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Fabronia Raddi (Musci) in Libya

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ABSTRACT

Fabronia pusilla Raddi var. *ciliata* Lesq. & James is recorded for the first time from Libya. This record adds family Fabroniaceae to the moss flora of Libya and increases the number of taxa known from there to 107.

KEY WORDS: pleurocarpous mosses, *Fabronia pusilla* var. *ciliata,* Libya

INTRODUCTION

Fabronia Raddi is a pleurocarpous moss genus, mainly distributed in tropical regions. About 40% of its species (according to Wijk et al. 1962) are recorded in South America and 20 % in Central and Souhern Africa. Only five taxa (out of its ± 100 recognized taxa) have been recorded from North Africa. Most taxa of *Fabronia* are restricted to one or two phytogeographical regions (*sensu* Index Muscorum) except *F. ciliaris* (Brid.) Brid. and *F. pusilla* Raddi, which are widespread in the northern hemisphere "Mediterranean Europe, Northern Africa, Southwestern Asia, Northern and Central America". In Northern Africa (according to Ros et al. 1999), *F. pusilla* has been recorded from Algeria, Chad, Morocco and Tunisia, while its variety *ciliata* Lesq. & James covers the same distribution range except for Chad: *F. ciliaris* has only been recorded from Tunisia.

The aim of this paper is to report on *Fabronia* and Fabroniaceae for the first time from Libya.

MATERIALS & METHODS

The moss was found as patches growing on the trunk and main branches of *Ceratonia siliqua* L. (Carob) trees. Three samples were collected in the winter of 2007 by the second author from Wadi Kauf, Al-Jabal Al-Akhdar, Libya, between lat. 32° 30′- 32° 50′ N, and long. 21° 2′- 22°E.

Al-Jabal Al-Akhdar (literally: the green mountain) is one of the 32 municipalities of Libya. It lies in the north-east corner of the country between Benghazi and Darnah. In this Jabal there is a gently arching plateau built of upper Cretaceous and Tertiary sediments (mostly limestone, subordinate dolomites and marls). These sediments were deposited at the southern margin of the Tethys sea (Röhlich, 1978).

Al-Jabal Al-Akhdar has a Mediterranean climate with moderate temperatures. It attracts considerably more reliable rainfall than other coastal regions of Libya between autumn to early spring. The annual average temperature is 16.4°C. The Jabal is dissected by many wadies, including Wadi Kauf. Wadi Kauf is a humid wadi getting rains from September to May and rarely in summer. The average annual rainfall ranges between 450 and 650 mm, 24-30 % falling in January. The temperature is 8-13˚C in winter and 22-27˚C in summer. Winds are northern in winter but southern and eastern southern in other seasons.

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These conditions afford suitable habitats for good vegetation. Vascular plants dominant in this wadi are *Juniperus phoenica*, *Cupressus sempervirens*, *Globularia alypum* and *Sarcopoaterium spinosium* (AKSAD, 1981). *Ceratonia siliqua* is not uncommon there.

C. siliqua is a tree reaching 50-55 ft (15-17 m) in high and at an age of 18 years may have a trunk 85 cm in circumference. Its thick trunk has a rough brown bark. It grows well throughout the Mediterranean region, in the warmest areas near the coast (Norton, 1987).

The following is an illustrated description of the moss collected from the trunks of *C. siliqua* trees and which was identified as *F. pusilla* var. *ciliata.* It is worth mentioning that this record increases the number of moss species and infra taxa known from Libya to 107, and the number of families to14.

