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# Contribution to the inventory of lichens encountered in the reserve of Sidi Boughaba (Morocco)

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## ABSTRACT

*A study of the lichen flora encountered in the Sidi Boughaba reserve, conducted in 2011, 2012 and 2013, allowed us to identify 63 lichen species among which Syncesia myrticola, new for the Moroccan flora, and Xanthoria polycarpa, new for the flora of the central region of Morocco.*

***Keywords:*** *Morocco, Sidi Boughaba Reserve, lichens; flora.*

## INTRODUCTION

The region of Sidi Boughaba is a coastal area, located at 35 km north from Rabat and 5 km south from Mehdia. The approximate coordinates are 34 ° 12 'north in latitude and 6 ° 42' in the west longitude[4]. It is bounded on the north by the embouchure of Oued Sebou, South by the marabout of Sidi Bou Ghaba which gives its name to the reserve, on the east by land of cultures and to the west by the station of Mehdia city. The Borough of Sidi Boughaba forest (652 ha), declared a permanent hunting reserve in 1951 by the Administration of Waters and Forests, and had implemented a biological reserve in 1973-1977 approximately 150 ha[5].

The reserve, established around the lake, is one of the last natural areas of permanent fresh water on the Atlantic coast of Morocco. Sidi Boughaba Lake extends on 5.5 km to 6 km long and 100-350 m wide and 0.5 to 2.5 meter depth[12].The lichen flora of Sidi Boughaba reserve is not well studied, and no inventory of lichens had been made on the territory, with the exception of a study that we conducted on a few species[8]. The purpose of this work was to realize an inventory of lichens developed in Sidi Boughaba reserve.

## MATERIALS AND METHODS

Surveys were conducted regularly during 2010 and 2013 in the dunes of Sidi Boughaba reserve in the aim to collect the maximum of lichens species and to study the distribution of these species in this environment. The collected species were brought to the laboratory for their study and analysis. Macroscopic study concerned the type, color, shape and size of the thallus and apothecia. Microscopic study concerned the shape of the ascus and appearance, color, and size of the spores.

Conventional chemical reagents were used in the field as well as in the laboratory: potassium hydroxide (KOH) with 10% and sodium hypochlorite (NaClO) to 12º. These reactions provide the essential information to progress in the the key determination of the used species[2,3,6,7,9,13,15,16].

## RESULTS AND DISCUSSION

This study has revealed 63 lichens belonging to 13 families.

