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Southwest cantabro-atlantic expression of coastal thorny woodland-fringe communities

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Abstract.- This study analyses thorny woodland-fringe communities of the deciduous woodlands of the south-western Cantabro-Atlantic Sub-Province (coasts of Galicia, Spain), particularly those situated in the thermotemperate belt and showing greater oceanality, floristically manifested by the presence of *Ulex gr. europaeus*, and Mediterranean influence. Comparative study of these communities allows identification of a new association, *Asparago aphylli-Prunetum spinosae*.

Key words : *Asparagus* - Cantabro-Atlantic subprovince - *Lonicerenion periclymeni* - *Rhamno-Prunetea* - *Pruno-Rubion ulmifolii* - thorny vegetation - *Ulex*.

Résumé.- On analyse les communautés épineuses qui ourlent les forêts à feuilles caduques de la façade cantabro-atlantique méridionale (côtes de la Galice, Espagne), particulièrement celles de l'étage thermotempéré et présentant un caractère océanique marqué attesté par la présence d'*Ulex gr. europaeus* et une influence méditerranéenne. L'étude comparative de ces communautés permet l'individualisation d'une nouvelle association (*Asparago aphylli-Prunetum spinosae*).

Mots clés : *Asparagus* - *Lonicerenion periclymeni* - *Rhamno-Prunetea* - *Pruno-Rubion ulmifolii* - Subprovince cantabro-atlantique - *Ulex* - végétation épineuse.

I. INTRODUCTION

The class *Rhamno-Prunetea* (syntax. syn. *Crataego-Prunetea*) is very rich and diverse: in continental Spain and Portugal more than 60 associations of this class have been described and similar diversity is seen throughout Europe. This diversity reflects richness in both thorny and non-thorny species, many of them of the family Rosaceae, which make up the intricate and lacerating protective barriers that surround most deciduous woodlands and many mesophyllous evergreen woodlands in Europe.

The systematic treatment of these thorny woodland fringe communities has been confused, with many proposals of numerous associations and higher-ranking syntaxa that have not stood up to overall analysis, to achieve finally an acceptable continental-level solution. Currently, at least in the Iberian Peninsula, a syntaxonomic scheme based on the synthesis of Rivas-Martínez *et al.* (2001) has gained wide acceptance: this includes a large alliance, *Pruno-Rubion ulmifolii* O. Bolós 1954, diversified into various suballiances, namely *Lonicerenion periclymeni, Pruno-Rubenion ulmifoli, Rosenion carioto-pouzinii* and *Tamo-Viburnenion lantanae*, together containing about twenty associations. However, only two of these associations have been cited from northwest Spain (Galicia), the broad-ranging *Rubo ulmifolii-Tametum communis* (Tüxen & Oberdorfer, 1958; Navarro, 1974; Díaz, 1975; Arnáiz & Loidi, 1983a, 1983b; Amigo, 1984; Gímenez de Azcárate *et al.*, 1996), of acidophilous and Eurosiberian character, and *Rubo ulmifolii-Rosetum corymbiferae*, occurring on the scarce calcareous outcrops in the Mediterranean eastern part of this region (Izco *et al.*, 1999). It is clear that there are other thorny woodland-fringe communities in this region, still not adequately understood.

The present study describes a new association within the alliance *Pruno-Rubion ulmifolii* (*Lonicerenion periclymeni*), identified and characterized by standard phytosociological procedures.

II. DESCRIPTION

This is a shrub community (1-2.5 m), dense, lacerating (*Prunus spinosa, Crataegus monogyna, Ulex gr. europaeus*), rich in climbing plants (*Rubia peregrina* s.l., *Asparagus aphyllus, Lonicera periclymenum* subsp. *periclymenum, Solanum dulcamara, Galium mollugo*, etc.) and with presence of thermophyllous species, often sclerophyllous (*Laurus nobilis, Ruscus aculeatus, Cistus salvifolius*, etc.) that have arrived via the so-called Lusitanian coastal route, *per loca maritima*, as discussed by Izco (1981). In this connection, *Asparagus aphyllus* is of key importance. This species, which was cited from this territory in the 19th century (Willkomm & Lange, 1870), is exclusively distributed in the Mediterranean region, including this region's northward extension along the Iberian Atlantic coast, although it does not reach the bay of Biscay (Mar Cantábrico) (Valdés, 1980; Aseguinolaza *et al.*, 1984; Franco & Afonso, 1994; Díaz & Fernández Prieto, 1994). Within the community we find a number of geophytes like *Arisarum vulgare* and *Arum italicum*. The community is generally linear in form, following hedges between plots of land, or banks, or the outer fringes of relict woodland stands. Other similar communities, dominated by *Rubus gr. ulmifolius* and sometimes accompanied by other species of the genus, are seen on plots abandoned after cultivation of crops like maize, potatoes or turnip. These communities have very low species richness and perhaps merit a different syntaxonomic classification.

