

Aphyllporaceous wood-inhabiting fungi on *Arbutus unedo* in Italy

SERGIO PÉREZ GORJÓN¹, ANNAROSA BERNICCHIA²
& TATIANA BAPTISTA GIBERTONI³

¹spgorjon@usal.es ²abernicc@agrsci.unibo.it ³tbgibertoni@hotmail.com

¹*Departamento de Botánica & Centro Hispano-Luso de Investigaciones Agrarias
Universidad de Salamanca, Ldo. Méndez Nieto s/n, 37007 Salamanca Spain*

²*Dipartimento di Scienze e Tecnologie Agroambientali, Patologia Vegetale
Università degli Studi di Bologna, Via Fanin 42, Bologna 40127 Italy*

³*Departamento de Micologia, Centro de Ciências Biológicas
Universidade Federal de Pernambuco, Av. Nelson Chaves s/n, 50670-420
Recife Pernambuco Brasil*

Abstract—Fifty-two species representing 32 aphyllporaceous genera growing on *Arbutus unedo* in Italy are reported. *Phlebia longicystidiata* is reported as new from Italy while *Antrodia sandaliae* has previously been described as a new species associated with *A. unedo*.

Key words—lignicolous fungi, diversity, Mediterranean, *Ericaceae*

Introduction

Italy, except for the north and mountainous areas, has a typically Mediterranean climate characterized by cold, rainy winters and dry summers that supports a particular vegetation type, called a sclerophyll forest, composed of trees and shrubs with hard leaves that are very resistant to changes in temperature and humidity. One of the most representative sclerophyllous plants is *Arbutus unedo* L. (*Ericaceae*), a 5-10 m tall evergreen shrub or tree with a variable trunk diameter that may be found growing on rocky slopes and (generally) acid soils. It often forms maquis, isolated or mixed with other plants, occasionally forming dense woods. *Arbutus unedo* is of great importance for the dynamics of vegetation because it grows rapidly after fires. The mild temperature and high environmental dampness are very important features that allow the development of large number of fungi. *Arbutus* woods, however, have not been well investigated from the mycological point of view and only scattered information can be found in literature. The distribution *Arbutus unedo* is limited to temperate zones, mainly in the Mediterranean region

that includes Turkey and northern Africa (Figure 1). In Italy, *A. unedo* occurs naturally at the 500 m.a.s.l. elevation, although it may also be found until 1200 meters in some southern areas. The species is distributed throughout the islands and along the coastal zone, except for the North Adriatic area.

Materials and methods

During the last 25 years, fungi have been collected in the sites listed below. Samples were taken to the laboratory for microscopical examination and identifications followed Eriksson & Ryvarden (1973, 1975, 1976), Eriksson et al. (1978, 1981, 1984), Burdsall (1985), Hjortstam et al. (1988), Ryvarden & Gilbertson (1993, 1994), Bernicchia (2005), and Miettinen et al. (2006). All specimens are kept in Herbarium HUBO. The list is partially referred to Onofri (2005) and the nomenclature to Donk (1984), Parmasto (1997), Hjortstam (1998), Kirk et al. (2001), and CBS (2006).

Collection localities (see also Figure 2): Collections were taken from the following sites—(1) Lazio, Latina, National Park of Circeo; (2) Lazio, Roma, San Martino al Cimino; (3) Sardegna, Cagliari, Campu Omu; (4) Sardegna, Cagliari, Capoterra; (5) Sardegna, Cagliari, Collinas; (6) Sardegna, Cagliari, Gentilis; (7) Sardegna, Cagliari, Is Antiogus; (8) Sardegna, Cagliari, Sibiri; (9) Sardegna, Nuoro, Montarbu Forest; (10) Sardegna, Nuoro, Piana di Urzulei; (11) Sardegna, Nuoro, Pinery Arzana; (12) Sardegna, Nuoro, Supramonte di Orgosolo; (13) Sardegna, Oristano, Arci Mountain, (14) Sardegna, Oristano, Arci Mountain, Pau; (15) Sardegna, Oristano, Sossu Mountain; (16) Sardegna, Sassari, Badde Longa; (17) Toscana, Grosseto, Amiata Mountain; (18) Toscana, Livorno, Colognole; (19) Toscana, Livorno, Il Giardino Forest; (20) Toscana, Livorno, Bibbona Forest; (21) Toscana, Siena, Santa Agnese *Cupressus* Forest.