List of taxas collected in Sidi Boughaba reserve

| **Species** | **Families** |
|---|---|
| *Arthonia pruinata* (Pers.) | Arthoniaceae |
| *Arthonia radiata* ( Pers. ) Ach | Arthoniaceae |
| *Bacidia heterochroa* (Müll.Arg.) Zahlbr. | Ramalinaceae |
| *Buellia disciformis* (Fr.) Mudd | Physciaceae . |
| *Caloplaca citrina* (Hoffm.) Th. Fr | Teloschistaceae |
| *Caloplaca holocarpa* (Hoffm.) A.E. Wade | Teloschistaceae |
| *Caloplaca luteoalba* (Turner) Th. Fr. | Teloschistaceae**.** |
| *Lecanora pyracea* (Ach.) Nyl | Teloschistaceae. |
| *Cladonia chlorophaea* (Flörke ex Sommerf.) Spreng. | Cladoniaceae |
| *Cladonia foliacea* (Huds.) Willd | Cladoniaceae |
| *Cladonia furcata* (Huds.) Schrad | Cladoniaceae |
| *Cresponea chloroconia* (Tuck.) Egea & Torrente | Roccellaceae. |
| *Dimerella lutea* (Dicks.) Trevis | Coenogoniaceae |
| *Dimerella tavaresianum* (Vězda) Lücking | Coenogoniaceae |
| *Diplotomma alboatrum* (Hoffm.) Flot | . Physciaceae |
| *Enterographa crassa* (DC.) Fée | Roccellaceae |
| *Evernia prunastri* (L.) Ach | Parmeliaceae |
| *Lepraria incana* (L.) Ach. | Stereocaulaceae |
| *Lecanora albescens* (Hoffm.) Flörke | Lecanoraceae |
| *Lecanora albella* (Pers.) Ach | Lecanoraceae |
| *Lecanora argentata* (Ach.) Malme | Lecanoraceae |
| *Lecanora carpinea* (L.) Vain. | Lecanoraceae |
| *Lecanora polytropa* (Ehrh.) Rabenh. | Lecanoraceae |
| *Lecanora varia* (Hoffm.) Ach | Lecanoraceae |
| *Lecidella elaeochroma* (Ach.) M. Choisy | Lecanoraceae |
| *Ochrolechia parella* (L.) A. Massal. | Ochrolechiaceae |
| *Opegrapha atra* Pers. | Arthoniacea |
| *Parmelia caperata* (L.) Ach. | Parmeliaceae |
| *Parmelia perlata* (Huds.) Ach. | Parmeliaceae |
| *Pertusaria amara* (Ach.) Nyl. | Pertusariaceae |
| *Pertusaria pustulata* (Ach.) Duby | Pertusariaceae |
| *Physcia adscendens* (Fr.) H. Olivier | Physciaceae |
| *Pyrenula macrospora* (Degel.) Coppins & P. James | Pyrenulaceae |
| *Ramalina canariensis* J. Steiner | Ramalinaceae |
| *Ramalina subgeniculata* Nyl. | Ramalinaceae |
| *Roccella phycopsis* Ach | . Roccellaceae |
| *Syncesia myrticola* (Fée) Tehler | Roccellaceae |
| *Teloschistes villosus* (Ach.) Norman | Teloschistaceae |
| *Toninia aromatica* (Turner) A. Massal | . Ramalinaceae |
| *Usnea marocana* Motyka | Parmeliaceae |
| *Xanthoria ectaneoides* (Nyl.) Zahlbr. : | Teloschistaceae |
| *Xanthoria polycarpa* (Hoffm.) Rieber | Teloschistaceae |
| *Ramalina fastigiata* (Pers.) Ach | Ramalinaceae |
| *Tornabea* scutellifera (With.) J.R. Laundon | Physciaceae |
| *Arthonia cinnabarina* (DC.) Wallr. | Arthoniaceae |
| *Diploicia canescens* (Dicks.) A. Massal | Physciaceae |
| *Dirina ceratoniae* (Ach.) Fr . | Roccellaceae |
| *Lecanora allophana* (Ach.) Nyl. | Lecanoraceae |
| *Lecanora subrugosa* Nyl. | Lecanoraceae |
| *Opegrapha vulgata* (Ach.) Ach. | Roccellaceae |
| *Opegrapha xerica* Torrente & Egea | Roccellacea |
| *Parmotrema hypoleucinum* (J. Steiner) Hale | Parmeliaceae |
| *Physcia clementei* (Turner) Lynge | Physciaceae |
| *Ramalina farinacea* f luxurians Berher ex Harm | Ramalinaceae |
| *Ramalina fraxinea* (L.) Ach | Ramalinaceae |
| *Ramalina lacera* (With.) J.R. Laundon | Ramalinaceae |
| *Ramalina pollinaria* (Westr.) Ach | Ramalinaceae |
| *Ramalina polymorpha* (Lilj.) Ach | Ramalinaceae |
| *Ramalina pusilla* Le Prévost, | Ramalinaceae |
| *Rinodina gennarii* Bagl**.** | Physciaceae |
| *Rinodina roboris* (Dufour ex Nyl.) Arnold | Physciaceae |
| *Caloplaca ferruginea* (Huds.) Th Fr | Teloschistaceae |
| *Xanthoria parietina* (L.) Beltr | Teloschistaceae |

The 63 species were found, growing on different substrates. According to the overall appearance of their ringworm, they were in the form of crustose lichens, foliose, fruticose, composites and lepers.
Among the shellfish species, *Syncesia myrticola* (Fairy) Tehle, synonyms *Chiodecton albidum* (Taylor) Leight, *Chiodecton myrticola* Fairy *Chiodecton myrticola* var. *sarniense* Mudd., *Chiodecton petraeum* (Delise) was encountered for the first time in the reserve of Sidi Boughaba and it is new to the lichen flora of Morocco. Thallus whitish gray color, is spread, irregular, thick and nodular (Figure 1 A). Nodules are 1 to 3.5 mm in thickness (Figure 1B). The fruiting bodies appear early in the form of mosaic, with a cerebriform appearance. Spores (36.63- 3.66- 5 x 43.29 µm) are fusiform with uneven ends, slightly curved and have partitions 1-3 (Figure 1 C).
*Synncesia myrticola* was reported along the west coast of Europe, the British Isles and Canary Islands[11]. It is also known in some Mediterranean areas. It grows mostly on the bark of trees[11], but can also be encountered on the rocks. It is non photophilic high humidity dependent[10] and considered as a rare species Lundy[1].
Another species has been found in the Sidi Boughaba reserve, is *Xanthoria polycarpa* (Hoffm.) Rieber, a new species for all the central region of Morocco. It has been reported only in southwestern of Morocco by Trotet[14], Werner[17] as var. *papillosa* (of Lesd.) Hillmann). This species is characterized by a foliose thallus greenish yellow rosette and measuring 3cm in diameter (Figure 2, A and B). The lobes are 3 mm, the upper face is orange yellow and the underside is whitish. The thallus is covered by several Apothecial that are 1 to 1.8 mm wide. Thallus becomes purple under the effect of KOH.
The épithecium is orange yellow; the hymenium and hypothecium are hyaline. The spores are hyaline, spores partitioned with a thick wall. Paraphyses are hinged at the top and 2 items are 2-3 cells at the top. The spores measure 10. 32 x -13. 326. 32- 6, 66 µm.
*Xanthoria polycarpa* is a species of wet microclimates that grows on the bark of tree branches[7].
Other species were found in the reserve were reported in Morocco. Most of them are attached to the bark of trees and especially *Juniperus phoenicea* which is very abundant in the reserve of Sidi Boughaba.

