

A contribution to the diversity of lichen-forming and lichenicolous fungi in the Spanish Pyrenees

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Abstract: VONDRÁK, J. & ETAYO, J. 2007. A contribution to the diversity of lichen-forming and lichenicolous fungi in the Spanish Pyrenees. – *Herzogia* 20: 189–198.

120 taxa of lichen-forming fungi and 13 taxa of lichenicolous fungi are reported from the Spanish Pyrenees, of which *Lecanora subaurea*, *Polyblastia agraria*, *Protoblastenia cyclospora*, and *Rhizocarpon solediosum* are new to Spain, and several, including *Anaptychia bryorum*, *Candelariella subdeflexa*, *Dacampia engeliana*, *Henrica ramulosa*, *Lecanora valesiaca*, and *Rosellinula haplospora*, have only rarely been recorded from Spain.

Zusammenfassung: VONDRÁK, J. & ETAYO, J. 2007. Beitrag zur Kenntnis der Flechten und lichenicolen Pilze in den Spanischen Pyrenäen. – *Herzogia* 20: 189–198.

120 Flechten und 13 lichenicole Pilze werden aus den Spanischen Pyrenäen gemeldet. *Lecanora subaurea*, *Polyblastia agraria*, *Protoblastenia cyclospora* und *Rhizocarpon solediosum* sind Neufunde für Spanien. *Anaptychia bryorum*, *Candelariella subdeflexa*, *Dacampia engeliana*, *Henrica ramulosa*, *Lecanora valesiaca* und *Rosellinula haplospora* sind nur selten in Spanien nachgewiesen worden.

Key words: Biodiversity, lichenized Ascomycetes, Aragón, Huesca, Spain.

Introduction

The species of lichen-forming and lichenicolous fungi collected by the first author in the Spanish Pyrenees during a short excursion to the north of Jaca and Sabiñánigo (community Aragón, province Huesca [see Fig. 1]), in the summer 2002 are listed. Records made by the second author during 2003–2005 throughout Aragón (from where incidentally more than 1400 taxa have been recorded), are also included, together with those of some rarely recorded species from other regions of Aragón. Although this contribution contains only 133 taxa, four species are new to Spain and new distribution data are provided for some rare or overlooked species.

A variety of siliceous and calcareous Devonian to Carbonian sedimentary rocks prevail throughout the study area (TEIXEL & BARNOLAS 2003), the commonest being schists and conglomerates which vary from acidic to strongly lime-rich. Up to c. 1600 m, the Pyrenean montane pine forest with *Pinus sylvestris* prevails, and from c. 1600 to 1800 m the Pyrenean *Pinus uncinata*-forest interspersed with *Rhododendron ferrugineum* scrub occurs. Above this zone, Pyrenean alpine grasslands and vegetation of rock faces prevail. In general, this part of the Spanish Pyrenees is dryer than the French part bordering in the north, where the humid Pyrenean fir-beech forests predominate as woodland vegetation.

Materials and Methods

Samples for all species listed have been collected by J. Vondrák, currently deposited in CBFS, or by the second author and deposited in JACA and the private herbarium J. Etayo. Microscopical examination of hand-made sections were examined in water (incl. all measurements), KOH and lactophenol cotton blue at a magnification of $\times 1000$. TLC was used to confirm the determination of *Rhizocarpon solediosum*. Information regarding the general occurrence of species in Spain was taken from LLIMONA & HLADUN (2001).

List of visited sites (see Fig. 1)

1. Jaca, Candanchú, slopes around village, alt. 1600–1700 m, 12.7.2002, J. Vondrák; 1570–1650 m, 27.6.2004, J. & M. Etayo.
2. Jaca, Candanchú, pine forest around pass “Puerto de Somport”, alt. c. 1650 m, 12.7.2002, J. Vondrák.
3. Jaca, Candanchú, valley of river “Río de Canal Roya” (left tributary to river Río Aragón), slopes around “Refugio de la Canal Roya”, alt. 1550–2000 m, 14.7.2002, J. Vondrák.
4. Jaca, Candanchú, valley of upper stream of “Río de Canal Roya” beneath lake “Ibón de Anayet”, alt. c. 2100 m, 15.7.2002, J. Vondrák.
5. Sabiñánigo, Sallent de Gállego, Formigal, slopes around village, alt. 1500 m, 14.7.2002, J. Vondrák.
6. Sabiñánigo, Sallent de Gállego, around town, alt. 1400–1500 m, 17.7.2002, J. Vondrák; walk to Mirador de S. Mamés, alt. 1400 m, 6.6.2004, J. Etayo.
7. Sabiñánigo, Sallent de Gállego, the saddle “Collado del Infierno”, alt. 2800 m, 17.7.2002, J. Vondrák.
8. Sabiñánigo, Baños de Panticosa, park in village centre, alt. 1650 m, 19.7.2002, J. Vondrák; *ibid.*, 6.6.2004, J. Etayo.
9. Sabiñánigo, Baños de Panticosa, around upper stream of “Barranco del Brazato”, alt. c. 2100 m, 20.7.2002, J. Vondrák.
10. Sabiñánigo, Baños de Panticosa, “Valle del Ara” beneath Mt Vignemale, around “La Baza”, alt. c. 2000 m, 21.7.2002, J. Vondrák.

