Orthotrichum schimperi Hammar a New Record to Libya

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ABSTRACT

Orthotrichum schimperi Hammar was recorded from Libya for the first time. The taxon is widely distributed through many different parts of the world. The distribution map, description, and illustrated of species are given. This study is to survey the genus *Orthotrichum* growing on trunks of some trees in Al-Jebel Al-Akhdar (Libya) throughout the Winter season (January-March, 2007) and May 2008 and collected it in order to revise the genus in Libya and other countries. About this species, seta was very short, capsule with immersed stomata and after drying having strongly 8 ribbed and calyptra oblong with smooth wall. The taxa moss flora of Libya after this record become 109.

Key words: *Orthotrichum*, Wadi Kouf, Al-Jebel Al-Akhdar, Libya

INTRODUCTION

Approximately 850 species, subspecies, varieties and forms of *Orthotrichum* were recorded all over the world (Fig. 1) in both the Northern and Southern hemispheres. From North America, e.g., Canada, Arizona, California, Colorado, Delaware, Georgia, Illinois, Indiana, Iowa, Kansas, Louisiana, Maryland, Michigan, Minnesota, Missouri, Montana, Nebraska, New Mexico, New York, North Dakota, Ohio, Oklahoma, Pennsylvania, South Dakota, Tennessee, Texas, Vermont, Wisconsin, Wyoming (Vitt, 1973, 1993; Lewinsky, 1977, 1978, 1984, 1993; Anderson *et al.,* 1990; Haring, 1961; Weber, 1973); European e.g., Austria, Germany, West Germany (Anderson *et al.,* 1990; Judd *et al.,* 2002; Lampton, 1970). Asia e.g., Kazakhstan (Vitt, 1973, 1993) Africa e.g., Algeria, Morocco (Ros *et al.,* 1999; Bizot, 1973; Kis, 1985; Ochi, 1972).

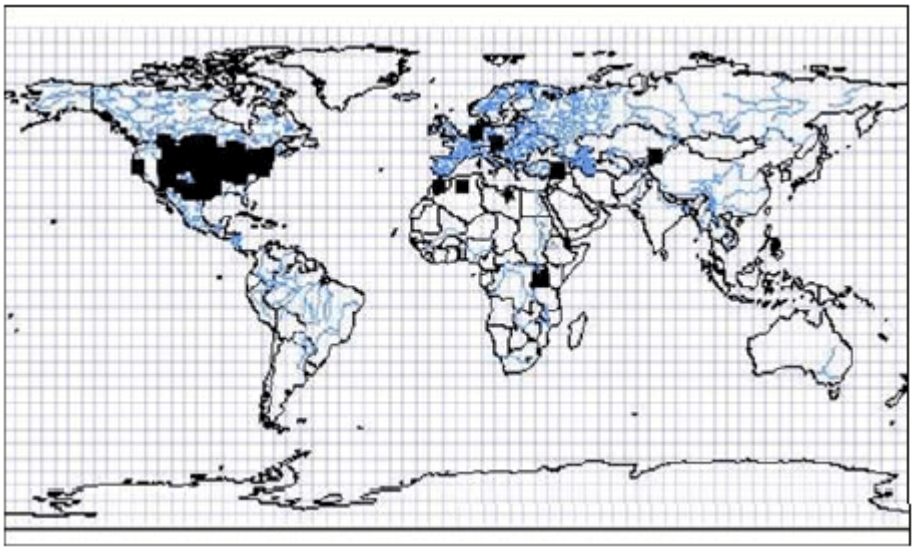

Fig. 1: Map showing distribution of *Orthotrichum* in different parts of the world. (solid square old record, solid stare present record).

The genus also having especially characters e.g., plants small, acrocarpous (sporophytes terminal), not branched or occasionally branched beneath the inflorescences, greenish to blackish, rarely whitish, goniautoicous or cladautoicous, rarely dioicous, known by the large campanulate calyptra covering the young capsule and erect dry leaves. It occurring on various habitats, tree trunks and rocks (Vitt, 1973; Lewinsky, 1993; Judd *et al.,* 2002).

In Libya, the previous literatures on mosses (Muller, 1874; Baroni, 1892; Durand and Barratte, 1910; Zodda, 1913, 1914, 1926; Pampanini, 1917, 1930; Bizot, 1973; Ros *et al.,* 1999; Shabbara and Youssef, 2006) reported 108 different species (14 families) only one of them, belonging to genus *Orthotrichum*, known as *Orthotrichum diaphaniyum* Brid. from Cirenaica (Pampanini, 1930).

The present study aimed to describe *Orthotrichum schimperi* Hammar recorded for the first time from Libya.

MATERIALS AND METHODS

One hundred of mosses specimens were collected throughout the Winter (January-March, 2007) and May 2008 on the trunks of vascular trees (*Quercus coccifera* L., *Olea europaea* L., *Ceratonia siliqua* L., *Juniperus phoenicea* L, *Pistacia lentscus* L and *Phillyrea latifolia* L.) growing in Wadi Kouf area, 82 of them containing genus *Orthotrichum*.