RESULTS

Fabronia pusilla Raddi var. *ciliata* Lesq. & James

Plants ca. 2.5 mm high, prostrate, with erect branches. Stems with crowded small leaves. Leaves of main stems and branches similar in form, ± concave, ovate to ovate lanceolate, up to 0.8 x 0.2 mm, size increase upward especially in branch leaves, spreading when moist, imbricate when dry; apex longly and finely acuminate to piliferous; margin flat, sharply or ciliatly dentate, especially at upper half of leaf, teeth may be uni to mostly multicellular (3-4 cells at base of teeth up to 0.05 mm wide), 20- 300 µm long, on the same leaf or on different leaves; costa weak and short, not extending behind the middle of the leaf; laminal cells smooth, thin walled, rhombodial, elongate beside the nerve and in the middle of the leaf, 52 x 7.8 µm, shorter quadrate towards the margins at base, 15.6 x 15.0 µm. Seta elongate, 2.8mm, yellowish, capsule erect, oval, with a short neck, 0.8 x 0.6 mm (without lid), exothecium cells often turgid and usually with undulate walls, annulus of small cells persistant, stomata at base of capsule, phaneropore; peristome paried, 125 µm, teeth incurved, smooth, on 4-5 rows of flat cells, lid conical, 0.25 x 0.3 mm, spores papillose, ca.10.5 µm.

DISCUSSION

Fabronia is one of the taxonomically difficult genera as it has a few stable characters (Buck, 1994). Many species have been described on the bases of marginal toothing, besides leaf apex (cf. Buck, 1994; Kürschner, 2000). *F. pusilla* is recognized under the microscope by short ovate leaves, ending by an abruptly long acuminate to piliferous point and by having toothed margin, teeth being long, cilia like and multicellular. In contrast, *F. ciliaris* leaves are lanceolate, ending by a gradually tapering point and having broad unicellular marginal teeth. In fact there are gradations between these two taxa to the extent that some bryologists put them as synonyms to each other (COSEWIC, 2002). In Iraq, for example, Agnew & Vondracèk (1975) found *F. pusilla* with some leaves having short broad unicelluar marginal teeth. They concluded that the character of teeth, multicellular or unicellular, given by several authors as a means of distinguishing between *F. pusilla* and *F. ciliaris* is of doubtful value. Furthermore, in Israel, Bilwesky (1965) reported that differences are sometimes very little between *F. pusilla* and *F. ciliaris* growing in Israel, and accordingly they are so closely linked with each other that their rank as separate species is questionable. Nevertheless, he still recognized them as two distinct taxa.

The studied moss shows combined characters of *F. pusilla* and *F. ciliaris*. Broadly ovate leaves of the first taxon and narrower leaves of the second one are found. Both types of leaf may have unicellular and / or multicellular teeth on the same leaf or on separate ones, but characters of *F. pusilla* are more common than those of *F. ciliaris.* Therefore, we recognize the present taxon as the variety *ciliata* of the species *pusilla,* thus extending its range to

include Libya besides Algeria, Morocco and Tunisia where *F. pusilla* var. *ciliata* was already recorded (Ros *et al*. 1999).

It is, however, recommended that serious international studies be done on this genus, taking into consideration the adaptations plants show to different kinds of habitats. For example, the description of *F. macroblepharis* Schwaegr, which is restricted to Mexico and southern South America (cf. Buck, 1994) applies very well to the present moss except for the gradually long acuminate apex of the leaf in America.

