF) y Organización de las Naciones Unidas para la Agricultura y la Alimentación (FAO), Documento de Trabajo N° 38.

Donoso, C. (1998): Bosques templados de Chile y Argentina. Variación, estructura y dinámica. – Editorial Universitaria, Santiago. 484 pp.

Ellenberg, H. (1988): Vegetation ecology of Central Europe, 4th edition. – Cambridge University Press. 731 pp

Eskuche, U. (1969): Berberitzengebüsche und Nothofagus antarctica-Wälder in NW-Patagonien. – Vegetatio **19**: 264–285.

– (1999): Estudios fitosociológicos en el norte de la Patagonia. II. Los bosques de Nothofagion dombeyi. – Phytocoenologia **29**(2): 177–252.

– (2006): Zwischen Scylla und Charybdis – Der magellanische Moorzypressen-Guindowald zwischen Wind und Wasser. – Folia Botanica et Geobotanica Correntesiana **20**: 1–28

Freiberg, H.-M. (1985): Vegetationskundliche Untersuchungen an südchilenischen Vulkanen. – Bonner Geogr. Abhandlungen 70.

Gajardo, R. (1994): La vegetación natural de Chile. Clasificación y distribución geográfica. – Ed. Universitaria, Santiago. 165 pp.

Géhu, J. M. (1999): Considérations sur les végétations charnières en position d'ourlet et leur classification phytosociologique. – Bull. Soc. Bot. Centre-Ouest 30: 35–46.

Géhu J. M. & Rivas-Martínez S. (1981): Notions fondamentaux de phytosociologie. – In: Dierschke, H. (ed.): Syntaxonomie, pp. 5–53. – J. Cramer, Vaduz.

Groenman-van Waateringe, W. (1975): Prunetalia scrub: early neolithic field enclosures in Europe. – XII Internat. Botan. Congr. (Leningrad) Abstr. 1: 113.

Hellwig, F. H. (1990): Die Gattung Baccharis L. (Compositae-Asteraceae) in Chile. – Mitt. Bot. Staatssamml. München 29: 1–456.

Hildebrand, R. (1983): Die Vegetation der Tieflandsgebüsche der südchilenische Lorbeerwaldgebiets unter besonderer Berücksichtigung der Neophytenproblematik. – Phytocoenologia **11**(2): 145–223.

Hildebrand-Vogel, R. (1984): Acerca de la vegetación de los matorrales de tierras bajas en la región del bosque laurifolio valdiviano en el sur de Chile. – Phytocoenologia 12 (2/3): 251–259.

Landrum, L. (1999): Revision of Berberis (Berberidaceae) in Chile and adjacent Southern Argentina. – Ann. Missouri Bot. Garden **86**: 796–834.

Luebert, F. & Pliscoff, P. (2006): Sinopsis bioclimática y vegetacional de Chile. – Editorial Universitaria, Santiago. 316 pp.

Marticorena, C. & Quezada, M. (1985): Catálogo de la flora vascular de Chile. – Gayana, Bot. **42** (1–2): 5–157.

Marticorena, C. & Rodríguez, R. (1995): Flora de Chile. Vol. I. Pteridophyta-Gymnospermae. – Universidad de Concepción, Editorial Anibal Pinto, Concepción. 352 pp.

– (2001): Flora de Chile. Vol. 2(1). Winteraceae-Ranunculaceae. – Universidad de Concepción, Trama Impresores S.A., Concepción. 99 pp.

– (2003): Flora de Chile. Vol. 2(2). Berberidaceae-Betulaceae. – Universidad de Concepción, Impresos Siglo XXI Ltda., Concepción. 93 pp.

– (2005): Flora de Chile. Vol. 2(3). Plumbaginaceae-Malvaceae. – Universidad de Concepción, Impresos Siglo XXI Ltda., Concepción. 128 pp.

Matthei, O. (1997): Las especies del género Chusquea Kunth (Poaceae: Bambusoideae), que crecen en la X^a Región, Chile. – Gayana Bot. **54**(2):199–220.

Monasterio-Huelin, E. (1998): Rubus L. – In: Muñoz-Garmendia, F. & Navarro, C. (ed.): Flora Iberica VI. Rosaceae, pp. 16–71. – Servicio de Publicaciones del CSIC, Madrid.

Oberdorfer, E. (1960): Pflanzensoziologische Studien in Chile. – Flora et Vegetatio Mundi **2**: 1–208.

Pisano, E. (1950): Observaciones sobre la renovación del bosque de laurel y ulmo en la región del lago Llanquihue. – Apartado de Agricultura Técnica **10**(1): 27–49.

Pollmann, W. (2001): Caracterización florística y posición sintaxonómica de los bosques caducifolios de Nothofagus alpina (Poepp. et Endl.) Oerst. En el centro-sur de Chile. – Phytocoenologia **31**(3): 353–400.

Ramírez, C. (1982): Pasado, Presente y Futuro: La vegetación nativa del sur de Chile.– Creces 3 (6/7): 40–45.