The community is visually evident from late February to early April, when *Prunus spinosa* bears abundant white flowers, often mixed with the yellow flowers of *Ulex gr. europaeus*. After this period it can be identified on the basis of its thorny shrub structure, ecology, and floristic composition. Table I lists 15 relevés from the Galician coast, all situated less than 100 m a.s.l., frequently on somewhat clayey soils derived from outcrops of schists, gneisses or metavulcanites; certainly, the community tends to occur on soils with relatively high nutrient contents, whether due to dissolution of the base rock or seawater spray, and does not occur on soils derived from granites, frequent in this region and with

low nutrient contents. This relatively high nutrient requirement is manifested by the presence of *Brachypodium rupestre*, an indicator of high nutrient contents in this region.

Climate in this community's range is characterized by high rainfall, mild temperatures, minor thermal oscillation and a certain summer drought, as expected for the Atlantic coastal region of Galicia. Macrobioclimate is temperate, temperate oceanic (or even hyperoceanic) Submediterranean variant, Thermotemperate belt (Rivas-Martínez *et al.*, 2002; *www.ucm.es/info/cif/form/bi_med.htm, www.ucm.es/info/cif/form/tb_med.htm*). The area occupied by the community forms part of the Eurosiberian Region, Atlantic-Central European Subregion, Atlantic European Province, Cantabroatlantic Subprovince, Galician-Portuguese and Galician-Asturian Sectors (Rivas-Martínez *et al.*, 2002, *www.ucm.es/info/cif/form/big_med.htm*).

In Galicia there are also other communities with *Prunus spinosa*, frequently accompanied by *Ulex gr. europaeus*, different *Rubus* species and other plants present in coastal areas; however, their overall composition clearly distinguishes them from the community described here. This is the case of the communities linked to eclogite outcrops of central Galicia (Lugo Sector) and the calcareous substrates of mid-altitude montane areas (Laciana-Ancares Sector), both under temperate climates.

III. DISCUSSION

A. The *Asparago aphylli-Prunetum spinosae*

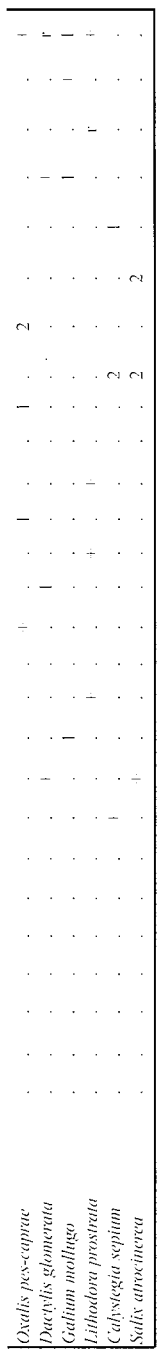
As shown in Table I, the new community is clearly related to the association *Rhamno-Prunetea, Prunetalia spinosae, Pruno-Rubion ulmifolii* in terms of floristic composition and structure. However, the new community frequently shows sclerophyllous scrub species of *Quercetea ilicis*, alongside deciduous species of *Querco-Fagetea* (s.a.) and the gorse/heath scrubs (*Calluno-Ulicetea*) characteristic of this territory, as well as *Pteridium aquilinum*. The new community undoubtedly forms part of the series of the coastal deciduous woodland of this territory, *i.e.* the thermophilous Galician-Portuguese oakwoods *Rusco aculeati-Quercetum roboris* subass. *quercetosum suberis*, in substitution of shrub communities not yet described, similar to the shrub communities of the alliance *Arbuto unedonis-Laurion nobilis* (*Pistacio-Rhamnetalia, Quercetea ilicis*) reported from the Cantabrian coast (Bueno & Fernández Prieto, 1991; Díaz & Fernández Prieto, 1994; Loidi *et al.*, 1994) and the Portuguese coast (Costa *et al.*, 2000).

The new community can distinguished from *Arbuto-Laurion* by the absence of *Arbutus unedo*. Notably, it can be separated from the *Hedero helicis-Lauretum nobilis* of Bueno & Fernández Prieto (1991), the existing Spanish syntaxon of *Arbuto-Laurion* most similar to the new community, by the absence of species including *Smilax aspera, Rhamnus alaternus, Cornus sanguinea* and *Genista occidentalis*.