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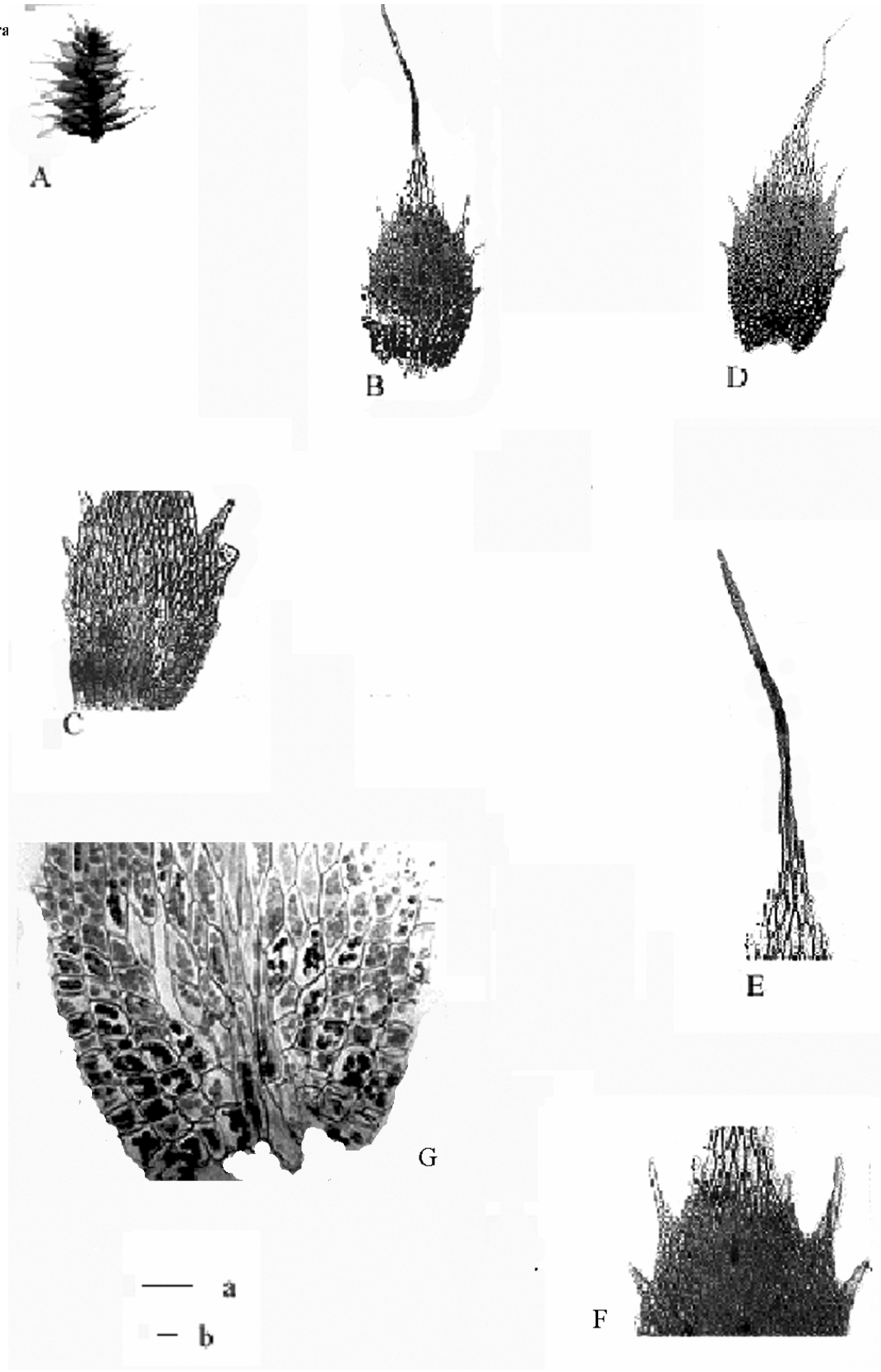

Figure1: *Fabronia pusilla* var. *ciliata* A-G. different parts of gametophyte. A. part of gametophyte, B. stem leaf, C. part of another stem leaf showing unicellular teeth, D. a third stem leaf, E. apex of stem leaf, F. apical part of stem leaf, G. base of stem leaf.
a = 52 µm (E), 80 µm (F), 24 µm (G) .
b = 0.3 mm (A), 22 µm (B, D), 15 µm (C).