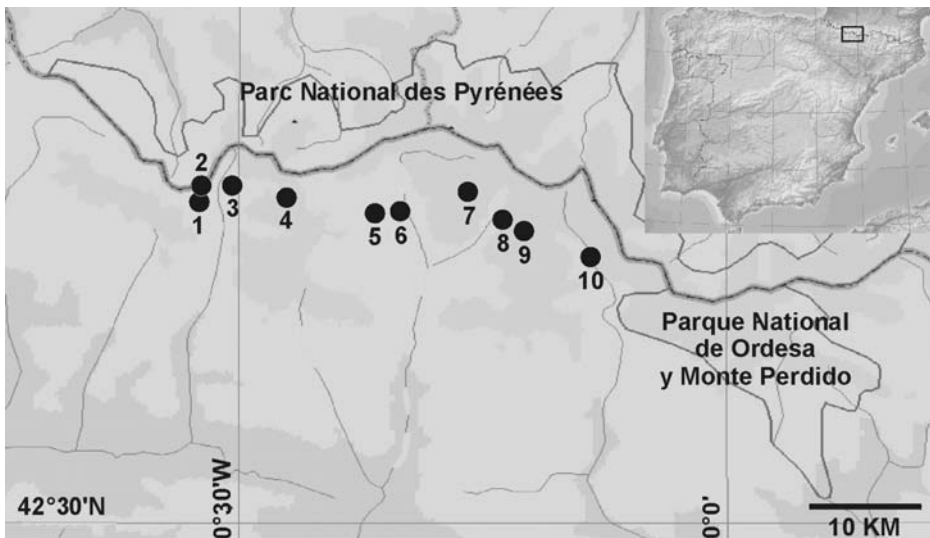


Fig 1: Location of the visited sites.

Species (those indicated by an asterisk are new to Spain)

1. Lichen-forming fungi

Acarospora cervina A.Massal.: 1, on calcareous rock (hb. Etayo 21810).

Acarospora fuscata (Schrad.) Th.Fr.: 6, on schist (CBFS 2945).

Acarospora peliscypha Th.Fr.: 10, on iron-rich weathered rock (CBFS 2576).

This species is characterized by its C+ red thallus, convex areoles and umbilicate apothecia. The most closely related species is *Acarospora bullata*, which has a clearly effigurate thallus. *A. peliscypha* has previously been recorded in Spain from the Sistema Central (SANCHO 1988).

Agonimia tristicula (Nyl.) Zahlbr.: 3, muscicolous on *Homalothecium sericeum* (CBFS 2572, 2684), conf. J. Halda.

The species is very common on several substrata, including other lichens, in the Pyrenees and is rarely without perithecia.

Other Huesca localities: Ordesa, senda cazadores hasta cascada del estrecho, fructificada en briofitos pleurocárpicos en caliza cercana al río, 1000–1450 m, 19.5.2002, J. Etayo 19239 (hb. Etayo), 19261 (JACA). Huesca: Broto, pueblo y cascada del Sorrosal, *Quercus*, 900 m, 19.5.2002, J. Etayo (o.c.). Huesca, Astún, 0,5 km antes de la estación de esquí, suelo musgoso ácido sobre arenisca, 1700 m, 8.8.2002, J. Etayo 19503 (JACA). Huesca, Gabardito, barranco Agüerri, caliza vertical, sobre otros líquenes, 1425 m, 7.7.2002, J. Etayo 19606 (herb. Etayo), 19612, 19615 (JACA). Huesca, Canfranc, camping de Canfranc, briofitos en areniscas de prados, 1400 m, 8.8.2002, J. Etayo 19643 (JACA). Huesca: Zuriza, Barcal de Linza, entre escuámulas de *P. lurida* en pared calcárea or. N, 1550–1780, 17.7.2003, J. Etayo 20491 (hb. Etayo). Huesca: Ibón de Estanés, Las Cabretas, fisuras calcáreas, 1800 m, 21.6.2003, J. Etayo 20685 (hb. Etayo). Huesca: ibón de Arriel Bajo, sobre *Dermatocarpon minutum* var. *complicatum* en bloques silíceos, 2180 m, 8.8.2003, J. A. Azpilicueta & J. Etayo 20900 (JACA). Huesca: garganta de Escuaín, interior, sobre *Mycobilimbia lurida*, 1040 m, 29.8.2003, J. Etayo 20944 & W. Sanders (JACA).

Anaptychia bryorum Poelt: 3, among bryophytes on lime-rich rock (CBFS 2779).

A rare species, previously recorded only once from the Iberian Peninsula (Montseny) by HLADUN et al. (1986, sub *A. stippea*).

Anaptychia ciliaris (L.) Körb.: 3, on conglomerate (CBFS 2578).

Aspicilia caesiocinerea agg.: 3, on schist, infected with *Rosellinula haplospora* (CBFS 2542).

Aspicilia contorta (Hoffm.) Kremp.: 5, on schist (hb. Etayo 21569).

Bilimbia sabuletorum (Schreb.) Arnold: 1, on lime-rich ground and on bryophytes, e.g. *Porella platyphylla* (CBFS 2675).

Bryoria fuscescens (Gyeln.) Brodo & D.Hawksw.: 3, on bark of *Pinus sylvestris* (CBFS 2692).

Buellia aethalea (Ach.) Th.Fr.: 6, on schist (CBFS 2943).