Ramírez, C., Barrera, J., Contreras, D. & Correa, M. (1989a): Estudio vegetacional del ecotono entre bosques de Roble-Laurel-Lingue y de Temo-Pitra. – Medio Ambiente **10**(1): 43–50.

Ramírez, C., Labbé, S., San Martín, C. & Figueroa, H. (1990): Sinecología de los bosques de boldo (Peumus boldus) de la cuenca del río Bueno, Chile. – Bosque **11**(1): 45–56.

Ramírez, C., San Martín, C. & Vásquez, R. (1996): La vegetación potencial leñosa de la Cordillera Pelada (Valdivia, Chile). – Revista Geográfica de Valparaíso **26–27**: 233–250.

Ramírez, C., San Martín, J., Hauenstein, E. & Contreras, D. (1989b): Estudio fitosociológico de la vegetación de Rucamanque (Cautín, Chile). – Studia Botanica 8: 91–115.
Reiche, C. (1902): Flora de Chile. Estudios críticos sobre la flora de Chile. Tomo III. – Imprenta Barcelona, Santiago. 425 pp.
Rivas-Martínez, S. (online): www.globalbioclimatics.es.
– (1976): Sinfitosociología, una nueva metodología para el estudio del paisaje vegetal. – Anales Inst. Bot. Cavanilles 33: 179–188.
– (1993): Bases para una nueva clasificación bioclimática de la Tierra. – Folia Bot. Matritensis 10: 1–23. Madrid.
– (1994): Dynamic-zonal phytosociology as landscape science. – Phytocoenologia 24: 23–25.
Rivas-Martínez, S., Fernández-González, F., Loidi, J., Lousã, M. & Penas, A. (2001): Syntaxonomical checklist of vascular plant communities of Spain and Portugal to association level. – Itinera Geobotanica 14: 5–341.
Rivas-Martínez, S. & Navarro, G. (1994): Mapa biogeográfico de Suramérica. – Folia Bot. Matritensis 12. Madrid.
Rivas-Martínez, S., Sánchez-Mata, D. & Costa, M. (1999): North American Boreal and Western Temperate Forest Vegetation. – Itinera Geobotanica 12: 3–316.
Roig, F. A., Dollenz, O. & Méndez, E. (1985): La vegetación de los canales, segunda parte. – In: Boelcke, O., Moore, D. M. & Roig, F. A. (eds.): Transecta Botánica de la Patagonia Austral, pp. 457–519. Buenos Aires.
Roivainen, H. (1954): Studien über die Moore Feuerlands. – Ann. Bot. Soc. Vanamo 28: 1–205.
SPSS Inc. (2005): SPSS for Windows, v. 13.0. – Chicago, Illinois.
Tortosa, R. D. (1983): El género Discaria (Rhamnaceae). – Bol. Soc. Argent. Bot. 22(1–4): 301–335.
Troncoso, A. & San Martín, J. (1988): Ampliación de área para diversas especies de plantas vasculares en la Cordillera de la Costa de la región del Maule. – Bol. Museo Nac. Hist. Nat., Chile 41: 45–56.
Tüxen, R. (1952): Hecken und Gebüsche. – Mitt. Geogr. Ges. Hamburg 50: 85–117.
Van der Maarel, E. (1979): Tranformation of cover-abundance values in phytosociology and its effects on community similarity. – Vegetatio 39: 97–144.
Veblen, T. T., Donoso, C., Kitzberger, T. & Rebertus, A. J. (1996): Ecology of Southern Chilean and Argentinean Nothofagus Forests. – In: Veblen, T. T., Hill, R. S. & Read, J. (eds.): The Ecology and Biogeography of Nothofagus Forests, pp. 293–353. Yale University Press, New Haven.
Weber, H. E., Moravec, J. & Theurillat, J. P. (2000): International code of phytosociological nomenclature. 3rd edition. – J. Veg. Sci. 11: 739–768

Addresses of the authors:
Dr. Javier Amigo Vázquez, Laboratorio de Botánica, Facultad de Farmacia, Universidad de Santiago de Compostela. 15782 Santiago de Compostela (Galicia, España). E-mail: bvherbar@usc.es
Dr. Carlos Ramírez García, Instituto de Botánica, Universidad Austral de Chile. Casilla 567, Valdivia (Chile).
Dr. Luis García Quintanilla, Departamento de Matemáticas y Física Aplicadas y Ciencias de la Naturaleza. Escuela Superior de Ciencias Ambientales y Tecnología. Universidad Rey Juan Carlos. 128933 Móstoles, Madrid (España).

Appendix 1: Species present in only 1 relevé at each Table. Only relevé field number pointed.

