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## Contribution to Mediterranean lichen flora. New or interesting epiphytic species from Morocco

### Abstract

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Forty-three lichen *taxa* from Morocco are discussed. At least, five of them are new reports to both Rif and Central Atlas; three are new to NW Central Region, five to Gran Atlas and six to Anti Atlas; seventeen are new reports to the all country. Notes on the distribution and the ecology of the species are given, paying attention to their behaviour in the Mediterranean area.

### Introduction

Making out of a Mediterranean lichen flora is the first step to understand ecological and phytogeographical traits concerning lichens which occur in this region.

The lichen biodiversity in the Mediterranean area is a question which was put forward since VI OPTIMA Symposium (1989). Also thanks to the project carried out to arrange a Med-Checklist, the contributions dealing with national floras, taxonomy, ecology and chorology allowed to propose new distributional ranges and phytoclimatic hypotheses (among them: Lumbsch & Vězda, 1992; Christensen, 1994; Nimis, 1996, 2000; Fos, 1998; Nimis & John, 1998; Tretiach & Hafellner, 1998; Nimis & Tretiach, 1999).

The main aim of this work is to contribute to the exploration of the Mediterranean area (*sensu* Nimis, 1996). From this point of view, Morocco is a very interesting country because of its five Mediterranean climates: *saharien*, *aride*, *semi-aride*, *subhumide*, *humide* (Emberger, 1939), and its altitudinal range: from sea level to 4.167 m (Jbel Toubkal, Gran Atlas).

At present, 1100 infrageneric *taxa* are known for Morocco, most of them thanks to R. G. Werner's lifetime work (Egea, 1996).

Epiphytic lichen flora of this country was recently investigated during 5 field trips in 1993 and from 1997 to 2001. In this paper, the most interesting *taxa* are reported. Among them, five are new to both Rif and Central Atlas, three to NW Central Region, five to Gran Atlas and six to Anti Atlas; finally, seventeen are new to the all country.

### Survey area

The artificial subdivision of Morocco is based on 9 biogeographical subregions (Egea, 1996). Epiphytic lichens were collected in 13 sites (Fig. 1) of five subregions: Rif, NW Central Region, Central Atlas, Gran Atlas and Anti Atlas.

**Rif.** 1) Jbel Dedokh, W of Ketama, on *Ilex aquifolium*, 1.600 m, 3/1/01; 2) Zinat, S of Tetouan, on *Tetraclinis articulata*, 200 m, 2/1/01; 3) between Bab-Berred and Bab-Besen, on *Quercus suber* and *Quercus faginea*, 1.300 m, 3/1/01; leg. S. Ravera.

**NW Central Region.** 4) Kénitra, N of Rabat, Forest of Mamora, on *Q. suber*, 100 m, 28/12/97, leg. S. Ravera.

**Central Atlas.** 5) 7 km N of Azrou, on *Quercus rotundifolia* and *Q. faginea*, 1.750-1.790 m, 2/1/98, 4/1/00, 4/1/01; 6) Jbel Hebri, between Ifrane and Azrou, on *Q. rotundifolia*, 1.980 m, 2-3/1/98, 3/1/00; 7) Michliffen, on *Taxus baccata*, 2.040 m, 31/12/00; 8) Jbel Tazzeke National Park, W of Taza, on *Q. suber* and *Q. faginea*, 1.700 m, 30/12/00; leg. S. Ravera. On *Q. rotundifolia* and *Q. faginea*, 1.300-1.550 m, 19/6/93, leg. S. Rambelli; 9) Ouzoud, between Demnate and Azilal, on *T. articulata*, 1/1/98; leg. S. Ravera.

**Gran Atlas.** 10) Toufiliat, on *Juniperus oxycedrus* and *Q. rotundifolia*, 31/12/97; 11) Tamrhakht, 20 km N of Agadir, on *Argania spinosa*, 80 m s.l.m., 16/4/01, leg. G. Massari.