Caloplaca arenaria (Pers.) Müll.Arg.: 3, on conglomerate and schist (CBFS 2649, 2664); 5, on schist (JACA 21574).

This taxon is treated here in the modern sense (e.g. LAUNDON 1992, WIRTH 1995), unlike the earlier authors (e.g. WADE 1965) who used the name *C. arenaria* for the taxa *C. erythrocarpa* (Pers.) Zwackh and *C. teicholyta* (Ach.) J.Steiner. However, the real meaning of the name *Caloplaca arenaria* is unclear since the type of *Lichen arenarius* Pers. is missing in Persoon's herbarium (Thijsse, pers. comm.); therefore, this taxon needs neotypification.

Other Huesca localities: Huesca: ladera de subida a Góriz, calcarenita, 1990 m, 3.7.2003, J. Etayo 20771 & Gómez-Bolea (hb. Etayo). Huesca, Formigal, camino de los Sarrios, ladera S del Lapazuso, esquistos, 1925 m, 5.6.2004, J. Etayo 21574 (JACA).

Caloplaca arnoldii (Wedd.) Zahlbr. ex Ginzb.: 3, on calcareous rock (CBFS 2676).

Recorded only a few times in Spain (see LLIMONA & HLADUN 2001), probably because it was usually considered under *C. saxicola* (cf. CLAUZADE & ROUX 1985).

Caloplaca cerina (Hoffm.) Th.Fr. var. *cerina*: 8, on bark of *Acer pseudoplatanus*, *Aesculus hippocastanum*, and *Populus* sp. (CBFS 2548, 2660, JACA 21658, 21813, 21814).

Caloplaca cerina var. *muscorum* (A.Massal.) Jatta: 3, muscicolous on *Homalothecium*, *Orthotrichum*, and *Tortella* (CBFS 2612, 2690).

It differs from the similar *C. stillicidiorum* in its deep orange-red apothecial discs, which are not greyish pruinose. According to some authors (e.g. NIMIS 1993), the distinction of both taxa is not always clear. Other Huesca locality: Huesca: Ibón de Ranas, pared norte, musgos, 2125 m, 6.8.2003, J. A. Azpilicueta & J. Etayo 20790 (hb. Etayo).

Caloplaca citrina (Hoffm.) Th.Fr.: 3, on concrete (CBFS 2567).

Caloplaca crenulatella (Nyl.) H.Olivier: 3, on concrete (CBFS 2566).

Caloplaca granulosa (Müll.Arg.) Jatta: 6, on calcareous wall (JACA, hb. Etayo 21629).

Caloplaca holocarpa (Hoffm. ex Ach.) A.E.Wade: 8, on bark of *Populus* sp. (CBFS 2656).

Caloplaca hungarica H.Magn.: 6, on thin twig of *Pinus uncinata* (CBFS 2630).

Caloplaca inconexa (Nyl.) Zahlbr.: 1, on calcareous rock (hb. Etayo 21810).

Caloplaca isidiigera Vězda: 5, on schist (JACA 21579).

Caloplaca oxfordensis Hedr.: 6, on schist (CBFS 2942).

Syn.: *C. subpallida* H.Magn.

British authors (e.g. LAUNDON 1992) consider *C. oxfordensis* synonymous with *C. arenaria*. The relationship between the two taxa apparently requires further taxonomic investigation. The respective specimen is morphologically indistinguishable from the type material of *Caloplaca subpallida* (UPS: L-097780, isotype!).

Other Aragón localities: Zaragoza: Jaraba, km 11 en dirección a Ateca, esquistos, 800 m, 23.12.2002, J. Etayo 20283 (hb. Etayo). Teruel, Calamocha, alto del Carrascal, arenisca, 1090 m, 18.8.2004, J. Etayo & J. A. Azpilicueta 21883 (hb. Etayo).

Caloplaca saxicola (Hoffm.) Nordin: 6, on vertical face of lime-rich siliceous rock (CBFS 2927).

Caloplaca stillicidiorum (Vahl) Lyngé: 3, on plant debris, with *Polyblastia agraria* (CBFS 2776); 5, over bryophytes on schist (JACA 21585).

Caloplaca teicholyta (Ach.) J.Steiner: 3, on concrete (CBFS 2568).

Caloplaca tirolensis Zahlbr.: 3, over bryophytes with *Agonimia tristicula* (CBFS 2571); 5, over bryophytes on schist (JACA 21585).

C. tirolensis has been scarcely recorded in Spain, but is not rare on bryophytes in the Pyrenees.

Other Huesca localities: Huesca, Benasque, del hospital a La Besurta, c. 1 km, madera de *Pinus* cerca del agua, 1870 m, 21.8.2002, J. Etayo 19818 (herb. Etayo). Huesca: camino Góriz a Monte Perdido, humus, 2600–2800 m, 2.2.2003, J. Etayo 20729 & Gómez-Bolea (hb. Etayo). Huesca: valle de Llena Cantal, ibón de Llena Cantal, briofitos, 2450 m, 7.8.2003, J. A. Azpilicueta & J. Etayo 20889 (hb. Etayo). Huesca, Formigal, camino de Sarrios, ladera S del Lapazuso, briofitos en esquistos, 1925 m, 5.6.2004, J. Etayo 21585 (JACA). Huesca, El Portalet, peñas enfrente de ventas de El Portalet, humus, 1920 m, 5.6.2004, J. Etayo 21609 (hb. Etayo). Huesca, Candanchú, Tuca Blanca, briofitos, 2000–2080 m, 27.6.2004, J. & M. Etayo 21776 (JACA).