Table 3:
Ass., All., Ord. & Class species: *Azara lanceolata*: + in 61; *Dasyphyllum diacanthoides*: 1 in 130; *Elytropus chilensis*: + in 226; *Eucryphia cordifolia:* 1 in 65 ; *Hydrangea serratifolia*: + in 129; *Rhaphithamnus spinosus*: + in 63; *Ribes integrifolia*: 1 in 226; *Schinus montanus*: + in 226; *Solanum gr. gayanum*: + in 171; *Ugni molinae:* 3 in 29; *Weinmannia trichosperma:* + in 65.
Companion species: *Acacia melanoxylon*: 1 in 172; *Acrysione* "concolor leaves": + in 29; *Arrhenatherum elatius*: 1 in 172; *Calceolaria dentata:* 1 in 130; *Cirsium vulgare:* 1 in 128; *Cytisus scoparius:* + in 122; *Digitalis purpurea:* 1 in 128; *Elymus andinus*: 1 in 171; *Escallonia pulverulenta*: 1 in 49; *Fabiana imbricata:* + in 122; *Festuca sp.*: + in 226; *Fragaria chiloensis*: 1 in 63; *Galega officinalis:* + in 130; *Gunnera tinctoria:* + in 65; *Jovellana picta*: 1 in 226; *Leucanthemum vulgare:* + in 75; *Lithraea caustica:* 2 in 49; *Myrceugenia obtusa:* 1 in 49; *Osmorhiza chilensis*: + in 62; *Proustia pyrifolia:* 3 in 119; *Prunus avium:* 1 in 120; *Rumohra adiantiformis*: + in 63; *Stachys macraei*: + in 62; *Ulex europaeus*: + in 74; *Valeriana lapathifolia*: + in 61.

Table 4:
Ass., All., Ord. & Class species: *Blepharocalyx cruckshanksii:* + in 83; *Caldcluvia paniculata*: 1 in 97; *Campsidium valdiviense*: + in 83; *Dioscorea cf. brachyobotria*: 1 in 92; *Discaria serratifolia*: 1 in 105; *Drimys winteri*: + in 72; *Elytropus chilensis*: 1 in 173; *Escallonia rubra*: + in 25; *Griselinia racemosa:* + in 97; *Hydrangea serratifolia*: + in 93; *Hydrocotyle poeppigi*: + in 111; *Lapageria rosea:* + in 80; *Latua pubiflora*: + in 118; *Laureliopsis philippiana*: + in 9; *Lomatia ferruginea*: r in 93; *Luzuriaga polyphylla*: + in 173; *Mutisia gr. spinosa*: + in 82; *Nertera granadensis:* 1 in 80; *Pseudopanax laetevirens:* + in 93; *Pseudopanax valdiviense*: + in 118; *Solanum gayanum*: + in 91; *Solanum krauseanum*: 1 in 43; *Uncinia phleoides*: 1 in 83.
Companion species: *Acacia dealbata*: r in 104; *Acaena ovalifolia*: 1 in 173; *Acer pseudoplatanus*: + in 111; *Arrhenatherum bulbosum*: + in 91; *Azara integrifolia*: r in 180; *Baccharis sagitalis*: + in 42; *Chusquea sp.*: 1 in 91; *Coriaria ruscifolia*: + in 82; *Elymus sp.*: 1 in 91; *Equisetum bogotense*: + in 72; *Geranium core-core*: + in 182; *Hymenophyllum pectinatum*: + in 93; *Hymenophyllum plicatum*: + in 93; *Hypericum perforatum*: 2 in 118; *Leptocarpha rivularis*: + in 43; *Senecio otites*: + in 104.

Table 5:
Ass., All., Ord. & Class species: *Berberis actinacantha*: + in 51; *Blechnum chilense*: 1 in 73; *Buddleja globosa*: + in 33; *Dasyphyllum diacanthoides*: 1 in 35; *Drimys winteri*: + in 50; *Myrceugenia exsucca:* + in 79; *Rosa canina:* 1 in 37; *Solanum gr. gayanum*: + in 229; *Solanum valdiviense:* 1 in 33; *Viola rubella:* + in 53.
Companion species: *Centella asiatica*: 1 in 36; *Eupatorium glechonophyllum*: 1 in 229; *Francoa appendiculata*: + in 229; *Hypericum perforatum*: + in 37; *Lardizabala biternata*: + in 51; *Leptocarpha rivularis*: 2 in 31; *Lithraea caustica*: + in 52; *Myrceugenia obtusa*: 1 in 52; *Nassella chilensis*: 1 in 32; *Sophora macrocarpa*: + in 52; *Sophora microphylla:* 3 in 30; *Sphacele chamaedrioides*: r in 53; *Ulex europaeus*: r in 31; *Viola gr. maculata*: + in 53.