**Anti Atlas.** 12) Âit-Melloul, S of Agadir, on *A. spinosa*, 80 m, 16/4/01; 13) Sous-Massa National Park, on *Euphorbia echynus*, 16/4/01; leg. G. Massari.

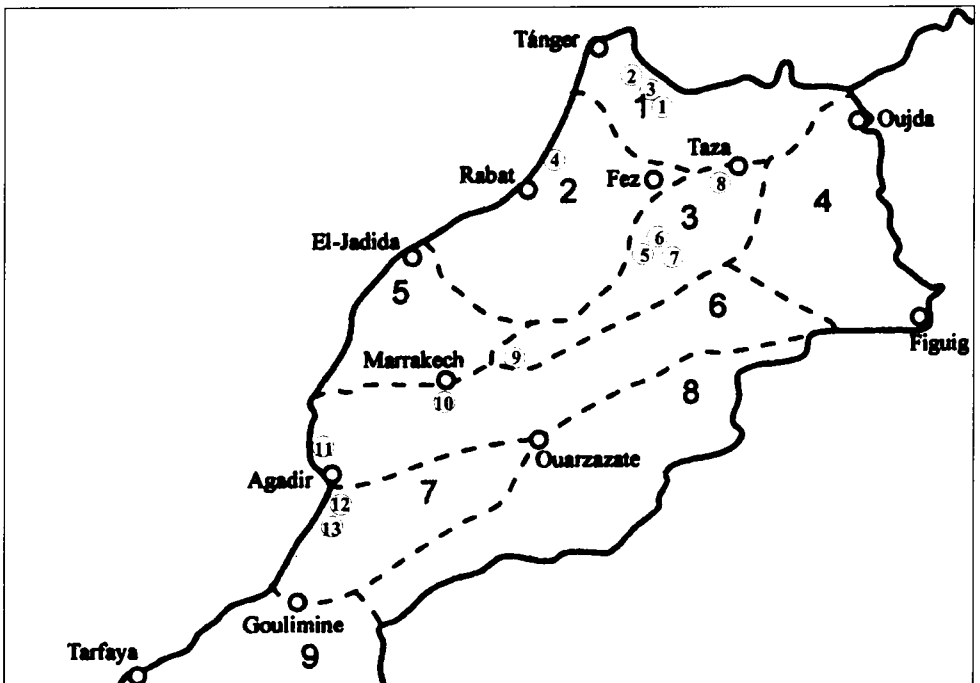


Fig. 1 - Biogeographical subdivision of Morocco (according to Egea, 1996) and lichen collecting sites (numbers in circles). 1. Rif, 2. NW Central Region, 3. Central Atlas, 4. High Plains, 5. SW Central Region, 6. Gran Atlas, 7. Anti Atlas, 8. Hammadas, 9. Southwest..

## Data and methods

Species are ordered alphabetically. Nomenclature mainly follows Nimis (2000) and authors' abbreviations, Brummitt & Powell (1992). *Usnea lapponica* Vainio, was kindly identified by P. Clerc.

For each *taxon*, morpho-functional characters and some ecological informations are given, following Nimis & Tretiach (1999) and "The Information System on Italian Lichens" (Nimis, 2000). These concern growth form, photobiont, mainly reproductive strategy, ecological indices (estimated according to the ecological behaviour in Italy), phytoclimatic range in Europe.

For growth forms, the following abbreviations are used: Cr, crustose; Cr.pl, crustose placodiomorph; Lepr, leprose; Sq, squamulose; Fol.b, foliose broad-lobed; Fol.n, foliose narrow-lobed; Frut, fruticose; Frut.f, fruticose filamentous. For algal partner: Ch, green algae, *Trentepohlia* except; Tr, *Trentepohlia*; Cy.h, cyanobacteria. About reproductive strategy: S is used for mainly sexual; A.s for asexual by soredia or soredia-like structures; A.i, for asexual by isidia or isidia-like structures. For substratum: Calc means calciferous rocks; Sil, acid siliceous rocks; Sil.b, base-rich siliceous rock.

The ecological indicator values concern: pH of the substratum, light requirement, water requirement (from the more hygrophytic to the more xerophytic), eutrophication. Each index is expressed by a 5-class ordinal scale.