Results

In this survey, 52 species of aphyllporaceous wood-inhabiting fungi representing 32 different genera were identified as occurring on *Arbutus unedo*. Species are listed in alphabetic order; each site number (given in brackets) is followed by collection date, habitat, and herbarium number. Additional notes on distribution or abundance are given for some species. *Phlebia longicystidiata* is reported as a new record from Italy. Particularly rare or infrequent species are *Aleurodiscus cerussatus*, *Antrodia sandaliae*, *Intextomyces contiguus*, *Junghuhnia semisupiniformis*, *Mycoaciella bispora*, *Oligoporus simanii*, *Peniophora pilatiana*, *Phellinus rosmarini* and *Scytinostromella heterogenea*.



Figure 1. Map of approximate distribution of *Arbutus unedo* in the Mediterranean area

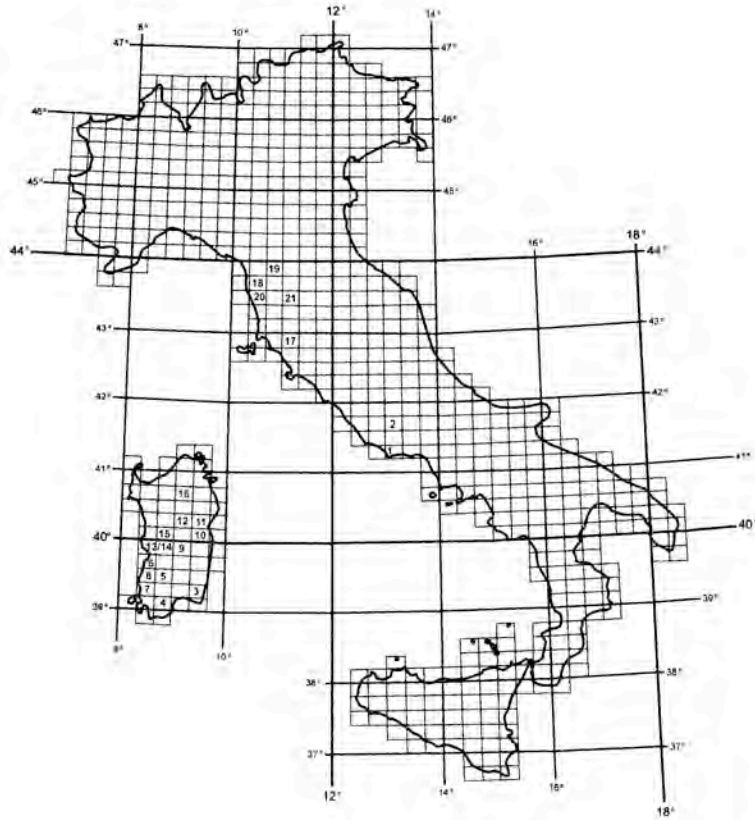


Figure 2. Map of Italy with the collecting sites. Scale 1:50000.

Checklist of collected Aphyllophorales

- Aleurodiscus cerussatus* (Bres.) Höhn. & Litsch.
(9), 04.12.2000, maquis, coll. 7460. A very rare species collected once more in Puglia.
- Amaurodon viridis* (Alb. & Schwein.) J. Schröt.
(9), 30.11.2000, maquis, coll. 7464. A rare species in Italy, previously recorded for Lazio and Sardegna, but never on *Arbutus*.
- Antrodia albida* (Fr.) Donk
(7), 18.11.1983, maquis, coll. 2122; (10), 22.11.1999, maquis, coll. 7295, 7327; (18), 12.11.2002, evergreen oak forest, coll. 7653. A common species in south Europe, sporadically distributed in the temperate zone.
- Antrodia sandaliae* Bernicchia & Ryvarden
(9), 23.11.1999, 24.11.1999, 18.12.1999, 30.11.2000, 04.12.2000, 29.11.2003, maquis, coll. 7339, 7337, 7340, 7352, 7486, 7488, 7350, 7351, 7348, 7513, 7803, 7804, 7784. It has been found only in Montarbu forest at 950 m growing on branches of *Arbutus*. For a detailed description see Bernicchia & Ryvarden (2001).
- Antrodiella leucoxantha* (Bres.) Miettinen & Niemelä
(18), 12.11.2002, maquis, coll. 7744. A rare species in Italy, collected only in some countries of southern Europe, more frequent on *Leguminosae* shrubs and *Quercus*.
- Antrodiella romellii* (Donk) Niemelä
(9), 29.11.2003, maquis, coll. 7798. Widespread in north Europe but sporadic in Italy.
- Byssocorticium atrovirens* (Fr.) Bondartsev & Singer ex Singer
(18), 12.11.2002, evergreen oak forest, coll. 7640.
- Ceratobasidium cornigerum* (Bourdot) D.P. Rogers
(5), 06.12.1983, maquis, coll. 4129. It is a rare species on both conifers and deciduous trees, although it seems to be more common in the latter.
- Dacryobolus sudans* (Alb. & Schwein.) Fr.
(20), 07.12.1985, maquis, coll. 4388. A rare species restricted to the coniferous forests, growing especially on *Pinus*.
- Dendrothele griseocana* (Bres.) Bourdot & Galzin
(20), 07.12.1985, maquis, coll. 4400. In Italy it was also collected on *Erica* and *Juniperus*.
- Dendrothele macrospora* (Bres.) P.A. Lemke
(20), 07.12.1985, maquis, coll. 4399. A typical species of Mediterranean maquis, it has also been found in Italy on *Pistacia*, *Erica*, *Cistus*, *Artemisia*, *Helianthemum* and *Calicotome*.
- Hyphoderma praetermissum* (P. Karst.) J. Erikss. & Å. Strid
(6), 15.11.1983, maquis, coll. 3818. A common species, in Italy it has been found in different biotopes, on several substrata, i.e. *Quercus*, *Taxus*, *Pinus*, *Juniperus*, *Eucalyptus*, *Picea*, *Abies*, *Fagus*, *Populus*, *Rubus*, *Cedrus*, *Clematis*, *Acer* and *Helichrysum*.