Table 6:
Ass., All., Ord. & Class species: *Aextoxicon punctatum*: r in 108; *Azara serrata*: 1 in 137; *Colletia spinosa*: r in 175; *Discaria serratifolia/chacaye*: + in 68; *Escallonia rubra*: + in 70;

Hydrangea serratifolia: + in 174; *Lapageria rosea*: 1 in 67; *Laureliopsis philippiana*: + in 108; *Muehlenbeckia hastulata*: r in 137; *Mutisia decurrens*: + in 134; *Mutisia spinosa*: + in 175; *Myoschilos oblonga*: r in 175; *Polystichum chilense*: + in 108; *Pseudopanax laetevirens*: + in 67; *Solanum valdiviense*: 1 in 67; *Uncinia phleoides*: + in 199.
Companion species: *Achillea millefolium*: 1 in 199; *Baccharis concava*: 1 in 199; *Bromus lithobius*: + in 134; *Calceolaria sp.*: + in 134; *Cynosurus echinatus*: 1 in 110; *Dactylis glomerata*: 1 in 132; *Equisetum bogotense*: + in 109; *Eryngium paniculatum*: r in 70; *Festuca scabriuscula*: + in 199; *Francoa appendiculata*: 2 in 137; *Galium cf. mollugo*: + in 134; *Hypochoeris radicata*: 1 in 139; *Oxalis gr. dumetorum*: + in 134; *Sanicula crassicaulis*: + in 109; *Schinus patagonicus*: + in 140; *Sophora microphylla*: 4 in 174; *Stipa poeppigiana*: + in 199; *Viola gr. maculata*: + in 134.

Table 7:
Ass., All., Ord. & Class species: *Berberis darwinii*: + in 10; *Berberis microphylla*: + in 188; *Blechnum penna-marina*: 1 in 188; *Campsidium valdiviense*: + in 84; *Chrysosplenium valdivicum*: + in 115; *Corynabutilon vitifolium*: 2 in 85; *Desfontainia spinosa*: 1 in 116; *Dysopsis glechomoides*: 1 in 115; *Elytropus chilensis*: + in 19; *Griselinia ruscifolia*: + in 116; *Hypolepis poeppigii*: 2 in 115; *Luzuriaga radicans*: + in 84; *Uncinia phleoides*: + in 19; *Weinmannia trichosperma*: + in 84.
Companion species: *Acaena ovalifolia:* 1 in 176; *Coriaria ruscifolia*: 1 in 26; *Equisetum bogotense*: 1 in 27; *Holcus lanatus*: 1 in 176; *Hymenophyllum dentatum:* + in 115; *Loasa acanthifolia:* + in 115; *Lysimachia sertulata:* 1 in 81; *Myrceugenia ovata var. nanophylla*: + in 10; *Ourisia alpina:* 1 in 116; *Sambucus nigra*: 1 in 27; *Senecio otites:* + in 26; *Stellaria cuspidata*: + in 115; *Urtica magellanica*: + in 115; *Valeriana lapathifolia*: 1 in 84.

Table 8:
Ass., All., Ord. & Class species: *Alstroemeria aurantiaca*: + in 231; *Blechnum mochaenum*: + in 95; *Griselinia racemosa*: + in 95; *Griselinia ruscifolia*: + in 234; *Hypolepis poeppigii*: 1 in 113; *Lomatia hirsuta*: 1 in 7; *Luzuriaga radicans*: 1 in 95; *Persea lingue*: 1 in 1; *Podocarpus saligna*: + in 1; *Relbunium hypocarpium*: + in 101; *Rubus geoides*: + in 190; *Saxegothaea conspicua*: 1 in 87; *Solanum gayanum*: 1 in 113;
Companion species: *Acrysione grex yegua*: + in 1; *Asplenium dareoides*: + in 190; *Centaurium cachanlauen*: 1 in 230; *Chusquea cf. uliginosa*: 3 in 87; *Digitalis purpurea*: + in 231; *Equisetum bogotense*: + in 103; *Gleichenia litoralis*: + in 103; *Gunnera magellanica*: 1 in 189; *Holcus lanatus*: + in 230; *Hymenophyllum cf. plicatum*: 1 in 190; *Hymenophyllum pectinatum*: 1 in 190; *Hymenophyllum peltatum*: + in 190; *Hymenophyllum seselifolium*: 1 in 190; *Pernettya mucronata:* 1 in 7; *Rumex obtusifolius*: + in 228; *Tristerix tetrandrus*: + in 103; *Uncinia erinacea*: + in 212; *Uncinia sp.*: + in 87.

Table 9:
Ass., All., Ord. & Class species: *Baccharis obovata*: + in 5; *Berberis trigona:* 1 in 235; *Buddleja globosa*: + in 186; *Dendroligotrichon dendroides*: + in 187; *Griselinia racemosa*: 3 in 185; *Griselinia ruscifolia*: + in 5; *Hydrocotyle poeppigii*: + in 235; *Hypolepis poeppigii*: 1 in 235; *Lomatia dentata*: 3 in 5; *Lomatia hirsuta*: + in 3; *Relbunium hypocarpium*: + in 187; *Rubus geoides*: + in 233; *Solanum cyrtopodium*: + in 98.
Companion species: *Agrostis capillaris*: 1 in 186; *Baccharis cymosa*: + in 192; *Carex aff. demissa*: + in 234; *Centella asiatica*: 2 in 187; *Hymenophyllum ferrugineum*: + in 184; *Hymenophyllum pectinatum*: 1 in 185; *Leptostigma arnottianum*: + in 186; *Loasa acanthifolia*: + in 3; *Luma chequen*: 1 in 187; *Pernettya mucronata*: 1 in 5; *Ugni candollei*: 1 in 235.