Candelariella aurella (Hoffm.) Zahlbr.: 3, on lime-rich conglomerate (CBFS 2689); 7, on calcareous rock, infected with *Muellerella lichenicola* (CBFS 2573).

Candelariella reflexa (Nyl.) Lettau: 3, on bark of *Abies alba* (CBFS 2774); 8, on bark of *Acer pseudoplatanus* (CBFS 2594).

Other Huesca localities: Huesca: Ordesa, senda cazadores hasta cascada del estrecho, rama de *Fagus*, 1000–1450 m, 19.5.2002, J. Etayo (hb. Etayo). Huesca: garganta de Escuaín, interior, *Buxus*, 1040 m, 29.8.2003, J. Etayo 20959 & W. Sanders (JACA). Huesca, Panticosa, paseo al mirador de Sta. María, *Quercus*, 1255 m, 6.6.2004, J. Etayo 21757 (JACA).

Candelariella subdeflexa (Nyl.) Lettau: 8, on bark of *Populus* sp. (CBFS 2657).

This species has been scarcely recorded in Spain (LLIMONA & HLADUN 2001).

Other Aragón locality: Huesca, Escuaín, pueblo y miradores, *Fraxinus* y *Sambucus*, 1200 m, 29.8.2003, J. Etayo & W. Sanders 20925 (hb. Etayo).

Candelariella vitellina (Hoffm.) Müll.Arg.: 3, on concrete and schist (CBFS 2555, 2569, 2665); 6, on vertical face of lime-rich siliceous rock (CBFS 2932).

Candelariella xanthostigma (Ach.) Lettau: 8, on bark of *Aesculus* and *Populus* (JACA 21658, 21814).

Catapyrenium cinereum (Pers.) Körb.: 3, on lime-rich soil (CBFS 2697, 2698); 9, on calcareous ground with *Placynthium nigrum* (CBFS 2642, 2643).

- Cetraria islandica* (L.) Ach.: 3, terricolous, on humus (CBFS 2683, 2934, 2935).
- Cladonia furcata* (Huds.) Schrad.: 3, terricolous, on humus (CBFS 2937).
- Collema auriforme* (With.) Coppins & J.R.Laundon: 6, on calcareous wall (hb. Etayo 21630).
- Collema subflaccidum* Degel.: 8, on bark of *Fraxinus* (JACA 21660).
- Collema undulatum* Flot.: 1, on calcareous rock (hb. Etayo 21811); 3, muscicolous, over *Schistidium* sp. growing on lime-rich rock (CBFS 2948).
- Dermatocarpon miniatum* (L.) W.Mann var. *complicatum* (Lightf.) Th.Fr.: 2, on shallow soil (CBFS 2780, sub *D. arnoldianum* Degel.), rev. S. Heidmarsson; 5, on schist (JACA 21566).
- Diploschistes scruposus* (Schreb.) Norman: 5, on schist (JACA 21576).
- Evernia divaricata* (L.) Ach.: 6, on thin twig of *Pinus uncinata* (CBFS 2629).
- Fulgensia bracteata* (Hoffm.) Räsänen: 1, on calcareous rock (JACA 21806).
- Fulgensia schistidii* (Anzi) Poelt: 3, muscicolous, over *Schistidium* sp. growing on lime-rich rock with *Collema undulatum* (CBFS 2947).
- Fuscopannaria leucophaea* (Vahl) P.M.Jørg.: 3, on weathered conglomerate (CBFS 2667); 6, on soil (CBFS 2950).
- Most records of this species in Spain are very old (cf. LLIMONA & HLADUN 2001) and probably incorrect. In Aragón, it was certainly known only from Panticosa (ETAYO 1990), and seems to be rare on shaded rocks in the Huesca-Pyrenees.
- Other Huesca locality: Huesca: barranco de aguas limpias, acceso a Resposuso desde Sallent, roca protegida por raíces de haya, 1600–1700 m, 28.8.2003, J.A. Azpilicueta & J. Etayo 20910 (hb. Etayo).
- Henrica ramulosa* de Lesd.: 5, on underhanging schist (GZU, hb. Etayo 21564).
- This species was only recorded in Spain by NAVARRO-ROSINÉS & HLADUN (1992).
- Hypogymnia farinacea* Zopf: 3, on bark of *Pinus sylvestris* (CBFS 2691).
- Lecania rabenhorstii* (Hepp) Arnold: 6, calcareous wall (JACA, hb. Etayo 21629).
- Lecania turicensis* (Hepp) Müll.Arg.: 6, on vertical face of lime-rich siliceous rock, infected with *Intralichen christiansenii* (CBFS 2930).
- Lecanora argopholis* (Ach.) Ach.: 3, on exposed conglomerate (CBFS 2553).
- Lecanora campestris* (Schaer.) Hue: 5, on schist (JACA 21584).
- Lecanora caesiosora* Poelt: 5, on schist (JACA 21587).
- Lecanora dispersa* (Pers.) Sommerf.: 3, on concrete (CBFS 2556, 2570); 6, on vertical face of lime-rich siliceous rock (CBFS 2931).
- Lecanora hagenii* (Ach.) Ach.: 8, on bark of *Populus* sp. (CBFS 2659).
- Lecanora muralis* (Schreb.) Rabenh.: 3, on siliceous rock (CBFS 2696); 5, on schist (JACA 21570).
- Lecanora polytropa* (Hoffm.) Rabenh. var. *alpigena* (Ach.) Rabenh.: 7, on schist (CBFS 2618, 2619).
- **Lecanora subaurea* Zahlbr.: 10, on iron-rich weathered rock (CBFS 2679).
- Lecanora subaurea* belongs to those *Lecanora* species with yellowish or yellow-green soralia. It differs from *L. epanora*, *L. handelii*, *L. reagens*, and *L. soralifera* in the soralia which arise on the margins of areoles and in the strong P+ red thallus reaction. It grows on metal-rich rocks, together with *Acarospora sinopica*, *Rhizocarpon ridescens*, etc.
- Other Huesca localities: Huesca, Eriste, cascada de Espigantosa, esquistos ferruginosos, 1575 m, 22.8.2002, J. Etayo 19558 (hb. Etayo). Huesca: Ibón de Gorgutes desde Forau de La Llana, esquistos ferruginosos, 2165 m, 21.8.2002, J. Etayo 19718 (herb. Etayo, JACA).
- Lecanora valesiaca* (Müll.Arg.) Stizenb.: 1, on calcareous rock (hb. Etayo 21805).
- This species has been rarely recorded from Spain (cf. LLIMONA & HLADUN 2001).
- Lecidea auriculata* Th.Fr.: 3, on conglomerate (CBFS 2653).
- Lecidea atrobrunnea* (Lam. & DC.) Schaer.: 4, on siliceous rock (CBFS 2796).
- Other Huesca Locality: Huesca: ibón de Arriel Bajo, bloques silíceo, 2180 m, 8.8.2003, J. A. Azpilicueta & J. Etayo 20906 (hb. Etayo).