The new community can be differentiated from the other thorny woodland fringe communities of the French and Iberian Atlantic coasts, *i.e.* of the suballiance *Lonicerenion periclymeni* (Table II), on the basis of various ecological and floristic features. Floristic differences with respect to other associations of this suballiance include the presence of *Asparagus aphyllus* and *Ulex gr. europaeus*, and probably *Rubia peregrina* subsp. *longifolia* and *Hedera hibernica*, whose presence in other associations of this group is not well documented. The former two species separate the new community from the wide-ranging syntaxon *Rubo ulmifolii-Tametum communis*, described by Tüxen and Oberdorfer (1958), while the absence of species including *Smilax aspera* and *Erica vagans* separates it from

Table I, Tableau I.- *Asparago aphylli-Pruentum spinosae ass. nov.* (*Pruno-Rubion ulmifolii, Lonicerenion periclymeni*).

Relevé-Nr.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Area (m^2)	80	40	80	60	50	60	40	25	100	80	60	120	30	15	20	40	45	50	90	90	120	100	120	100	50	30	120
Cover (%)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Altitude (m)	40	15	80	100	10	-	-	-	15	-	80	15	70	5	15	10	50	25	50	25	-	10	-	-	-	10	-
Nr. sp.	10	8	9	8	9	10	12	10	13	11	11	10	13	14	15	14	15	11	11	15	16	15	19	19	13	17	25
Charact. of ass. and higher ranks																											
Rubus gr. ulmifolius	1	4	5	1	2	.	2	4	5	4	3	2	2	2	2	2	3	2	3	3	4	2	1	3	4	4	3
Prunus spinosa	5	3	1	5	5	5	4	2	3	3	1	.	4	.	.	5	3	3	4	2	3	1	1	2	2	2	3
Lonicera periclymenum p.	.	1	1	+	2	+	2	1	1	.	r	1	1	.	1	3	2	.	.	2	1	1	.	+	2	4	2
Rubia peregrina longifolia	+	2	+	+	.	.	2	1	1	2	2	2	.	1	+	.	2	2	2	.	+	2	.	.	.	+	2
Ulex gr. europaeus	1	.	1	1	.	.	1	1	.	2	3	4	.	.	3	1	2	.	1	.	.	.	.	+	1	2	1
Tamus communis	r	.	.	.	+	r	2	.	1	.	.	.	.	.	+	1	1	.	.	.	+	2	.	.	.	+	2
Asparagus aphyllus	.	.	.	.	+	.	1	+	.	.	.	.	.	1	.	+	.	.	.	.	+	.	.	.	.	+	r
Crataegus monogyna	.	.	.	.	.	.	1	.	.	.	.	.	.	4	.	+	1	.	.	3	2	.	3	.	.	.	.
Ruscus aculeatus	.	.	.	.	.	.	1	.	.	.	.	.	.	2	+	.	.	.	.	.	.	1	.	.	.	.	r
Ligustrum vulgare	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	.
Differentials of subassociations																											
Sambucus nigra	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	1	+	+	1	+	.	.	.
Cytisus scoparius	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	+	+
Diagnostic species of *Quercetea ilicis* and *Querco-Fagetea*																											
Hedera hibernica	.	2	.	+	2	1	+	2	1	+	.	.	3	.	.	1	2	3	.	2	1	1	1	1	.	.	2
Laurus nobilis	r	.	+	.	.	.	1	1	+	1	+	.	1	2	+	.	1	1	.	+	1	4	4	1	.	.	4
Arum italicum	.	.	.	.	1	+	.	.	.	.	.	.	.	r	.	+	.	.	.	.	1	1	+	.	.	1	1
Arisarum vulgare	.	.	.	.	2	r	.	.	.	.	.	.	.	r	.	2	1	.	.	.	.	.	.	.	.	.	.
Stellaria holostea	.	.	1	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	.	1	.	+
Arenaria montana	.	.	.	.	.	.	.	.	.	.	r	.	.	+	.	.	1	.	.	.	.	.	.	.	.	.	.
Teucrium scorodonia	.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	.	.	.	.	.	.	1	+	.
Companions																											
Pteridium aquilinum	1	2	3	.	2	1	1	.	+	2	2	+	1	.	.	1	.	2	+	2	1	+	2	2	2	2	1
Brachypodium rupestre	1	.	+	+	.	1	.	.	.	1	.	.	1	.	.	.	.	.	.	.	.	.	+	1	1	.	.
Lamium maculatum	.	1	.	.	.	.	.	.	+	.	.	.	1	.	.	.	.	+	.	.	+	.	.	+	.	.	r
Silene latifolia	.	+	.	.	.	.	.	+	.	.	.	.	+	.	.	.	.	.	.	.	r	1	.	.	r	.	r
Geranium purpureum	1	.	.	1	.	.	.	.	.	.	.	.	.	.	+	.	.	.	.	+	+	.	.	.	.	+	.
Agrostis capillaris	.	.	.	.	.	.	.	.	.	1	+	r	1	.	.	.	.	1	.	.	.	.	.	+	.	.	.
Daphne gnidium	.	.	.	.	.	.	.	.	.	.	.	1	+	2	2	.	+	.	.	.	.	.	.	.	.	1	.
Urtica dioica	.	.	.	.	.	1	.	.	.	1	.	.	.	.	.	.	.	.	+	.	.	+	.	1	.		.