For the distributional range, diagnoses for the Turkey flora by John & Nimis (1998) and Nimis & John (1998) have been followed.

Each comparison with known lichen behaviour in Europe and any information of lichenological interest are based upon the literature mainly dealing with Mediterranean areas (e.g. Clauzade & Roux, 1985; Nimis, 1993; Fos, 1998; Nimis & Tretiach, 1999; Litterski & Mayrhofer, 2000; Nimis, 2000).

In the list of the *taxa*, all collecting sites are presented by their respective numbers; the kind of tree, by cipher (for example: *Quercus rotundifolia* as *Qr*). First records for Morocco are marked by an asterisk "\*".

All samples are preserved in the Herbarium of the University of Rome "La Sapienza" (RO).

## List of species

*Arthonia albopulvurea* Nyl. - **New to Anti Atlas**. - Cr/ Tr/ S/ 1-2, 3-4, 2-3, 1/ suboc/ - This species mostly occurs on smooth bark in maritime stands. - Loc.: 12).

*Arthonia pruinata* (Pers.) A. L. Sm. - **New to NW Central Region**. - Cr/ Tr/ S/ 1-2, 3-4, 2, 1/ suboc/ - This holarctic species seems to be more frequent in the western and southern Europe. In Spain, it mainly occurs in the *Carici-Quercus canariensis sigmetum*; in Portugal it was collected in oak-woods belonging to the *Oleo-Quercetum suberis* and to the *Myrto-Quercetum suberis*. It is declining in Italy, occurring on old isolated deciduous trees. In Morocco, extensive thalli colonize cork-oaks along with *Pyrrhospora querneae* (Dicks.) Körb. and *Schimatomma decolorans*. - Loc.: 4).

*Arthonia punctiformis* Ach. - **New to Anti Atlas**. - Cr/ Tr/ S/ 2-3, 3-4, 3-4, 1/ - This species seems to be rare in the driest areas of Mediterranean countries. - Loc.: 13).