- Lecidea promiscua* Nyl.: 5, on schist (hb. Etayo 21580).
- Lecidea silacea* Ach.: 10, on iron-rich weathered rock, with *Lecanora subaurea* (CBFS 2678).
Previously the species was only known with certainty in mountains of central and western Spain (SANCHO 1986, TERRÓN 1991).
- Lecidella carpathica* Körb.: 3, on conglomerate (CBFS 2652); 5, on schist (JACA 21573).
- Lecidella elaeochroma* (Ach.) M.Choisy: 8, on bark of *Acer pseudoplatanus* (CBFS 2550).
- Lecidella patavina* (A.Massal.) Knoph & Leuckert: 6, on vertical face of lime-rich siliceous rock, infected with *Intralichen christiansenii* (CBFS 2928, sub *L. inamoena*).
- Leptogium saturninum* (Dicks.) Nyl.: 8, on bark of *Acer pseudoplatanus* (CBFS 2681); *ibid.*, on bark of *Fraxinus* (JACA 21660).
Other Huesca localities: Huesca: Ordesa, senda cazadores hasta cascada del estrecho, *Abies*, 1000–1450 m, 19.5.2002, J. Etayo 19245 (JACA.). Huesca: Zuriza, de Plano de la Casa, dir. E a Barcal de Linza, *Fagus*, 1400 m, 17.5.2003, J. Etayo 20421 (JACA). Huesca: Zuriza, barranco de Gamueta, *Fagus*, 1350–1550 m, 31.5.2003, J. Etayo 20526 (JACA). Huesca: S. Juan de la Peña, camino del Llano de S. Indalencio a Botaya, *Q. faginea*, 1290 m, 1.5.2004, J. Etayo 21426 (JACA). Huesca: Panticosa, balneario, parque cercano al ibón, *Fraxinus*, 1650 m, 6.6.2004, J. Etayo 21660 (JACA).
- Leptogium schraderi* (Bernh.) Nyl.: 6, on calcareous wall (JACA, hb. Etayo 21169).
- Leptogium teretiunculum* (Wallr.) Arnold: 3, on plant debris growing with *Caloplaca stillicidiorum* (CBFS 3514).
In Aragón, previously only known on *Juniperus thurifera* from the mountains of Teruel (ATIENZA et al. 1992).
Other Aragón locality: Teruel: S^a de Albarracín, entre Albarracín y Tramacastilla, cruce de Royuela, sabinar, *J. thurifera*, 1350 m, 14.4.2004, J. Etayo 21332 & E. Ros (hb. Etayo, JACA).
- Lobothallia praeradiosa* (Nyl.) Hafellner: 5, on schist (JACA 21568, 21582).
- Lobothallia radiosa* (Hoffm.) Hafellner: 1, on calcareous rock (JACA 21808).
- Megaspora verrucosa* (Ach.) Hafellner & V.Wirth: 9, on plant debris (CBFS 2554).
- Melanelia exasperatula* (Nyl.) Essl.: 8, on bark of *Aesculus* (JACA 21659).
- Melanelia glabra* (Schaer.) Essl.: 6, on bark of *Acer pseudoplatanus* (CBFS 2685, sub *Parmelia glabra*); 8, on bark of *Aesculus* (JACA 21659).
- Melanelia stygia* (L.) Essl.: 9, on granitic rock (CBFS 3028, sub *Parmelia stygia*).
- Melanelia subargentifera* (Nyl.) Essl.: 8, on bark of *Acer pseudoplatanus* (CBFS 2593).
- Micarea bauschiana* (Körb.) V.Wirth & Vězda: 3, terricolous, on remains of bark (CBFS 2938).
- Mycobilimbia hypnorum* (Lib.) Kalb & Hafellner: 4, on calcareous soil and over mosses (CBFS 2992).
- Mycobilimbia lurida* (Ach.) Hafellner & Türk: 1, on calcareous rock (JACA 21806); 5, on schist (JACA 21588).
- Neofuscelia loxodes* (Nyl.) Essl.: 5, on schist (JACA 21586).
- Nephroma parile* (Ach.) Ach.: 3, on ground with *Cetraria islandica* and mosses *Polytrichum* sp. and *Racomitrium* sp. (CBFS 2682); 6, on dead trunk with mosses *Anomodon attenuatus* and *Orthotrichum* sp. (CBFS 2624).
- Parmeliella triptophylla* (Ach.) Müll.Arg.: 4, on plant debris over calcareous soil (CBFS 2775).
- Parmelina tiliacea* (Hoffm.) Hale: 3, on conglomerate and over bryophytes, e.g. *Orthotrichum* sp. (CBFS 2563, sub *Parmelia pastillifera*).
- Peltigera rufescens* (Weiss) Humb.: 5, on soil (JACA 21581); 6, on soil (JACA 21631).
- Peltigera venosa* (L.) Hoffm.: 2, on soil (CBFS 2787).
This species has been recorded from only seven localities in Aragón (MARTÍNEZ 1999). The second author found only a small thallus in one locality of Huesca: ladera de subida a Góriz, repisa protegida de suelo calcáreo, 1990 m, 3.7.2003, J. Etayo 20760 & A. Gómez-Bolea (JACA).
- Phaeophyscia endococcina* (Körb.) Moberg: 5, on schist (JACA 21582, 21585).