Table 10:
Ass., All., Ord. & Class species: *Alstroemeria aurantiaca*: 2 in 88; *Berberis microphylla*: 1 in 221; *Blechnum magellanicum*: + in 222; *Caldcluvia paniculata*: r in 89; *Dasyphyllum diacanthoides*: 1 in 89; *Dendroligotrichon dendroides*: 1 in 88; *Drimys winteri*: 2 en 89; *Dysopsis glechomoides*: 1 in 88; *Griselinia ruscifolia*: + in 88; *Maytenus magellanica*: 1 in 222; *Nothofagus nitida*: + in 89; *Nothofagus betuloides*: + in 221; *Osmorhiza chilensis*: 1 in 88; *Polystichum chilense:* 1 in 223; *Polystichum multifidum*: 1 in 223; *Weinmannia trichosperma*: 1 in 89.
Companion species: *Acrysione* "concolor leaves": + in 222; *Fragaria chiloensis*: 2 in 178. *Festuca aff. spadicea*: 1 in 221; *Gleichenia squamulosa*: 1 in 221; *Lotus uliginosus*: 1 in 178; *Pernettya mucronata*: + in 223; *Valeriana lapathifolia*: + in 221.

Appendix 2: Relevé locations. (N. P. = National Park; N. R. = National Reserve)

Relevé Field Nr. Author's relevé code. Region, Province: more precise locality. Southern Latitude // Western Longitude

1. 980129/4. Los Lagos, Valdivia: Pelada Range, from La Unión to Hueicolla. 40° 12′ // 73° 25′.
3. 980129/8. Los Lagos, Valdivia: from La Unión to Hueicolla, ascent to Pelada Range. 40° 12′ //73° 25′.
4. 980129/10. Los Lagos, Valdivia: from La Unión to Hueicolla, ascent to Pelada Range. 40° 12′ //73° 24′.
5. 980129/11. Los Lagos, Valdivia: from La Unión to Hueicolla, ascent to Pelada Range. 40° 12′ //73° 24′.
7. 980129/14. Los Lagos, Valdivia: from La Unión to Hueicolla, upper than relevé n° 1. 40° 12′ // 73° 25′.
9. 980206/7. La Araucanía, Cautín: between Pucón and Termas de Palguín. 39° 25′ // 71° 20′.
10. 980206/2. La Araucanía, Cautín: between Curarrehue and Puesco. 39° 29′ // 71° 28′.
13. 980124/2. La Araucanía, Malleco: little southerly from Termas de Tolhuaca. 38° 15′ // 71° 43′.
19. 980131/3. Los Lagos, Valdivia: ascent to Choshuenco volcano. 39° 56′ // 72° 06′.
20. 980131/2. Los Lagos, Valdivia: ascent to Choshuenco volcano, upper than relevé n° 19. 39° 56′ // 72° 06′.
25. 980201/8. Los Lagos, Valdivia: between Liquiñe and Paimún. 39° 41′ // 71° 54′.
26. 980201/9. Los Lagos, Valdivia: Coñaripe. 39° 35′ // 71° 59′.
27. 980205/2. La Araucanía, Cautín: between Pucón and Termas de Huife. 39° 13′ // 71° 40′.
29. 980129/1. Los Lagos, Valdivia: ascent to Pelada Range from La Unión: Las Trancas. 40° 16′ // 73° 16′.
30. 030115/3. La Araucanía, Cautín: Nueva Toltén, Imperial river upwards. 39° 07′ // 73° 10′.
31. 030115/5. La Araucanía, Cautín: between Puerto Saavedra and Carahue. 38° 42′ // 73° 16′.
32. 030115/7. La Araucanía, Cautín: Chomío, after crossing Cautín river northwards to Tirúa. 38° 41′ // 73° 23′.
33. 030116/1. La Araucanía, Cautín: From Imperial river to Tirúa. 38° 39′ // 73° 25′.
34. 030116/2. La Araucanía, Cautín: down to the coast near Coicoi. 38° 37′ // 73° 28′.