Additional taxa. Differential species of *Quercetea ilicis* and *Querco-Fagetea*: *Osyris alba* 15 (2), *Viola alba* subsp. *dehnharti* 20 (r). *Asplenium onopteris* 23 (r), *Polystichum setiferum* 23 (r), *Carex vulpina* subsp. *nemorosa* 23 (r), *Quercus* x*andegavensis* 27 (+), *Quercus robur* 27(+).
Companions: *Panicum repens* 9 (1), *Stenotaphrum americanum* 11 (r), 19 (1), *Pinus pinaster* 12 (r), 26 (+), *Cistus psilosepalus* 14 (1), 27 (+), *Festuca pruinosa* 14 (1), *Cistus salviifolius* 15 (3), 26 (2), *Cytinus hypocistis* 15 (1), *Asparagus gr. officinalis* 17 (r), *Cytisus striatus* 17 (2), *Parietaria judaica* 19 (1), *Holcus mollis* 20 (1), 24 (+), *Rosa* sp. 21 (2), 23 (+), *Lotus corniculatus* 25 (+), *Ulex minor* 25 (+).

Localities. Relevé code: year/month/day/number of the relevé. C: Coruña Province, Po: Pontevedra Province.
1. (920817.01). C. Ría de Ladrido. Between Ortigueira and Esteiro.
2. (000307.01). C. Arteixo, Barrañán.
3. (010304.01). C. Sada, Carnoedo.
4. (920817.02). C. Ría de Ladrido.
5. (030315.02). Po. Circa Sanxenxo, Alos, Pragueira beach.
6. (010304.02). C. Lorbé, Corgo.
7. (830316.08). C. Corrubedo, Vilar, in the beach, near the Lagoon.
8. (830316.09). C. Corrubedo, Vilar, in the beach, near the Lagoon.
9. (000307.02). C. Arteixo, Barrañán.
10. (010304.04). C. Lorbé, Corgo, near Barrañán.
11. (010314.01). C. Baldaio, As Anchianas. UTM 528/4794.
12. (010314.02) C. Baldaio, As Anchianas. UTM 528/4794.
13. (010314.07). C. Malpica, Cerqueda, A Fonte dos Bois. UTM 515/ 4794.
14. (970314.12). C. Ribeira, beach of the town.
15. (850523.01). Po. O Grove, Areagrande beach.
16. (030315.01). Po. Circa Sanxenxo, Alós. Pragueira beach.
17. (830316.01). C. Aguiño, Artés.
18. (010314.03). C. Baldaio, Lema. UTM 527/4792.
19. (010314.06). C. Malpica, Seaia. UTM 513/4796.
20. (940904.01). Po. O Grove, Bodeira lagoon.
21. (970314.19). C. Corrubedo. A Eirexa, Las Dunas camping.
22. (000307.03). C. Arteixo. Barrañán lagoon.
23. (920817.03). C. Carnota. Postdune Carnota beach.
24. (010304.03). C. Lorbé, Corgo.
25. (010304.05). C. Lorbé Corgo.
26. (030315.03) Po. O Grove, La Toja Island, near O Bao.
27. (000319.01). C. Corrubedo. P.N. Corrubedo, near Casa da Costa.

Smilaco asperae-Rosetum pimpinellifoliae described by Herrera (1995). These are the two most similar associations.

In contrast, the new community shows close relationships with the *Ulex europaeus*-communities described from the French Atlantic coast (northern and southern Brittany, Picardy, Normandy) (Table II; Fig. 1): *Daphno gnidium-Ligustretum, Erico scopariae-Ligustretum, Erico scopariae-Sarothamnetum, Rubio-Ulicetum europaei, Scopario-Franguletum alni, Scopario-Sarothamnetum, Ulici-Prunetum spinosae, Rubio-Salicetum arenariae* (Delelis, 1973; Géhu, 1963, 1969a, 1969c, 1972, 1991; Géhu & Géhu, 1975b). The community with which the new association shows greatest similarity is *Ulici europaei-Prunetum spinosae* (*in* Delelis, 1973): both have a coastal distribution, on clayey and relatively nutrient-rich soils, and similar floristic compositions. The fundamental difference lies in the presence in the new community of species that do not reach the French Atlantic coast, notably *Asparagus aphyllus*. Géhu (1969b) has remarked on the latitudinal vicariance of the shrub associations of the French coast cited above; likewise, the Galician association described here can be considered a southern vicariant of them, particularlly of the *Ulici europaei-Prunetum spinosae* and of other coastal shrub communities with *Ulex europaeus* s.l.