- Phaeophyscia nigricans* (Flörke) Moberg: 3, on lime-rich siliceous rock (CBFS 2673).
- Phaeophyscia orbicularis* (Neck.) Moberg: 8, on bark of *Acer pseudoplatanus*, infected with *Taeniolella phaeophysciae* (CBFS 2549).
- Physcia aipolia* (Humb.) Fürnr.: 8, on bark of *Acer pseudoplatanus* (CBFS 2552, 2592).
- Physcia caesia* (Hoffm.) Fürnr.: 5, on schist (JACA 21582).
- Physcia stellaris* (L.) Nyl. 8, on bark of *Acer pseudoplatanus* (CBFS 2788).
- Physconia muscigena* (Ach.) Poelt: 5, over silicicolous bryophytes (JACA 21567).
- Physconia perisidiosa* (Erichsen) Moberg: 8, on bark of *Acer pseudoplatanus* (CBFS 2591).
- **Polyblastia agraria* (Th.Fr.) A.Orange: 3, on plant debris growing with *Caloplaca stillicidiorum* (CBFS 3345).
This record is outstanding due its high altitude; however, it corresponds well with *P. agraria*: ascospores two per ascus, colourless, 50–80 × 20–25 µm, hyaline or becoming brownish when old; thallus inconspicuous, gelatinous reduced to a thin film over the substrate. *Agonimia vouauxii* differs in having a granulose to squamulose thallus and never brownish ascospores (SÉRUSIAUX et al. 1999). *Polyblastia helvetica* differs in larger, dark brown ascospores (SWINSCOW 1971).
Other Huesca locality: Huesca: Cerler, subida a Cerler, sendero Benasque-Cerler, sobre briofitos calcícolas junto a *Bacidia bagliettoana*, 1425 m, 20.8.2002, J. Etayo 19646 (hb. Etayo).
- Polychidium muscicola* (Sw.) Gray: 3, terricolous, on humus growing with *Psoroma hypnorum* (CBFS 4149); 5, on silicicolous bryophytes (hb. Etayo 21565).
- **Protoblastenia cyclospora* (Körb.) Poelt: 6, on vertical face of lime-rich siliceous rock, infected with *Intralichen christiansenii* (CBFS 2929).
Protoblastenia cyclospora and *P. geitleri* Zahlbr. differ from all other European species in having globose ascospores. *P. geitleri* is distinguished by its reddish to violet hymenium and hypothecium (POELT & VĚZDA 1977).
- Pseudephebe pubescens* (L.) M.Choisy: 9, on granite rock (CBFS 2584).
- Pseudevernia furfuracea* (L.) Zopf: 3, on bark of *Pinus sylvestris* (CBFS 2694).
- Psoroma hypnorum* (Vahl) Gray: 3, terricolous, on humus and remains of bark (CBFS 2933).
Very rare in the alpine belt in Aragón.
Other Aragón localities: Huesca: Hecho, ibón de Acherito, suelo ácido, 1875 m, 14.6.2003, J. Etayo 20632 (hb. Etayo). Zaragoza, Moncayo, peñas Circo S. Gaudioso, or. N, suelo ácido, 2100 m, 21.9.2003, J. Etayo 21103 (JACA).
- Rhizocarpon geminatum* Körb.: 3, on conglomerate, infected with *Endococcus perpusillus* (CBFS 2650).
- Rhizocarpon geographicum* (L.) DC.: 3, on conglomerate (CBFS 2654).
- **Rhizocarpon solediosum* Runemark: 6, on schist (CBFS 3890).
One of the two yellow solediate *Rhizocarpon* species known from Europe. The other species, *R. ride-scens* (Nyl.) Zahlbr., differs in its strongly convex areoles, which are a brighter yellow, and in its chemistry (POELT & VĚZDA 1977). The chemical substances known from *R. solediosum*, barbatic and psoromic acid, were confirmed by TLC. Superficially similar *Lecanora* species contain different substances.
- Rhizocarpon viridiatrum* (Wulfen) Körb.: 6, on schist (CBFS 2941).
Other Huesca locality: Huesca: Cerler, subida a Cerler, sendero Benasque-Cerler, sobre *Pertusaria* cf. *amarescens* en esquistos, 1425 m, 20.8.2002, J. Etayo 19657 (hb. Etayo).
- Rhizoplaca melanophthalma* (DC.) Leuckert & Poelt: 9, on granite rock, infected with *Cercidospora melanophthalmae* (CBFS 2545).
- Rinodina colobina* (Ach.) Th.Fr.: 8, on bark of *Populus* sp. (CBFS 2658).
R. colobina belongs to the *Rinodina* species with a grey epihymenium, containing the acetone-insoluble pigment Sedifolia-grey (nomenclature sensu MEYER & PRINTZEN 2000). It is further characterized by its *Pachysporaria* to *Mischoblastia* type of ascospores. Closely related species, *R. mayrhoferi* and *R. pityrea*, are easily distinguishable by their ascospores, which are Bicincta-type and Tunicata-