- Arthopyrenia punctiformis* (Pers.) A. Massal. - **New to both Gran Atlas and Anti Atlas.** - Cr/ Tr/ S/ 2-3, 3-5, 3, 1-2/ - Loc.: 11). 12).
- \* *Bacidia circumspecta* (Vain.) Malme - Cr/ Ch/ S/ 2-3, 3-4, 2, 1-3/ - It is an indicator of old trees in open and humid woodlands. - Loc.: 7). 8) *Qr*, 1.300 m, 19/6/93.
- \* *Bacidia rubella* (Hoffm.) A. Massal. - Cr/ Ch/ S/ 2-3, 4, 2-3, 1-3/ Med-Smed?S Temp (Eur, N Amer)/ - In Italy, this species is declining and mostly occurs on old trees. In Morocco it was collected only once. - Loc.: 2).
- Bacidia subincompta* (Nyl.) Arnold - **New to Rif.** - Cr/ Ch/ S/ 2-3, 3, 2, 1-2/ suboc/ - Already known for Central Atlas (Werner, 1974a), it usually occurs on old trees in open woodlands. - Loc.: 1). 2).
- Buellia triphragmia* (Nyl.) Arnold - **New to Rif.** - This lignicolous species has a boreal-montane distribution in Europe; in Spain it occurs in the supramediterranean belt. In Morocco it was already known from Gran Atlas (Werner, 1930; Gattefossè & Werner, 1931). - Loc.: 1).
- \* *Caloplaca sarcopidoides* auct. - Collected in France mostly on *Juniperus*, in Spain mostly on *Quercus suber*, this very little known species occurs with *C. ulcerosa* on dusty bark of *Tetraclinis articulata*. - Loc.: 2).
- \* *Caloplaca ulcerosa* Coppins & P. James - Cr/ Ch/ A.s/ 3-4, 4-5, 3-4, 3-4/ - Sample fertile found on dusty bark with *C. sarcopidoides*, *Strangospora ochrophora*, *Collema occultatum*, *Bacidia subincompta*. This species seems to have a West European distributional range. - Loc.: 2).
- Chrysothrix candelaris* (L.) J. R. Laundon - Lepr/ Ch/ A.s/ 1-2, 3, 1-3, 1/ - According to Nimis & John (1998) it occurs in Eu-Mediterranean vegetation but only in humid areas. According to Fos (1998) this lichen seems to occur on *Quercus suber* when woodlands are well-structured, far from managed areas with modified ecological conditions of air humidity and luminosity. Nevertheless, in Morocco it was collected in a very exploited cork-oak wood. - Loc.: 4).
- \* *Collema occultatum* Bagl. - Cr/ Cy.h/ S/ 3, 3, 2-3, 1-2/ - An overlooked lichen of base-rich trees which mostly occurs in open woodlands. - Loc.: 2).
- \* *Fuscopannaria ignobilis* (Anzi) M. Jørg. - Sq/ Cy.h/ S/ 2-3, 3-4, 1-2, 1-2/ suboc/ - A Mediterranean-atlantic species, endemic to Europe and North Africa (Nimis & Poelt, 1987), which mainly occurs on old trees, in the cracks of the bark. - Loc.: 3) *Qf*.
- \* *Koerberia biformis* A. Massal - Fol.n/ Cy.h/ S/ 2-3, 3-4, 2-3, 1-2/ suboc/ - This species is mostly found on ancient trees, in humid situations, in Italy and in the Iberian Peninsula. In the survey area, it was collected only once. - Loc.: 5) *Qr*.
- \* *Lecanora expallens* Ach. - Cr/ Ch/ A.s/ 1-2, 3-4, 2-3, 1-2/ Smed-Med.mont?Temp/ - In coastal stands, this species occurs on the most humid sides of boles and branches (Giralt & al., 1991; Hladun & al., 1994). It was recently collected fertile in Greece, (Christensen, 1994, 1995). Moroccan records seem to be the most southern in the Northern Hemisphere. - Loc.: 4) fertile. 13).
- Lecanora horiza* (Ach.) Linds. - **New to both Gran Atlas and Anti Atlas.** - Cr/ Ch/ S/ 2-3, 4-5, 3-4, 2-3/ Med-Smed?S Temp - It is an altitudinal vicariant of *Lecanora argentata* (Ach.) Malme in the Mediterranean belt (Nimis & Tretiach, 1999). - Loc.: 2). 10) *Qr*. 13).
- Lecanora lividocinerea* Bagl. - Cr/ Ch/ S/ 3, 4-5, 3, 3/ suboc/ - Already known in Morocco for NW Central Region (Werner, 1969), this Mediterranean species occurs mostly on cork-oak. - Loc.: 4).