The association *Asparago-Pruentum* is present in southern Eurosiberian territories, Cantabroatlantic Subprovince, Galician-Portuguese Sector, close to the boundary with the Mediterranean region (Fig. 1). This proximity and the Submediterranean character of the local climate, with many years classifiable as Mediterranean, explain the presence of species with Mediterranean optima, many of them sclerophyllous or lauroid (*Cistus salvifolius, Laurus nobilis, Rhamnus alaternus, Arbutus unedo, Pinus pinaster, Rubia peregrina* subsp. *longifolia*, etc.). By this coastal route some of these taxa reach the French Landes, and even more northerly locations.

In parallel with the northern French association *Ulici europaei-Prunetum spinosae* we recognize in the new association, in addition to the typical subassociation *asparagetosum aphylli*, two subassociations differenciated by *Sambucus nigra* and *Cytisus scoparius*, respectively.

Asparago aphylli-Prunetum spinosae Izco, Amigo & Pulgar *ass. nova*

The new association is characterized by the presence of *Ulex gr. europaeus, Prunus spinosa, Asparagus aphyllus, Rubia peregrina* subsp. *longifolia, Laurus nobilis, Tamus communis*, etc. (Table I, relevés 1-27).

Holotypus: Table I, relevé 7 (designated here).

Asparago aphylli-Prunetum spinosae subass. *asparagetosum aphylli* Izco, Amigo & Pulgar (typical subassociation) *subass. nova* (Table I, relevés 1-17). Differential species: *Asparagus aphyllus*.

Holotypus: Table I, relevé 7 (designated here).

Asparago aphylli-Prunetum spinosae subass. *sambucetosum nigrae* Izco, Amigo & Pulgar *subass. nova*.

Moderately nitrophilous, related to shrub communities of wet soils with high organic matter contents (Table I, relevés 18-24). Differential species: *Sambucus nigra*.

Holotypus: Table I, relevé 22 (designated here).

Asparago aphylli-Prunetum spinosae subass. *cytisetosum scoparii* Izco, Amigo & Pulgar *subass. nova* (Table I, relevés 25-27).

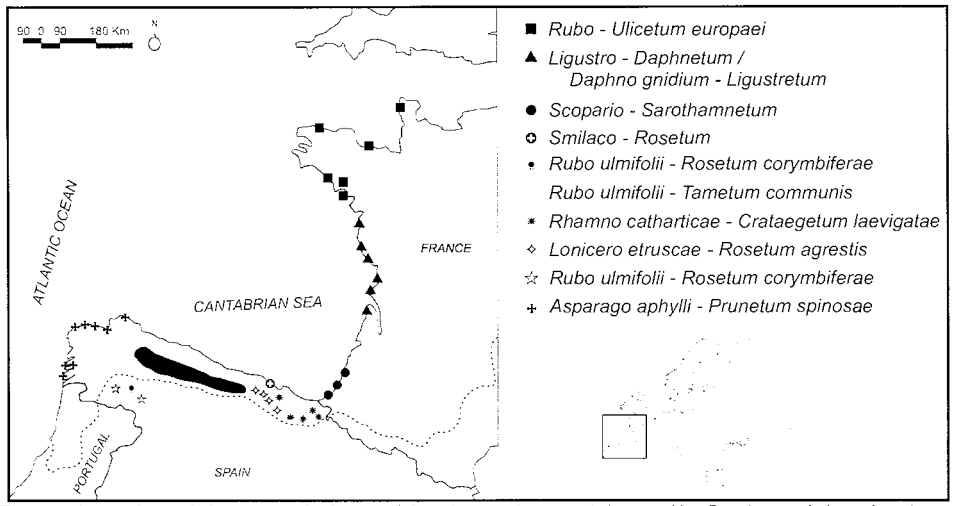


Fig. 1.- Location of the associations of *Lonicerenion periclymeni* in Spain and the vicariants associations of *Asparago-Prunetum* in the coasts of France. Shadow area: European Atlantic chorological province. Dark area (Cantabrian range): lack of *Lonicerenion periclymeni.*

Fig. 1.- Localisation des associations du *Lonicerenion periclymeni* en Espagne et des associations vicariantes de l'*Asparago-Prunetum* sur les côtes atlantiques de France. Aire ombrée : province chorologique atlantique européenne ; aire noire (cordillère cantabrique) : absence du *Lonicerenion periclymeni.*

Subassociation related to the woodland-fringe broom scrub communities of this territory. Differentials species: *Cytisus scoparius.*
Holotypus: Table I, relevé 26 (designated here).