type, respectively (ROPIN & MAYRHOFER 1995). There are several Iberian records where it prefers Xanthorion communities on eutrophic bark (GIRALT 2001).

Other Huesca localities: Huesca: 2 km N of Ainsa, 600 m, on *Quercus ilex*, 6.8.1992, P. van den Boom (hb. van den Boom 13592, BCC-11949). Huesca, foz de Biniés, chopera en la entrada, *Populus nigra*, 700 m, 15.5.2004, J. Etayo (o.c.). Huesca, Panticosa, balneario, parque cercano al ibón, *Populus*, 1650 m, 6.6.2004, J. Etayo 21813 (JACA).

Rinodina milvina (Wahlenb.) Th.Fr.: 5, on schist (JACA 21571).

Scoliciosporum chlorococcum (Stenh.) Vězda: 6, on thin twig of *Pinus uncinata* (CBFS 2631).

Scoliciosporum umbrinum (Ach.) Arnold: 6, on schist (CBFS 2944).

Solorina saccata (Nyl.) Nyl.: 2, on ground with moss *Ctenidium molluscum*, infected with *Dacampia engeliana* (CBFS 2645).

Sporastatia testudinea (Ach.) A.Massal.: 4, on siliceous rock with *Rhizocarpon geographicum* and *Umbilicaria proboscidea* (CBFS 2616).

Squamarina gypsacea (Sm.) Poelt: 1, on calcareous rock (hb. Etayo 21807).

Synalissa symphorea (Ach.) Nyl.: 1, on calcareous rock (hb. Etayo 21806).

Tephromela armeniaca (DC.) Hertel & Rambold: 4, on siliceous rock growing with *Sporastatia testudinea* (CBFS 3027).

Toninia diffracta (A.Massal.) Zahlbr.: 1, on calcareous rock (hb. Etayo 21807).

Umbilicaria deusta (L.) Baumg.: 3, on siliceous rock (CBFS 2595).

Umbilicaria proboscidea (L.) Schrad.: 4, on siliceous rock (CBFS 2617).

Verrucaria fuscula Nyl.: 1, on calcareous rock (JACA 21809).

Xanthoparmelia verrucigera (Nyl.) Hale: 5, on schist (hb. Etayo 21572, 21586).

Xanthoria contortuplicata (Ach.) Boistel: 9, on shallow calcareous soil (CBFS 2778).

Recently transferred to the genus *Seirophora* Poelt (FRÖDÉN & LASSEN 2004). The species is very rare in the Pyrenees.

Xanthoria elegans (Link) Th.Fr.: 1, on lime-rich conglomerates (CBFS 2547, JACA 21808); 3, on lime-rich rock (CBFS 2672).

Xanthoria fulva (Hoffm.) Poelt & Petutschnig: 8, on bark of *Populus* (JACA 21813).

Xanthoria soreliata (Vain.) Poelt: 3, on lime-rich conglomerate (CBFS 2688).

Other Huesca localities: Huesca: Benasque, La Besurta, roquedos verticales bajo pinar, calizas subverticales, 1940 m, 21.7.2002, J. Etayo 19827, 19828 (herb. Etayo). Huesca: valle de Lena Cantal, ibón de Lena Cantal, bloque silíceo, 2450 m, 7.8.2003, J. A. Azpilicueta & J. Etayo 20877 (hb. Etayo). Ibid., 20867 (JACA). Huesca, Formigal, camino de Sarrios, ladera S del Lapazuso, esquistos, 1925 m, 5.6.2004, J. Etayo 21579 (JACA). Huesca, El Portalet, peñas enfrente de ventas de El Portalet, peñasco silíceo, 1920 m, 5.6.2004, J. Etayo 21590 (hb. Etayo). Huesca, Candanchú, camino a Tuca Blanca, areniscas y musgos adyacentes, 1900, 27.6.2004, J. Etayo.