- Hyphodontia arguta* (Fr.) J. Erikss.
(21), 20.11.1996, mixed forest, coll. 6724. As well as the other *Hyphodontia* species reported in this paper, it is common in Italy and collected on several substrata of both hardwoods and conifers.
- Hyphodontia crustosa* (Pers.) J. Erikss.
(20), 07.12.1985, maquis, coll. 4352; (11), 05.11.1997, maquis, coll. 7012.
- Hyphodontia sambuci* (Pers.) J. Erikss.
(13), 10.12.1982, mixed forest, coll. 1334; (1), 19.10.1984, mixed forest, coll. 3048.
- Hypochnicium lundellii* (Bourdot) J. Erikss.
(6), 06.11.1985, maquis, coll. 3866. It is a rare species in Italy.
- Intextomyces contiguus* (P. Karst) J. Erikss. & Ryvarde
(9), 04.12.2000, maquis, coll. 7477. Collected in Calabria on *Erica* and in Sardegna on *Arbutus*.
- Junghuhnia nitida* (Pers.) Ryvarde
(14), 05.12.1996, mixed forest, coll. 6850; (18), 12.11.2002, evergreen oak forest, coll. 7654; (9), 29.11.2003, maquis, coll. 7874.
- Junghuhnia semisupiniformis* (Murrill) Ryvarde
(9), 30.11.2000, maquis, coll. 7364, 7365, 7367, 29.11.2003, maquis, coll. 7793, 7794, 7795. It is a very rare species in the world, recorded only from Mexico, France, Germany, and from Italy, in Bosco della Mesola in Ferrara and in the forest of Montarbu in Sardegna. The substratum of the type species is unknown, but in Italy it has been collected on *Fraxinus* and *Arbutus*.
- Laeticorticium polygonioides* (P. Karst.) Donk
(11), 05.11.1997, maquis, coll. 7010; (9), 23.11.1999, maquis, coll. 7383.
- Litschauerella clematidis* (Bourdot & Galzin) J. Erikss. & Ryvarde
(6), 06.11.1985, maquis, coll. 3875.
- Mycocaciella bispora* (Stalpers) J. Erikss. & Ryvarde
(9), 30.11.2000, maquis, coll. 7371, 04.12.2000, maquis, coll. 7368.
A rare species in Italy.
- Oligoporus balsameus* (Peck) Gilb. & Ryvarde
(14), 05.12.1996, maquis, coll. 7116. This species is widely distributed in northern and central Europe, but in Italy it is considered a rare species.
- Oligoporus leucomallellus* (Murrill) Gilb. & Ryvarde
(9), 29.11.2003, maquis, coll. 7904. It grows preferably on dead conifers and very rarely in hardwoods. Frequent in Europe, it has a scattered distribution in Italy.
- Oligoporus simanii* (Pilát) Bernicchia
(12), 05.11.1986, mixed forest, coll. 4790. A very rare species in Italy.
- Oligoporus subcaesius* (A. David) Ryvarde & Gilb.
(9), 29.11.2003, maquis, coll. 7791. It is a species frequent in Italy and collected on hardwoods.