B. Nomenclature of higher ranks

Géhu, de Foucault and Delelis (1983: 467) defined an alliance of acidophilous or neutrophilous associations, euatlantic or subatlantic, characterized by species like *Lonicera periclymenum, Rubus ulmifolius, Tamus communis, Ulex europaeus, Ilex aquifolium, Cytisus scoparius* and *Ruscus aculeatus.* This proposal, « *Lonicerion periclymeni* all. nov.... syn.: *Rubion subatlanticum* Tx. 1952 nom. illeg., *Ligustro-Rubion ulmifolii* Géhu & Del. 1972 p.p.) », is based on the nomenclatural type « *Lonicero-Rubetum ulmifolii* Géhu & Del. 1972 ». However, the references list of this article does not include any 1972 publication by Géhu and/or Delelis, so that this proposal must be considered invalid (ICPN, Art. 2b).

Rivas-Martínez *et al.* (1991) proposed a change of rank for the alliance *Lonicerion periclymeni* to suballiance, « *Lonicerenion periclymeni* (Géhu, de Foucault & Delelis, 1983) stat. nov. » and repeat the type given by the authors of the original alliance, though clearly indicating that the type is to be found in the publication of Delelis (1973) corresponding to her doctoral thesis. Thus the valid proposal of the suballiance and name is *Lonicerenion periclymeni* Géhu *et al.* ex Rivas-Martínez *et al.* [Vegetación del Pirineo Occidental y Navarra, *Itinera Geobot.* **5**: 279. 1991].

Acknowledgments - We thank J. C. Costa and J. Honrado the information about the absence of *Rubo-Tametum* in Portugal.

Table II.- Comparative synthetic table (associations of the suballiance *Lonicerenion periclymeni*).

Tableau II.- Tableau synthétique comparatif (associations de la suballiance *Lonicerenion periclymeni*).