- Leptogium saturninum*** (Dicks.) Nyl. - Fol.b/ Cy.h/ A.i/ 3, 4, 2-3, 2-3/ suboc/ - This is a montane species in the Mediterranean region and mostly occurs in humid stands. In Morocco it was collected by Arvidsson (1979) both in Rif and in Central Atlas. - Loc.: 8) *Qf*, 1.700 m, 30/12/00.
- Lobaria pulmonaria*** (L.) Hoffm. - Fol.b/ Ch/ A.s/ 2-3, 3, 1-2, 1-2/ Med-Med.mont?Temp, suboc/ - In the Mediterranean area, this declining species is still locally common in montane woodlands and it reaches the coast in very humid stands. In Morocco it is known only from Rif (Gattefossé & Werner, 1931; Werner, 1931 a,b, 1937, 1948, 1979). - Loc.: 3) *Qs*.
- Ochrolechia pallescens*** (L.) A. Massal. - **New to NW Central Region.** - Cr/ Ch/ S/ 2, 3-4, 2-3, 1-2/ Smed-Med.mont?Temp, suboc/ - Loc.: 1). 4).
- \****Parmelia horrescens*** Taylor - Fol.b/ Ch/ A.i/ 2-3, 3, 1-2, 1-2/ suboc/ - This species mostly occurs on old trees in ancient, open forests. - Loc.: 10) *Jo*.
- Parmelia submontana*** Hale - Fol.b/ Ch/ A.i/ 2, 3, 1-2, 1-2/ Med.mo-S Temp/ - In the Mediterranean region it was mostly collected in humid montane woodlands. In Morocco it is locally very common in *Cedrus atlantica* forests with a humid mediterranean climate. It seems to reach lower altitudes in Rif. Fertile. - Loc.: 3) *Qs*.
- Parmotrema hypoleucinum*** (J. Steiner) Hale - **New to Anti Atlas.** - Fol.b/ Ch/ A.s/ 2-3, 4-5, 1-2, 1-2/ suboc/ - Extremely rare along the Tyrrhenian coast in Italy, this species occurs mostly on shrubs in undisturbed vegetation. - Loc.: 13).
- Parmotrema reticulatum*** (Taylor) M. Choisy - **New to NW Central Region.** - Fol.b/ Ch/ A.s/ 2-3, 3-4, 2, 1-2/ suboc/ - In Italy it is strongly declining but relatively common in Sardinia (Nimis & Poelt, 1987). In south-western Portuguese coast it seems to have a high competitive capacity (Carvalho & al., 2000). Quite common in the survey stand. - Loc.: 4).
- Pertusaria heterochroa*** (Müll. Arg.) Erichsen - Cr/ Ch/ S/ 2-3, 4-5, 2-3, 1-3/ Med-Smed?S Temp/ - This species has its optimum in evergreen sclerophyllous vegetation, in coastal situations and on smooth bark. Often found on cork-oak in Spain (Atienza & al., 1988; Barreno & al., 1988; Fos, 1998), in Morocco it was collected very rarely (Egea, 1996). - Loc.: 4).
- \* ***Phaeophyscia hirsuta*** (Mereschk.) Essl. - Fol.n/ Ch/ A.s/ 3-4, 4-5, 3-4, 3-4/ - In Italy it is common in the submediterranean belt in quite humid situations while in Iberian Peninsula *P. hirsuta* is considered a dry, nitrophilous Mediterranean element. - Loc.: 2).
- Phaeophyscia orbicularis*** (Neck.) Moberg - **New to Rif, Gran Atlas and Central Atlas.** - Fol.n/ Ch/ A.s/ 2-5, 3-5, 3-4, 4-5/ Med-Oromed?Arct (Subcosmop)/ - Loc.: 2). 5) *Qr*. 8) *Qr*, 1.300 m, 19/6/93. 10) *Qr*.
- Phlyctis argena*** (Spreng.) Flot. - **New to Rif.** - Cr/ Ch/ A.s/ 2, 2-3, 2-3, 1-2/ Smed-Med.mont?Temp/ - This is an aggressive pioneer of smooth bark. It is not common in the survey area. - Loc.: 1). 5) *Qf*.
- Physcia biziana*** (A. Massal.) Zahlbr. v. *biziana* - **New to Central Atlas.** - Fol.n/ Ch/ S/ 3, 4-5, 3-4, 3-4/ Med-Smed?S Temp/ - This chiefly southern European species was known in Morocco from Gran Atlas (Werner, 1974b). In Iberian Peninsula it seems to be more common in continental areas than in coastal and atlantic ones. - Loc.: 5) *Qr*. 6). 9). 10) *Jo*.
- Physcia tenella*** (Scop.) DC. - **New to both Central Atlas and Gran Atlas.** - Fol.n/ Ch/ A.s/ 2-4, 4-5, 3-4, 3-4/ - Loc.: 2). 7). 8) *Qf*, 1.550 m, 19/6/93; *Qs*, 1.700 m, 30/12/00. 10) *Jo*.