35. 030116/3. La Araucanía, Cautín: Huañalhuen, southward from Tirúa. 38° 33′ // 73° 29′.
36. 030116/5. Bío-Bío, Arauco: close to Tirúa. 38° 21′ // 73° 29′.
37. 030116/6. La Araucanía, Malleco: from Capitán Pastene to Lumaco. 38° 11′ // 72° 56′.
38. 030117/2. La Araucanía, Cautín: between Galvarino and Chol-Chol. 38° 32′ // 72° 49′.
40. 030115/2. La Araucanía, Cautín: Nueva Toltén, very close to Toltén river. 39° 08′ // 73° 09′.
42. 030115/1. Los Lagos, Valdivia: S. José de la Mariquina. 39° 27′ // 73° 04′.
43. 030115/6. La Araucanía, Cautín: Cautín river right margin, close to Nehuentué. 38° 41′ // 73° 21′.
49. 030122/2. La Araucanía, Malleco: Angol outskirts, northwards. 37° 43′ // 72° 43′.
50. 030122/3. La Araucanía, Malleco: between Angol and Maitenrehue. 37° 43′ // 72° 43′.
51. 030122/6. Bío-Bío, Bío-Bío: between Maitenrehue and Nacimiento. 37° 39′ // 72° 43′.
52. 030123/1. Bío-Bío, Arauco: between Arauco and Lebu. 37° 15′ // 73° 25′.
53. 030122/2. Bío-Bío, Arauco: between Arauco and Lebu, southerly from Requi. 37° 18′ // 73° 31′.
56. 030122/9. Bio-Bio, Bío-Bio: between Nacimiento and Santa Juana. 37° 27′ // 72° 45′.
57. 030123/6. Bío-Bío, Arauco: between Cayucupil and Nahuel Buta N.P. 37° 48′ // 73° 14′.
61. 030117/4. La Araucanía, Cautín: between Vilcún and Cherquenco. 38° 40′ // 72° 11′.
62. 030117/8. La Araucanía, Cautín: between Cherquenco and Melipeuco. 38° 42′ // 71° 58′.
63. 030117/9. La Araucanía, Cautín: between Cherquenco and Melipeuco, near Melipeuco. 38° 43′ // 71° 56′.
65. 030117/11. La Araucanía, Cautín: eastward from Cunco. 38° 50′ // 71° 51′.
66. 030117/12. La Araucanía, Cautín: between Cunco and Temuco. 38° 55′ // 72° 04′.
67. 030123/8. Bío-Bío, Arauco: eastward from Cañete to Nahuel Buta N.P. 37° 48′ // 73° 05′.
68. 030123/13. La Araucanía, Malleco: from Curacautín westward. 38° 21′ // 71° 56′.
70. 030124/2. La Araucanía, Malleco: between Termas de Tolhuaca and Curacautín. 38° 20′ // 71° 49′.
71. 030124/3. La Araucanía, Malleco: between Curacautín and Malalcahuello. 38° 28′ // 71° 41′.
72. 030124/8. Los Lagos, Valdivia: between Coñaripe and Panguipulli. 39° 35′ // 72° 01′.
73. 030124/10. Los Lagos, Valdivia: between Coñaripe and Panguipulli, westerly from nr. 72. 39° 34′ // 72° 07′.
74. 030124/4. La Araucanía, Malleco: between Curacautín and Lautaro. 600 m. 38° 28′ // 71° 57′.
75. 030124/6. La Araucanía, Cautín: between Freire and Villarrica. 39° 04′ // 72° 25′.
79. 030129/1. Los Lagos, Valdivia: between Panguipulli and Choshuenco. 39° 39′ // 72° 12′.
80. 030129/5. Los Lagos, Valdivia: between Neltume and Liquiñe. 39° 42′ // 71° 55′.
81. 030129/6. Los Lagos, Valdivia: from Carirriñe to the border line. 39° 46′ // 71° 46′.
82. 030130/1. Los Lagos, Valdivia: between Choshuenco and Enco. 39° 50′ // 72° 05′.
83. 030130/5. Los Lagos, Osorno: between Osorno and Puyehue. 40° 37′ // 72° 40′.