Column number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	
Average of altitude (m)	-	395	335	332	320	130	383	-	60	363	-	-	-	-	-	-	-	-	-	34	
Average of sp/relevé	13'6	15'1	13'5	19'6	13	17	19'5	-	17'8	16'7	10'4	-	10'7	-	13'9	11'7	11	13'5	12'9	12'8	
Nr. of relevés	12	17	16	12	12	12	12	12	15	10	25	14	12	12	27	15	20	10	44	27	
Nr. sp/table	-	65	50	40	35	43	46	46	62	50	29	28	24	19	c50	c25	c30	c35	-	55	
Rhamno-Prunetea species																					
Rubus gr. ulmifolius	V	V	V	V	V	V	V	V	V	V	V	V	III	III	V	V	IV	.	V	V	19
Crataegus monogyna	III	IV	V	V	IV	V	V	V	IV	V	IV	III	III	II	I	.	II	.	V	III	18
Lonicera periclymenum	.	III	III	I	I	I	II	III	IV	II	III	II	III	III	I	II	IV	.	V	IV	18
Prunus spinosa	I	V	V	V	IV	V	V	V	II	V	V	V	IV	IV	.	.	.	I	V	V	17
Rubia peregrina (1)	V	II	III	V	III	V	I	III	III	IV	.	.	V	V	V	V	.	V	III	IV	17
Ligustrum vulgare	V	II	III	V	III	IV	.	.	I	II	II	II	IV	IV	V	.	.	I	IV	I	16
Rosa canina	.	.	I	V	III	II	III	III	I	IV	IV	III	.	.	I	.	.	.	IV	.	13
Sambucus nigra	.	II	II	I	III	I	II	.	V	III	II	III	.	.	I	.	.	.	I	II	13
Clematis vitalba	III	III	IV	V	IV	IV	II	III	II	III	I	II	.	.	.	.	.	.	.	.	12
Cornus sanguinea	III	V	IV	V	V	V	III	.	II	III	I	I	.	.	.	.	.	.	III	.	12
Tamus communis	.	IV	V	V	V	V	IV	V	V	V	II	III	.	.	.	.	.	.	.	II	12
Euonymus europaeus	.	II	I	IV	III	I	I	.	.	I	I	I	.	.	I	.	.	.	III	.	11
Ruscus aculeatus	.	I		II	.	II	II	V	.	.			III	III	I				II	I	10
Rosa nitidula	.	.	I	.	I	I	I	II	.	.	.	.	.	.	.	.	.	.	.	.	5
Rosa sempervirens	I	.	III	III	.	V	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4
Rosa pimpinellifolia	V	.	I	.	.	.	.	.	.	.	.	.	III	III	.	.	.	.	.	.	4
Viburnum lantana	.	I	.	V	I	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4
Prunus mahaleb	.	I	.	II	I	.	.	.	.	II	.	.	.	.	.	.	.	.	.	.	4
Rosa squarrosa	.	.	III	III	V	II	.	.	.	.	.	.	.	.	.	.	.	.	.	.	4
Lonicera etrusca	I	.	I	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	3
Rosa corymbifera	.	.	I	II	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	3
Rosa arvensis	.	.	I	II	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	3
Rosa micrantha	.	.	I	.	.	.	II	II	.	.	.	.	.	.	.	.	.	.	.	.	3
Rosa pouzini	.	.	I	.	.	.	I	I	.	.	.	.	.	.	.	.	.	.	.	.	3
Rhamnus cathartica	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	2
Crataegus oxyacantha	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	I	.	2
Rosa rubiginosa	.	.	I	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	2
Frangula alnus	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	V	.	I	.	2
Companions*																					
Hedera helix (2)	.	III	III	V	III	IV	III	IV	III	II	III	IV	III	II	III	.	I	.	V	IV	17
Pteridium aquilinum	.	II	II	III	III	II	IV	IV	IV	II	.	.	III	III	.	.	II	I	I	V	15
Fraxinus excelsior	.	IV	III	I	III	II	I	I	II	I	I	I	.	.	.	.	.	.	II	.	12
Quercus robur	.	.	I	.	III	I	I	.	I	.	II	I	.	.	II	II	V	.	IV	I	12
Brachypodium pinnatum s.l.(4)	I	I	I	.	.	.	IV	III	III	III	I	.	I	.	.	.	.	.	I	II	11
Salix atrocinerea	II	.	II	II	III	III	.	.	I	.	.	.	.	.	.	II	III	II	II	I	11
Teucrium scorodonia	.	II	I	.	.	.	III	III	IV	II	II	II	III	II	.	.	.	.	.	I	11
Cytisus scoparius	.	I	.	.	.	.	I	III	.	.	II	I	II	II	II	V	.	II	.	I	11
Ulex europaeus (3)	.	.	I	.	.	.	III	.	I	.	V	V	V	V	III	V	V	.	.	III	11
Dactylis glomerata	I	.	.	.	.	.	I	.	III	II	II	I	III	II	.	.	.	.	.	I	9
Corylus avellana	.	IV	III	IV	III	III	I	.	II	III	.	.	.	.	.	.	.	.	II	.	9
Urtica dioica	.	II	I	.	I	I	.	.	I	IV	II	III	.	.	.	.	.	.	.	I	9
Rubus sp. pl.	.	.	.	II	.	.	.	.	.	.	IV	III	III	III	.	III	III	V	II	.	9
Sanguisorba minor	III	.	III	V	.	.	I	.	II	III	.	.	.	II	.	.	.	.	.	.	8
Calystegia sepium	.	I	I	.	I	I	I	.	I	I	.	.	.	.	.	.	.	.	.	I	8
Smilax aspera	.	III	.	.	I	V	II	.	II	.	III	.	III	.	.	.	.	.	I	.	8
Quercus ilex	I	I	III	IV	.	III	.	.	.	.	.	.	.	.	V	IV	.	.	.	.	7
Laurus nobilis	I	I	.	.	I	I	II	.	II	.	.	.	.	.	.	.	.	.	.	IV	7
Galium aparine	.	I	I	.	I	.	I	.	.	I	II	III	.	.	.	.	.	.	II	.	7
Arum italicum	.	.	I	II	I	I	.	II	I	.	.		.				.		.	II	7