- Physconia enteroxantha*** (Nyl.) Poelt - **New to Gran Atlas.** - Fol.n/ Ch/ A.s/ 2-4, 4-5, 3, 3-4/ suboc/ - In Morocco it has been recently collected in Rif (Egea, 1996). - Loc.: 10) Jo.
- Physconia perisidiosa*** (Erichsen) Moberg - Fol.n/ Ch/ A.s/ 2-3, 3-4, 2-3, 2-3/ Med.mo-Smed, suboc/ - This extremely air pollution-sensitive species, was already known from Morocco even if it has rarely been recorded (Bouly de Lesdain & Pitard, 1913; Bouly de Lesdain, 1924). - Loc.: 5) *Qr*.
- Physconia servitii*** (Nádv.) Poelt - **New to both Rif and Central Atlas.** - Fol.n/ Ch/ S/ 2-3, 3-4, 2-3, 2-3/ suboc/ - In Morocco, this species was known from Anti Atlas (Werner, 1968). In the Mediterranean area it occurs mostly on old trees in open woodlands. - Loc.: 2). 8) *Qr*, 1.300 m, 19/6/93.
- Ramalina canariensis*** J. Steiner - **New to Anti Atlas.** - Frut/ Ch/ A.s/ 1-3, 4-5, 2, 2-4/ - This species is widespread from Northern Africa, Cyprus and Anatolia throughout western Mediterranean regions to Macaronesia. It is mostly coastal and is confined in semi-natural habitats both in Italy and in Spain (Giralt, 1996). In Spain it is thermophilous and very sensitive to low temperature (Fos, 1998; Llimona, 1982). - Loc.: 4). 12).
- \* ***Ramalina lusitanica*** H. Magn. - Frut/ Ch/ S/ 2-3, 4-5, 1-2, 1-2/ suboc/ - Often found in coastal shrubs; extremely rare in Italy. - Loc.: 12).
- Ramalina pollinaria*** (Westr.) Ach. - **New to Central Atlas.** - Frut/ Ch/ A.s/ 2-3, 3-5, 2-3, 1-3/ - On ancient trees, quite rare in Italy, in Morocco it was known from NW Central Region (Werner, 1955; 1970). - Loc.: 8) *Qr*, 1.300 m, 19/6/93.
- \* ***Ramalina sinensis*** Jatta - Frut/ Ch/ S/ 2-3, 4, 2, 1/subc/ - In Fennoscandia it is mainly an inland photophilous species occurring in the upper canopies of deciduous trees (Krog & James, 1977). In Italy it is known from oceanic sites of the Alps. Even in Morocco it is a montane species but occurs in more continental stands where *Letharia vulpina* (L.) Hue is one of the dominant species. - Loc.: 6)
- \* ***Rinodina capensis*** Hampe - This is a montane lichen which occurs in humid stands. According to Nimis (1993) it has its distributional centre in the Alps. - Loc.: 1).
- \* ***Rinodina colobina*** (Ach.) Th. Fr. - Cr/ Ch/ S/ 3-4, 4-5, 4, 3-4/ - This species is mostly found below the montane belt, in *Xanthorion*-communities. - Loc.: 9).
- Rinodina guzzinii*** Jatta - Cr/ Ch/ S/ 3-4, 4-5, 4, 3-4/ - This species has an Irano-Turanian-Mediterranean distribution and occurs on weakly calcareous rocks. In the survey area it was collected on *Euphorbia echynus* covered with flowstone. - Loc.: 13).
- \* ***Schismatomma decolorans*** (Sm.) Clauzade & Vezda - Cr/ Ch/ S/ 2, 1-3, 1-3, 2-3/ suboc/ - This species forms extensive pink thalli on cork-oak along with *P. querneae* and *A. pruinata*. In the Mediterranean region it occurs mainly on acid and rough bark of old trees. It was recently found fertile in Corfu, Greece (Christensen, 1995). - Loc.: 4).
- \* ***Strangospora ochrophora*** (Nyl.) R. A. Anderson - Cr/ Ch/ S/ 3, 4-5, 3, 2-3/ suboc/ - This overlooked inconspicuous species is declining over its distributional range because of atmospheric pollution. - Loc.: 2).
- \* ***Usnea lapponica*** Vain. - Fr.f/ Ch/ A.s/ 1-2, 4-5, 1-2, 1/ subc/ - According to Nimis (1993), this lichen has a more subcontinental distribution pattern than *Usnea fulvovireagens* (Räsänen) Räsänen. In Italy, *U. lapponica* was found on coniferous trees in montane, cold-humid forests. In Corsic, it occurs even on *Erica arborea* (Kalb, 1976). In

Morocco, the collected specimens come from a cedar forest influenced by oceanic winds. - Loc.: 5) *Qr*.