84. 030129/7. Los Lagos, Valdivia: between Carirriñe to the border line. 39° 46′ // 71° 43′.
85. 030130/6. Los Lagos, Osorno: Termas de Puyehue. 40° 42′ // 72° 19′.
86. 030130/7. Los Lagos, Osorno: Puyehue N. P. 40° 44′ // 72° 13′.
87. 030130/8. Los Lagos, Osorno: Puyehue N. P. 40° 44′ // 72° 19′.
88. 030129/8. Los Lagos, Valdivia: from Carirriñe to the border line. 39° 46′ // 71° 42′.
89. 030130/9. Los Lagos, Osorno: Puyehue N. P., ascending to Antillanca. 40° 46′ // 72° 15′.
90. 030130/10. Los Lagos, Osorno: Puyehue N. P. 40° 46′ // 72° 17′.
91. 030130/12. Los Lagos, Osorno: between Entre Lagos and Puerto Octay 40° 50′ // 72° 52′.
92. 030130/13. Los Lagos, Osorno: between Pto. Octay and Pto. Clocker. 40° 59′ // 72° 43′.
93. 030131/2. Los Lagos, Llanquihue: from Ensenada to Osorno volcano. 41° 11′ // 72° 31′.
94. 030131/5. Los Lagos, Llanquihue: ascending to Osorno volcano, La Burbuja sector. 41° 10′ // 72° 31′.
95. 030131/7. Los Lagos, Osorno: Osorno volcano, La Picada sector. 41° 00′ // 72° 33′.
97. 030205/1. Los Lagos, Llanquihue: between Puerto Varas and Ensenada. 41° 18′ // 72° 52′.
98. 030205/2. Los Lagos, Llanquihue: between Llanquihue lake and Colonia Sur. 41° 18′ // 72° 41′.
99. 030205/5. Los Lagos, Llanquihue: between Correntoso and Sargazo lagoon. 41° 30′ // 72° 39′.
100. 030205/3. Los Lagos, Llanquihue: between Llanquihue lake and Colonia Sur. 41° 17′ // 72° 43′.
101. 030205/4. Los Lagos, Llanquihue: between Correntoso and Sargazo lagoon. 41° 28′ // 72° 39′.
102. 030205/6. Los Lagos, Llanquihue: Alerce Andino N.P., Sargazo sector. 41° 30′ // 72° 37′.
103. 030205/7. Los Lagos, Llanquihue: between Correntoso and Chapo lake. 41° 24′ // 72° 37′.
104. 030206/1. Los Lagos, Valdivia: Lanco, between Ruta 5 and the railroad. 39° 25′ // 72° 43′.
105. 030206/3. La Araucanía, Cautín: ascending to Villarrica volcano, from Pucón. 39° 19′ // 71° 58′.
107. 030206/5. La Araucanía, Cautín: between Pucón and Termas de Palguin. 39° 22′ // 71° 47′.
108. 030206/8. La Araucanía, Cautín: between Curarrehue and Reigolil. 39° 20′ // 71° 31′.
109. 030206/10. La Araucanía, Cautín: between Curarrehue and Reigolil. 39° 15′ // 71° 25′.
110. 030206/11. La Araucanía, Cautín: between Curarrehue and Reigolil. 39° 09′ // 71° 29′.
111. 030207/1. La Araucanía, Cautín: between Villarrica and Los Laureles. 39° 08′ // 72° 13′.
112. 030207/2. La Araucanía, Cautín: between Villarrica and Los Laureles. 39° 04′ // 72° 13′.
113. 980218/2. Los Lagos, Osorno: Hueyusca Coastal Range. 40° 54′ // 73° 40′.
114. 980218/3. Los Lagos, Osorno: Hueyusca Coastal Range. 40° 55′ // 73° 38′.

115. 980217/2. Los Lagos, Valdivia: little eastherly from Chabranco. 40° 09′ // 71° 55′.
116. 980201/5. Los Lagos, Valdivia: from Carirriñe to the border line. 39° 46′ // 71° 42′.
117. 980218/6. Los Lagos, Osorno: Coastal Range between Hueyusca and San Pedro. 40° 57′ // 73° 41′.
118. 980129/2. Los Lagos, Valdivia: ascent to Pelada Range from Las Trancas. 40° 15′ // 73° 20′.
119. 050115/2. Bío-Bío, Ñuble: between Chillán and Los Huemules N. R. 36° 39′// 71° 43′.
120. 050115/3. Bío-Bío, Ñuble: between Ñiblinto and Minas El Prado. 36° 37′ // 71° 45′.
121. 050115/4. Bío-Bío, Ñuble: between Pinto and Recinto. 36° 48′ // 71° 44′.
122. 050116/4. Bío-Bío, Ñuble: between Recinto and Pinto. 36° 49′ // 71° 40′.
123. 050116/5. Bío-Bío, Ñuble: between Recinto and Pinto. 36° 48′ // 71° 44′.
124. 050116/6. Bio-Bio, Bío-Bio: between Polcura and Central El Abanico. 37° 18′ // 71° 38′.
125. 050118/1. La Araucanía, Malleco: between Curaco and Malleco N. R 38° 02′ // 72° 16′.
126. 050118/3. La Araucanía, Malleco: between Curaco and Malleco N. R, eastherly than nr. 125. 38° 08′ // 71° 59′.
127. 050118/4. La Araucanía, Malleco: inside Malleco N. R. 38° 08′ // 71° 56′.
128. 050118/7. La Araucanía, Malleco: from Ñiblinto valley to Rosario (inside Malleco N.R.). 38° 09′ // 71° 55′.
129. 050117/2. Bio-Bio, Bío-Bio: between Ralco and Pangue reservoir. 37° 53′ // 71° 37′.
130. 050117/3. Bio-Bio, Bío-Bio: from Pangue reservoir, upwards Bío-Bío river. 37° 55′ // 71° 35′.
131. 050124/11. La Araucanía, Cautín: between Villarrica and Loncoche. 39° 16′ // 72° 15′.
132. 050122/2. La Araucanía, Malleco: between Lautaro and Curacautín. 38° 29′ // 72° 04′.
134. 050123/1. La Araucanía, Malleco: between Troyo and Contraco. 38° 10′ // 71° 18′.
135. 050123/10. La Araucanía, Cautín: Sta. Elvira de Tracura. 38° 50′ // 71° 27′.
136. 050123/11. La Araucanía, Cautín: between Tracura and Melipeuco. 38° 50′ // 71° 28′.
137. 050123/12. La Araucanía, Cautín: westwards from Sta. Elvira de Tracura. 38° 50′ // 71° 32′.
138. 050124/5. La Araucanía, Cautín: between Caburgua lake and Reigolil. 39° 04′ // 71° 34′.
139. 050124/8. La Araucanía, Cautín: southwards from Reigolil. 39° 09′ // 71° 29′.
140. 050124/9. La Araucanía, Cautín: southwards from Reigolil. 39° 12′ // 71° 27′.
171. 060124/1. Bio-Bio, Bío-Bio: from Ralco, upwards Queuco river. 37° 50′ // 71° 35′.
172. 060112/6. Bio-Bio, Bío-Bio: between S. Fabián de Alicó and S. Carlos 36° 27′ // 71° 42′.
173. 050210/5. Los Lagos, Osorno: between Pajaritos border and Termas de Puyehue. 40° 39′ // 72° 06′.
174. 050207/1. La Araucanía, Cautín: eastwards from Melipeuco. 38° 50′ // 71° 29′.
175. 050208/6. ARGENTINA, Neuquén: going to Hua Hum border from S. Martín de los Andes. 40° 09′ // 71° 31′.
176. 050210/4. Los Lagos, Osorno: between Puyehue border line to Pajaritos border. 40° 40′ // 72° 03′.
178. 050210/3. Los Lagos, Osorno: between Puyehue border line to Pajaritos border. 40° 40′ // 72° 01′.