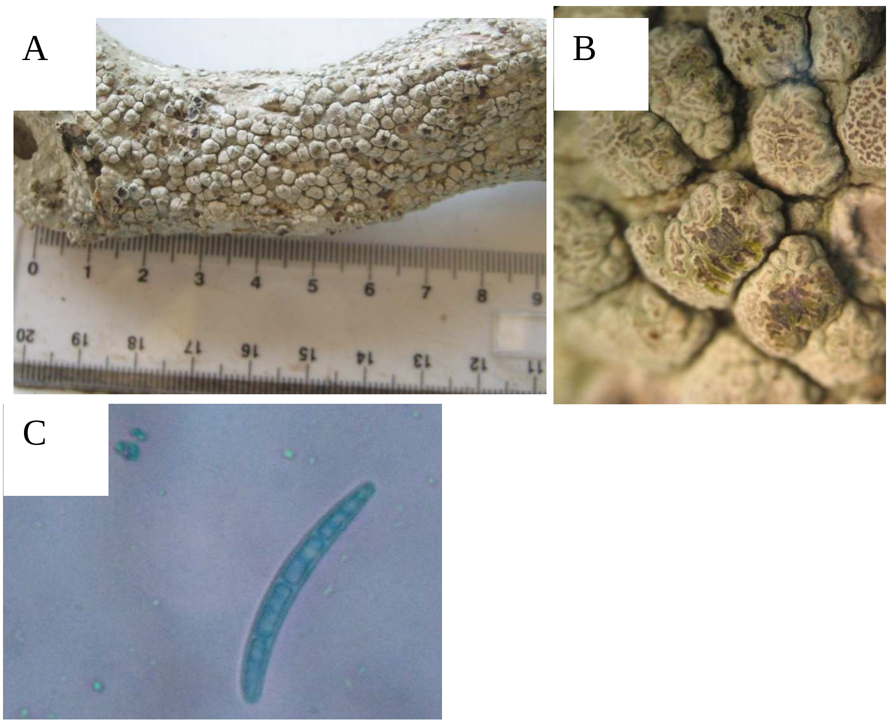


**Fig.1. Syncesia myrticola: Thallus (A), nodules with apothecia (B), spore (C)**

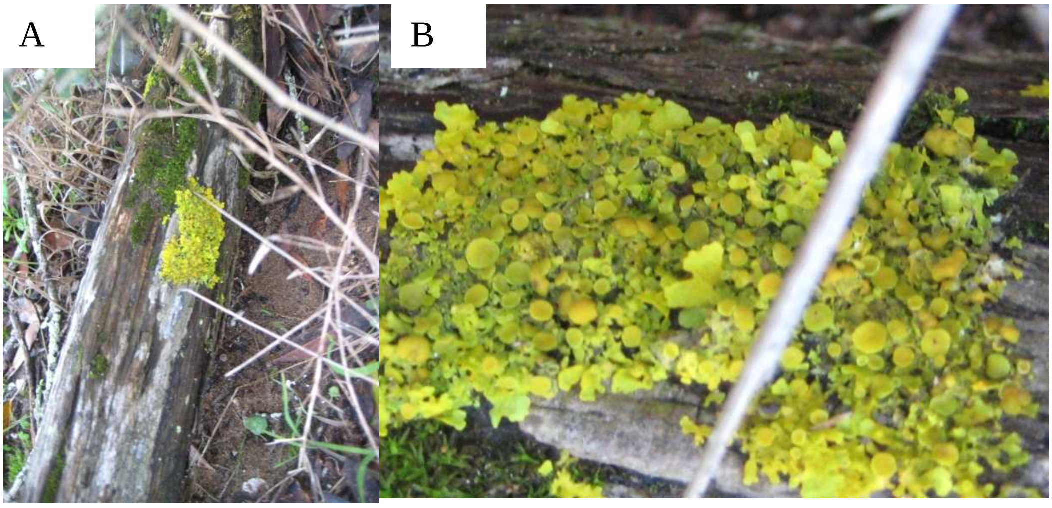


**Figure 2:** ***Xanthoria polycarpa*: Thallus (A) et (B)**

## CONCLUSION

Most of the lichen species those were found in the reserve of Sidi Boughaba are epiphytes, and developed on a fixed *Juniperus pohoenicea*. This lichen richness is due to the rich flora and favorable climatic conditions helping the development of all species genera.

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