## References

- Arvidsson, L. 1979: Notes on some interesting Lichens from Morocco and Spain. — Göteborgs Svampklubb Arsskr.: 21-37.
- Atienza, V., Barreno, E., Muñoz, A. & Sanz, M. J. 1988: Sobre los líquenes de los alcornoques valencianos (España). — Actes del Simposi Internacional de Botànica Pius Font i Quer. Vol. I. Criptogàmia: 169-178.
- Barreno, E., Sanz, M. J., Atienza, V. & Muñoz, A. 1988: Biogeografía y ecología comparadas de líquenes epífitos de alcornoques ibéricos y sardos. — Actes del Simposi Internacional de Botànica Pius Font i Quer. Vol. I. Criptogàmia: 179-185.
- Bouly de Lesdain, M. & Pitard, C. J. 1913: Lichenes. — Pp 153-163 in Pitard, C. J. (ed.), Exploration scientifique du Maroc, fasc. 1, Botanique.
- , M. 1924: Lichens du Maroc recueillis par M. Mouret en 1912. — Mém. Soc. Sci. Nat. Maroc **8(2)**: 190-229.
- Brummitt, R. K. & Powell, C. E. (eds.) 1992: Authors of plant names. — Royal Botanic Gardens, Kew.
- Carvalho, P., Figueira, R., Pina, P., Jones, M. P., Sérgio, C., Sim-Sim, M. & Catarino, F. 2000: Dynamics of epiphytic lichen communities in an industrial area of Portugal. — Book of Abstract of the Fourth IAL Symposium, Barcelona.: 84.
- Christensen, S. N. 1994: Lichens associated with *Pinus nigra* on Mt. Trapezitsa, Epirus, NW Greece. — Acta Bot. Fennica **150**: 11-20.
- 1995: Lichens from olive groves on the Ionian island Corfu (Kerkyra), Greece. — Flora Mediterranea **5**: 191-209.
- Clauzade, G. & Roux, C. 1985: Likenoj de Okcidenta Europo. Ilustrita determinlibro. — Bull. Soc. Bot. Centre-Ouest, n. s., nr. spéc. 7.
- Egea, J. M. 1996: Catalogue of lichenized and lichenicolous fungi of Morocco. — *Boccone* **6**: 19-114.
- Emberger, L. 1939: Aperçu général sur la végétation du Maroc. — Veröffentlichungen des Geobotanischen Institutes Rübel in Zürich **14**: 40-157.
- Fos, S. 1998: Líquenes epífitos de los alcornoques ibéricos. Correlaciones bioclimáticas, anatómicas y densimétricas con el corcho de reproducción. — *Guineana* **4**, 507 pp.
- Gattefossé J. & Werner, R. G. 1931: Catalogus lichenum maroccanorum adhuc cognitorum. — Bull. Soc. Sci. Nat. Maroc **11**: 185-255.
- Giralt, M. 1996: Líquens epífitis i contaminació atmosfèrica a la plana i les serralades litorals teragonines. — Institut d'Estudis Catalans. ASC, 113. Barcelona
- , Gómez-Bolea, A., & Llimona, X. 1991: Flora líquènica epifítica de la Punta de La Mora (Terraconès, Catalunya). — *Butll. Inst. Cat. Hist. Nat.* **59 (Sec. Bot. 8)**: 57-69.
- Hladun, N. L., Gómez-Bolea, A., & Llimona, X. 1994: Aportació a la flora i vegetació líquènica dels aiguamolls de l'Alt Empordà. — *Treb. Inst. Cat. Hist. Nat.* **13**: 151-166.
- John, V. & Nimis, P.L., 1998: Lichen Flora of Amanos Mountain and the Province of Hatay. — *Tr. J. of Botany* **22**: 257-267.
- Kalb, von K. 1976: Flechtenfunde aus Korsika. — *Herzogia* **4**: 55-63.
- Krog, H. & James, P. W. 1977: The genus *Ramalina* in Fennoscandia and in the British Isles. — *Nord. J. Bot.* **24**: 15-43.
- Litterski, B. & Mayrhofer, H. 2000: Additional records to the lichen flora of Cyprus. — *Herzogia* **14**: 145-150.