179. 030131/4. Los Lagos, Llanquihue: Osorno volcano, La Burbuja sector. 41° 07′ // 72° 32′.
180. 050124/2. La Araucanía, Cautín: among Colico and Caburgua lakes. 39° 03′ // 71° 46′.
181. 050124/3. La Araucanía, Cautín: eastwards from Caburgua lake. 39° 03′ // 71° 39′.
182. 050124/4. La Araucanía, Cautín: between Caburgua lake and Reigolil. 39° 04′ // 71° 37′.
183. 050214/1. Los Lagos, Palena: between Contao and Hornopirén. 41° 50′ // 72° 41′.
184. 050124/2. Los Lagos, Palena: between Contao and Hornopirén. 41° 53′ // 72° 41′.
185. 050214/4. Los Lagos, Palena: Puente El Manzano, between Contao and Hornopirén. 42° 00′ // 72° 37′.
186. 050215/2. Los Lagos, Llanquihue: between Los Muermos and Estaquillas. 41° 26′ // 73° 41′.
187. 050215/6. Los Lagos, Valdivia: Oncol Park. 39° 41′ // 73° 19′.
188. 050214/3. Los Lagos, Palena: little southerly from Puente El Cisne, going to Hornopirén. 41° 58′ // 72° 39′.
189. 050214/5. Los Lagos, Palena: between Caleta Manzano and Hornopirén. 42° 00′ // 72° 35′.
190. 050214/6. Los Lagos, Palena: between Hornopirén and Cholgo. 41° 56′ // 72° 24′.
191. 050214/7. Los Lagos, Palena: little westerly from Hornopirén, Puente Ciruelillo. 41° 57′ // 72° 33′.
192. 980218/5. Los Lagos, Osorno: between Hueyusca and S. Pedro. 40° 57′ // 73° 40′.
199. 050118/11. La Araucanía, Malleco: little westerly from Malleco lagoon. 38° 14′ // 71° 52′.
211. 060131/1. Los Lagos, Palena: between Puerto Austral and Hornopirén. 41° 59′ // 72° 34′.
212. 060201/3. Los Lagos, Palena: Pumalín Park, close to Negro lake. 42° 43′ // 72° 35′.
221. 060202/2. Aysén, Aysén: Queulat N. P., Portezuelo Queulat. 44° 36′ // 72° 26′.
222. 060202/4. Aysén, Aysén: Queulat N. P., Bosque Encantado pathway. 44° 37′ // 72° 27′.
223. 060203/4. Aysén, Aysén: Queulat N. P., Bosque Encantado pathway: timberline. 44° 37′ // 72° 27′.
226. 030123/11. La Araucanía, Malleco: between Angol and Nahuel Buta N. P. 37° 46′ // 72° 47′.
228. 960130/2. Los Lagos, Palena: eastwards from Hornopirén, after crossing Blanco river. 41° 57′ // 72° 25′.
229. 060113/1. Bío-Bío, Ñuble: between Cobquecura and Buchupureo. 36° 04′// 72° 48′.
230. 060126/3. Los Lagos, Valdivia: ascent to Oncol Park. 39° 45′ // 73° 20′.
231. 060206/3. Los Lagos, Valdivia: from La Unión to Hueicolla, ascent to Pelada Range. 40° 14′ // 73° 21′.
232. 060201/5. Los Lagos, Palena: westside Yelcho lake, near Ventisquero. 43° 16′ // 72° 25′.
233. 060201/2. Los Lagos, Palena: Pumalín Park; between Puente Gral. Feliú and Negro lake. 42° 41′ // 72° 34′.
234. 060131/2. Los Lagos, Palena: ascent to Hornopirén N. P. 41° 54′ // 72° 24′.
235. 060206/4. Los Lagos, Valdivia: from La Unión to Hueicolla, ascent to Pelada Range. 40° 12′ // 73° 25′.