- Peniophora lycii* (Pers.) Höhn. & Litsch.
(20), 30.10.1982, maquis, coll. 1070. A common species in Italy, collected on dead stems of deciduous trees.
- Peniophora meridionalis* Boidin
(20), 07.12.1985, maquis, coll. 4354. A typical Mediterranean species recorded from many localities of Italy on different substrata.
- Peniophora pilatiana* Pouzar & Svr_ek
(20), 07.12.1985, maquis, coll. 4360. A rare species, reported only from this locality in Italy.
- Peniophora quercina* (Pers.) Cooke
(6), 15.11.1983, mixed forest, coll. 2037; (21), 28.01.1999, maquis, coll. 7445. A common species in the hardwood forest, rare on other communities.
- Peniophora rufomarginata* (Pers.) Bourdot & Galzin
(10), 22.11.1999, maquis, coll. 7331. Previously known for growing on branches of *Tilia*, it has been collected in Italy on *Quercus*, *Populus*, *Tilia* and *Arbutus*.
- Peniophora versicolor* (Bres.) Sacc. & P. Syd.
(19), 27.10.1982, maquis, coll. 982; (13), 17.11.1983, mixed forest, coll. 2059; (7), 18.11.1983, mixed forest, coll. 2132; (14), 05.12.1996, maquis, coll. 7018. A typical Mediterranean species that grows on different substrats.
- Perenniporia ochroleuca* (Berk.) Ryvarden
(13), 10.11.1982, mixed forest, coll. 1520; (6), 06.11.1985, mixed forest, coll. 3873; (18), 12.11.2002, evergreen oak forest, coll. 7644. It is a species with a Mediterranean distribution.
- Phanerochaete martelliana* (Bres.) J. Erikss. & Ryvarden
(3), 10.11.1982, mixed forest, coll. 1694; (6), 15.11.1983, mixed forest, coll. 2048; (8), 28.12.1983, mixed forest, coll. 2383. It is a Mediterranean species that grows in Italy on *Clematis*, *Quercus*, *Cistus*, *Juniperus*, *Rubus*, *Erica* and *Arbutus*.
- Phellinus contiguus* (Pers.) Pat.
(12), 05.11.1986, mixed forest, coll. 4779. A termophilous and frequent species in Italy.
- Phellinus punctatus* (Fr.) Pilát
(7), 18.11.1983, maquis, coll. 2131. A cosmopolitan species widely distributed and frequent in Italy on hardwoods.
- Phellinus robustus* (P. Karst.) Bourdot & Galzin
(16), 02.11.1990, maquis, coll. 5293. Not very frequent in Italy. It is a cosmopolitan species reported for several European countries though its distribution is not really well known because it has been confused with other close species like *Phellinus punctatus* and *Phellinus pseudopunctatus* A. David, Dequatre & Fiasson.
- Phellinus rosmarini* Bernicchia
(21), 20.11.1996, mixed forest, coll. 6609, 28.01.1999, maquis, coll. 7450, 7451. Known only from Italy and southern France growing on

- the base of different shrubs, i.e. *Rosmarinus*, *Rhamnus*, *Cistus*, *Crataegus*, *Ostrya*, *Pistacia*, *Erica* and *Arbutus*.
- Phellinus torulosus* (Pers.) Bourdot & Galzin
(13), 10.12.1982, mixed forest, coll. 1314 ; (4), 10.01.1984, mixed forest, coll. 2320. Widespread in termophilous Europe with southern distribution, it is a common species in Italy recorded on a wide range of hardwoods.
- Phlebia longicystidiata* (Litsch.) Hjortstam & Ryvarden
(18), 12.11.2002, evergreen oak forest, coll. 7667. A new species for Italy. A very rare species collected in Finland, Norway and Austria on decorticated coniferous wood.
- Phlebiopsis ravenelii* (Cooke) Hjortstam
(9), 23.11.1999, maquis, coll. 7403, 30.11.2000, maquis, coll. 7482.
- Polyporus brumalis* (Pers.) Fr.
(6), 10.11.1983, mixed forest, coll. 2687. A cosmopolitan species common in Europe, including Italy. It grows on branches or fallen trunks of numerous hardwoods.
- Polyporus corylinus* Mauri
(17), 15.09.1982, coll. 1801; (2), 29.04.1995, mixed forest, coll. 6763. A species distributed in the Mediterranean area and north Africa, it grows on dead or burnt branches of *Corylus*, *Castanea*, *Cytisus*, *Ulmus*, *Quercus* and *Arbutus*.
- Polyporus melanopus* (Pers.) Fr.
(15), 12.11.1983, maquis, coll. 1888. Widely distributed in Europe, common in Italy though not very frequent.
- Radulomyces rickii* (Bres.) M.P. Christ.
(18), 12.11.2002, evergreen oak forest, coll. 7669. Uncommon species in Italy.
- Scytinostromella heterogenea* (Bourdot & Galzin) Parmasto
(9), 29.11.2003, maquis, coll. 7802. It is a very rare species, collected only in Sardegna.
- Skeletocutis nivea* (Jungh.) Jean Keller
(18), 12.11.2002, evergreen oak forest, coll. 7645. It is a common species with wide distribution in Europe and frequent in Italy.
- Skeletocutis percandida* (Malençon & Bertault) Jean Keller
(6), 15.11.1983, mixed forest, coll. 2039, 06.11.1985, maquis, coll. 3876. It is a Mediterranean species and common in Italy.
- Stereum reflexulum* D.A. Reid
(18), 12.10.2002, maquis, coll. 7742. It is a Mediterranean species that grows on *Erica*, *Myrtus*, *Quercus*, *Cistus*, *Artemisia* and *Arbutus*.
- Tubulicium vermiferum* (Bourdot) Oberw. ex Jülich
(20), 07.12.1985, maquis, coll. 4373, 4396.
- Tulasnella violea* (Quél.) Bourdot & Galzin
(6), 15.11.1983, mixed forest, coll. 2040.
- Xenasmatella vaga* (Fr.) Stalpers
(12), 05.11.1986, mixed forest, coll. 4761. A very common species in Europe known from both deciduous and coniferous substrata.