2. Lichenicolous fungi

Carbonea vitellinaria (Nyl.) Hertel: 3, parasitic on *Candelariella vitellina* growing on schist (CBFS 2541).

Cercidospora epipolytropa (Mudd) Arnold: 5, parasitic on *Lecanora polytropa* growing on schist (hb. Etayo 21575).

Cercidospora melanophthalmae Nav.-Ros., Calat. & Hafellner, nom. nud.: 9, parasitic on *Rhizoplaca melanophthalma* (CBFS 2546).

This species was previously recorded under the name *C. epipolytropa* in NAVARRO-ROSINÉS et al. (2004).

Dacampia engeliana (Saut.) A.Massal.: 2, parasitic on thallus of *Solorina saccata* (CBFS 2646).

This lichenicolous fungus seems to be very rare in the Pyrenees. The related species *Dacampia hookeri* is more common in alpine and subalpine belts of the Pyrenees.

Endococcus perpusillus Nyl.: 3, parasitic on thallus of *Rhizocarpon geminatum* (CBFS 2651).

Intralichen christiansenii (D.Hawksw.) D.Hawksw. & M.S.Cole: 6, parasitic in apothecia of *Lecania turicensis* (CBFS 2936).

Intralichen lichenicola (M.S.Christ. & D.Hawksw.) D.Hawksw. & M.S.Cole: 3; 6, parasitic in apothecia of *Candelariella vitellina* (CBFS 2557, 4151); 8, parasitic in apothecia of *C. subdeflexa* (CBFS 4150).

This species is characterized by its multicellular conidia arising as elongated chains of cells (HAWKSWORTH & COLE 2002). It is clearly different from *I. christiansenii* with 1-septate conidia.

Other Huesca localities: Huesca, Astún, 0,5 km antes de la estación de esquí, sobre el disco de *C. vitellina* en arenisca, 1700 m, 8.8.2002, J. Etayo 19542 (JACA). Huesca, Escuaín, pueblo y miradores, en el disco de *C. vitellina* en rama de *Acer*, 1200 m, 29.8.2003, J. Etayo & W. Sanders 20932 (JACA). Huesca: Monegros, lomas arcillosas entre Chalamera y Ontiñena, sobre *Candelariella aurella*, *Caloplaca lactea* y *Caloplaca decipiens* en caliza, 200 m, 19.3.2004, J. & A. Etayo 21550 (hb. Etayo y JACA). Huesca, El Portalet, peñas enfrente de ventas de El Portalet, sobre *C. vitellina*, 1920 m, 5.6.2004, J. Etayo 21621 (JACA).

Lichenocodium erodens M.S.Christ. & D.Hawksw.: 5, in apothecia of *Lecanora muralis* (hb. Etayo 21577); 6, parasitic on *Neofuscelia* sp. (CBFS 2946).

Muellerella lichenicola (Sommerf.) D.Hawksw.: 7, parasitic on thallus of *Candelariella aurella* (CBFS 2574).

Muellerella pygmaea (Körb.) D.Hawksw. var. ***athalina*** (Müll.Arg.) Triebel: 3, parasitic on thallus of saxicolous *Lecanora* sp. (CBFS 2655); 5, on thallus of *Lecidea* cf. *diducens* and *Lecidea* sp. (hb. Etayo 21578, 21580, 21588).

Myxophora leptogiophila (G.Winter) Nik.Hoffm. & Hafellner: 6, on *Collema auriforme* on calcareous wall (hb. Etayo 21630).

Rosellinula haplospora (Th.Fr.) R.Sant.: 3, parasitic on *Aspicilia caesiocinerea* (CBFS 2543).

Note: This species has been rarely recorded in the Iberian Peninsula (cf. LLIMONA & HLADUN 2001).

Taeniolella phaeophysciae D.Hawksw.: 8, parasitic on *Phaeophyscia orbicularis* (CBFS 2551).

In Aragón, previous known only from La Retuerta (Zaragoza) on *Hyperphyscia adglutinata* (ETAYO & BLASCO-ZUMETA 1992).

Other Huesca localities: Huesca: valle de Pineta, refugio, sobre *Physconia distorta*, 1270 m, 18.5.2002, J. Etayo 19301 (hb. Etayo). Huesca, Bolea, sobre *Phaeophyscia orbicularis*, 625–700 m, 15, 16.6.2002, J. Etayo 19397 (hb. Etayo).

Acknowledgements

We are most grateful to Helmut Mayrhofer (Graz, A) for valuable comments on the manuscript and for providing the German summary, Starri Heidmarsson (Akureyri, Iceland) and Josef Halda (Rychnov n. Kněžnou, CZ) for revision of selected samples, Štěpánka Bayerová-Slavíková (Průhonice, CZ) for performing the TLC, Pieter van den Boom (Son, NL) for providing his sample of *Rinodina colobina* to be published here, and Mark Seaward (Bradford, UK) and Marek Stibal (Bristol, UK) for linguistic corrections. The second author is grateful to Gobierno de Aragón for a grant to the “Realización de un estudio de los líquenes de Aragón”.

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Manuscript accepted: 12 December 2006.

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