Pinus pinaster	.	.	.	.	.	.	I	.	I	.	.	.	.	.	III	V	II	II	.	I	7
Rhamnus alaternus	I	I	III	III	.	V	.	.	.	II	.	.	.	.	.	.	.	.	.	.	6
Stellaria holostea	.	I	.	.	.	.	I	III	I	II	.	.	.	.	.	.	.	.	.	I	6
Galium mollugo	.	I	.	.	.	.	III	III	I	III	.	.	.	.	.	.	.	.	.	I	6
Solanum dulcamara	.	.	.	I	.	.	.	.	I	.	II	II	.	.	.	.	.	II	.	I	6
Arbutus unedo	I	.	.	III	.	III		.	.	.	.	.	.	.	.	III	.	I	.	.	5
Castanea sativa	.	I	.	.	II	I	.	.	.	II	I	.	.	.	.	.	.	.	.	.	5
Acer pseudoplatanus	.	I	.	.	.	I	.	I	I	.	I	II	.	.	.	.	.	.	.	.	5
Polypodium vulgare	.	I	.	.	.	.	I	.	I	.	.	.	.	.	I	.	.	III	.	.	5
Geranium robertianum	.	.	.	.	.	.	IV	III	V	III	.	.	.	.	.	.	.	.	I	.	5
Erica scoparia	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	V	V	I	I	.	5
Carex arenaria	II	.	.	.	.	.	.	.	.	.	.	.	.	.	III	IV	.	IV	.	.	4
Geum urbanum	.	I	I	.	.	.	I	.	.	I	.	.	.	.	.	.	.	.	.	.	4
Quercus pyrenaica	.	I	.	.	.	.	I	II	.	.	.	.	.	.	.	.	II	.	.	.	4
Bryonia dioica	.	I	.	.	.	.	.	.	.	.	II	II	.	.	.	.	.	.	I	.	4
Ilex aquifolium	.	.	I	.	.	I	.	.	.	.	I		.						I	.	4
Lithodora diffusa = prostrata	.	.	.	.	.	.	I	III	i	I	.	.	.	.	.	.	.	.	.	.	4
Erica cinerea	.	.	.	.	.	.	I	II	.	.	.	.	.	.	.	II	III	.	.	.	4
Euphorbia amygdaloides	.	.	.	.	.	.	I	.	I	I	.	.	.	.	.	.	.	.	I	.	4
Populus tremula	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	I	I	.	I	.	4
Cistus salviifolius	.	.	.	.	.	.	.	.	.	.	.	.	IV	III	.	III	.	.	.	I	4

(*) Companion species with fewer than 4 presences not shown; (1) *Rubia peregrina* subsp. *longifolia* at least in 1 and 20. (2) *Hedera hibernica* in 20. (3) *Ulex gr. europaeus* at least in 20. (4) *Brachypodium rupestre* at least in 20.

Rhamno-Prunetea species presents in a only column - *Berberis vulgaris:* I in 2; *Rosa agrestis*: I in 3; *Rosa andegavensis*: II in 3; *Viburnum tinus*: I in 4; *Prunus insititia*: II in 4; *Clematis flammula*: I in 15.

Ass. and origin of tables

1.- *Smilaco asperae-Rosetum pimpinellifoliae* (Herrera, 1995, Tab. 87).
2.- *Rubo ulmifolii-Tametum communis* (Tüxen & Oberdorfer, 1958, tab. 77).
3.- *Rubo ulmifolii-Tametum communis* (Herrera, 1995, tab. 86).
4.- *Rubo ulmifolii-Tametum communis* (Arnáiz & Loidi, 1983a, tab. 1).
5.- *Rubo ulmifolii-Tametum communis* (Loidi,1983, tab. 36)
6.- *Rubo ulmifolii-Tametum communis* (Loidi, 1983, tab. 37)
7.- *Rubo ulmifolii-Tametum communis* (Giménez de Azcárate *et al.*, 1996, tab. 1).
8.- *Rubo ulmifolii-Tametum communis* (Amigo, 1984, tab. 7).
9.- *Rubo ulmifolii-Tametum communis* (Díaz, 1975, tab. 38).
10.- *Rubo ulmifolii-Tametum communis* (Navarro, 1974, tab. 27).
11.- *Ulici-Prunetum spinosae* (Delelis, 1973, tab. 6).
12.- *Ulici europaei-Prunetum spinosae* (Géhu & Géhu, 1983, tab. 1, col. 4).
13.- *Rubio-Ulicetum europaei* (Delelis, 1973, tab. 8).
14.- *Rubio-Ulicetum europaei* (Géhu & Géhu, 1983, tab. 1, col. 5).
15.- *Daphno gnidium-Ligustretum* (Géhu & Géhu, 1975a, tab. 3).
16.- *Erico scopariae-Sarothamnetum* (Géhu & Géhu, 1975a, tab. 2).
17.- *Scopario-Franguletum alni* (Géhu & Géhu, 1975b).
18.- *Rubio-Salicetum arenariae* (Géhu & Géhu, 1975a, tab.4).
19.- *Lonicero-Rubetum ulmifolii* (Delelis, 1973, tab. 10).
20.- *Asparago aphylli-Prunetum spinosae* (*hoc loco*, tab. 1)

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