- Llimona, X. 1982: Lichens of the arid mediterranean area and North Africa. — Journ. Hattori Bot. Lab. **53**: 345-349.
- Lumbsch, H. T. & Vezda, A. 1992: Contributions to the lichen flora of Tenerife. — Lichenologist **24** (1): 21-26.
- Nimis, P. L. 1993: The Lichens of Italy. An annotated catalogue. — Mus. Reg. Sci. Nat. Torino. Monogr. **12**, Torino.
- 1996: Towards a checklist of Mediterranean lichens. — *Bocconea* **6**: 5-17.
- 2000: Checklist of the Lichens of Italy 2.0. — University of Trieste, Dept. of Biology, IN2.0/2 (<http://dbiodbs.univ.trieste.it/>), Trieste
- & John V. 1998: A contribution to the lichen flora of Mediterranean Turkey. — *Cryptogamie, Bryol. Lichénol.* **19** (1): 35-58.
- & Poelt, J. 1987: The Lichens and lichenicolous fungi of Sardinia (Italy). An annotated list. — *Studia Geobot.* **7** Suppl. 1.
- & Tretiach, M. 1999. *Itinera Adriatica* - Lichens from the Eastern Part of the Italian Peninsula. — *Studia Geobot.* **18**: 51-106.
- Tretiach, M. & Hafellner, J. 1998: A new species of *Catillaria* from coastal Mediterranean regions. — *Lichenologist* **30** (3): 221-229.
- Werner, R. G. 1930: Contribution à la flore cryptogamique du Maroc I. — *Bull. Soc. Sci. Nat. Maroc* **10** (1-6): 98-105.
- 1931a: Contribution à la flore cryptogamique du Maroc II. — *Bull. Soc. Hist. Nat. Afrique N.* **22**: 93-102.
- 1931b: Contribution à la flore cryptogamique du Maroc III. — *Bull. Soc. Sci. Nat. Maroc* **10** (7-12): 217-226.
- 1937: Essai de synthèse phytogéographique des cryptogames en montagne marocaine d'après nos connaissances actuelles. — *Bull. Soc. Sci. Nat. Maroc* **17** (2): 99-126.
- 1948: Les origines de la flore cryptogamique du Maroc d'après nos connaissances actuelles. — Pp. 147-202. In: Vol. Jubil. Soc. Sci. Nat. Maroc 1920-1945.
- 1955: Contribution à la flore cryptogamique du Maroc XIX. — *Bull. Soc. Sci. Nat. Maroc* **35**: 19-67.
- 1968: Lichenes et fungi maroccani annis 1931-1935 a Cl. J. Gattefossé et M. Zaborski lecti. — *Rev. Bryol. Lichénol.* **36**: 305-313.
- 1969: Lichenes et fungi maroccani III. Etude Substratique. — *Bull. Soc. Mycol. France* **85** (2): 195-204.
- 1970: La flore lichénique des chênes à liège et des cèdres. — *Bull. Soc. Mycol. France* **86** (4): 813-830.
- 1974a: Flore lichénologique du Moyen Atlas central. — *Bull. Soc. Mycol. France* **90** (1): 50-66.
- 1974b: Mission scientifique dans le Grand Atlas marocain oriental. — *Bull. Acad. Soc. Lorr. Sci.* **13** (1): 55-70.
- 1979: La flora lichénique de la cordillère bético-Raine. Etude phytogéographique et écologique. — *Collect. Bot.* **1**: 401-463.

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