Conclusions

From an ecological point of view, the *Arbutus* maquis fulfil a series of suitable conditions for the development of lignicolous fungi and support high fungal diversity. Although many of the aphyllorphoraceous wood-inhabiting fungi listed above may also be found growing on conifers and other deciduous trees, at least one recently described species, *Antrodia sandaliae*, is expected to be found exclusively on *Arbutus unedo*, which makes this substrate worthwhile for mycological surveys.

Acknowledgements

We would like to thank Prof. Giuseppe Venturella and Dr. Ireneia Melo for critically reviewing the manuscript. The first author is supported by a research grant co-financed by the *European Social Fund* and the *Junta de Castilla y León* (Spain).

Literature Cited

- Bernicchia A. 2005. *Polyporaceae* s.l. Fungi Europei, 10. Ed. Candusso. Alassio. Italy.
- Bernicchia A, Ryvarden L. 2001. A new *Antrodia* species (Corticiaceae, Basidiomycetes) from Italy. *Mycotaxon* 79: 57-66.
- Burdsall HH. 1985. A contribution to the taxonomy of the genus *Phanerochaete* (Corticiaceae, Aphyllorphorales). *Mycol. Mem. No. 10*, Cramer, Germany.
- CBS. 2006. *Aphyllorphorales* database. www.cbs.knaw.nl/databases/index.htm.
- Donk MA. 1984. Check list of European polypores. North. Holland Publ. Comp. Amsterdam. The Netherlands.
- Eriksson J, Ryvarden L. 1973-1975-1976. The *Corticiaceae* of North Europe. Vols. 2-3-4. Fungiflora, Oslo, Norway.
- Eriksson J, Hjortstam K, Ryvarden L. 1978-1981-1984. The *Corticiaceae* of North Europe. Vols. 5-6-7. Fungiflora, Oslo, Norway.
- Hjortstam K. 1998. A checklist to genera and species of corticioid fungi (*Basidiomycotina*, *Aphyllorphorales*). *Windahlia* 23: 1-54.
- Hjortstam K, Larsson K, Ryvarden L. 1988. The *Corticiaceae* of North Europe. Vol. 8. Fungiflora, Oslo, Norway.
- Kirk PM, Cannon PF, David JC, Stalpers JA. 2001. *Ainsworth & Bisby's Dictionary of the Fungi*. 9th edition. CABI Publishing, Oxon, U.K.
- Miettinen O, Niemelä T, Spirin W. 2006. Northern *Antrodiella* species: the identity of *A. semisupina*, and type studies of related taxa. *Mycotaxon* 96: 336-364.
- Onofri, S. (coord.). 2005. Checklist of Italian fungi. Carlo Delfino editore.
- Parmasto E. 1997. CORTBASE – a nomenclatural taxa base of corticioid fungi (Hymenomycetes). *Mycotaxon* 61: 467-471.
- Ryvarden L, Gilbertson, RL. 1993-1994. *European Polypores*. Vols. 1-2. Fungiflora, Oslo, Norway.