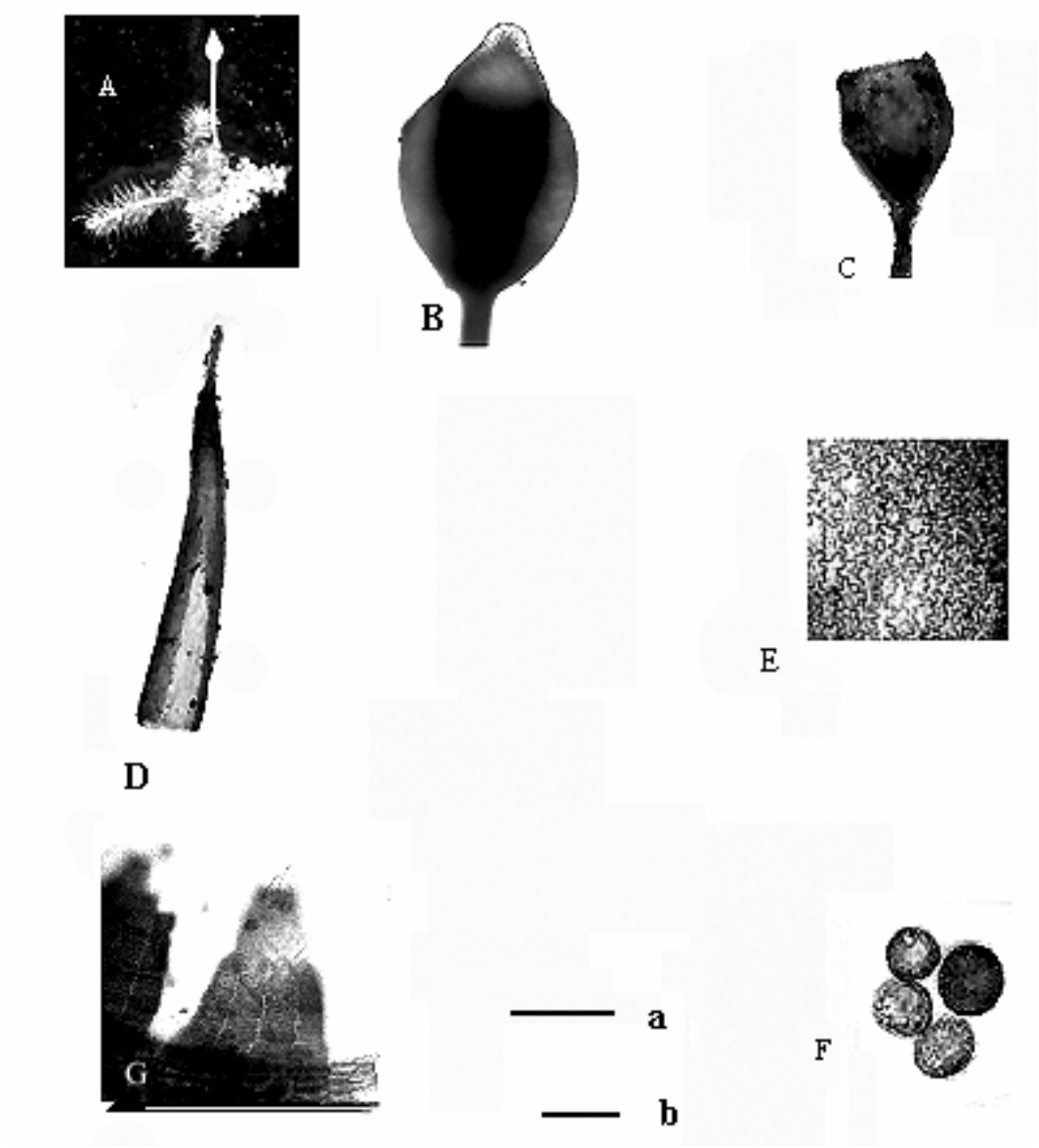

Figure 2: *Fabronia pusilla* var. *ciliata* A-G. different parts of sporophyte. A. gametophyte carrying sporophyte, B. capsule carrying lid, C. capsule without lid, D. caluptra, E. exothecium tissue of capsule, F. spores, G. peristome teeth.
a = 67 µm (G), 175 µm (F),
b = 1.9 mm (A), 0.3 mm (B), 0.4 mm (C,D).

U**الملخص العربى**

جنس فابرونيا (حزازيات) فى **ليبيا**

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تم فى هذا البحث تسجيل *Fabronia pusilla* Raddi var. *ciliata* Lesq. & James من لبيا , و هذا التسجيل يمثل التسجيل الاول للعائلة الفابرونية هناك. و هو يؤدى لزيادة عدد الحزازيات الى 107 حزازا.

و فى هذا البحث تم وصف النبات وصفا دقيقا مزودا بصور فوتوغرافية لاجزاء النبات المختلفة و تمت مناقشة تعريف هذا النبات ومقارنته بالنوع و الانواع المشا ة فى المناطق المختلفة.