Wadi Kouf area is a part of Al-Jebel Al-Akhdar in Libya. Al-Jebel Al-Akhdar lies between 32° 30'-32° 50' N and 21° 2'-22° E in the North-East of Libya between Benghazi and Darnah (Fig. 2). This Jebel covering by arching Plateau built of upper Cretaceous and tertiary sediments of limestone, subordinate dolomites and marls. These sediments were deposited at the Southern margin of the Tethys sea.

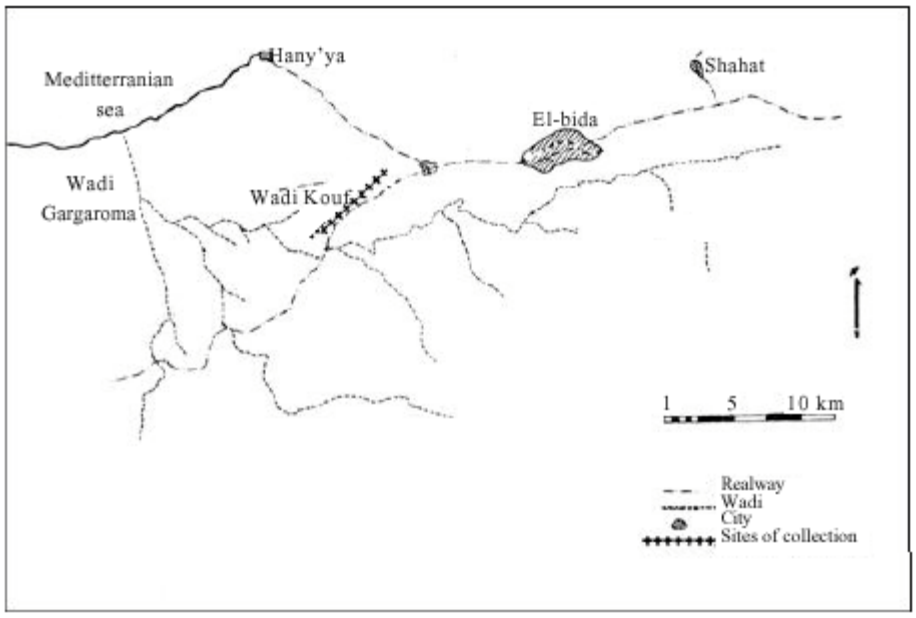

Fig. 2:Map showing the site of study area (Wadi Kouf).

Mediterranean climate with moderate temperature is the climate of Al-Jebel Al-Akhdar, with more reliable rain fall from Autumn to early Spring. The annual average temperature is 16.4°C.

Wadi Kouf is a humid wadi getting rain from September to May and rarely in Summer. The average annual rainfall ranges between 450-650 mm, 24-30% falling in January. The temperature is 8-13°C in Winter and 22-27°C in Summer, while winds are Northern in Winter but Southern and East Southern in other seasons. The parent rock is mainly limestone of tertiary age. All these conditions suitable habitats for good bryophytes plants (ACSAD, 1981).

Specimens were kept to dry in the laboratory away from direct sunlight. The specimens to be examined were first cleaned in water using a small brush and a needle to remove sticking soil particles. Free-hand transfers sections were prepared from the leaves and stems of gametophytes and longitudinally section from the capsules. The sections were made by placing the specimen in a drop of hot Gelatin 10% on a clean glass slides under a suitable power of a binocular stereoscopic microscope and cutting by a sharp razor with the help of a needle. The lid was removed and the capsule was cut transversely just below the peristome teeth, the latter were then cleaned and transferred onto a clean glass slide being ready for mounting in gelatin. The specimens (whole plants, leaves, capsules, spores, sections, etc.) were photographed using OLYMPUS camera (C-7070, 7.1 Megapixal).

RESULTS

After careful examination of the eighty two collected specimens, it was found that, nineteen specimens of them related to *Orthotrichum diaphanum* Brid and sixty three to *Orthotrichum schimperi* Hammar (Table 1).

The description and illustrated of *Orthotrichum diaphanum* was made before by others authors (Pampanini, 1930). So this study was described, distributed and illustrated the second species *Orthotrichum schimperi* Hammar in details.

Table 1: *Orthotrichum diaphanum* Brid. (Od.) and *Orthotrichum schimperi* Hammar (Os.) recorded throughout the study period.

	Date of collection				Samples No.	
Plant taxa	Juan.2007	Feb. 2007	March 2007	May-08	*Orthotrichum diaphanum*	*Orthotrichum schimperi*
Quercus coccifera L.	1Od.		3 Od.		4	15
	3 Os.	6 Os.	4 Os.	2 Os.		
Olea europaea L.	1 Od.			2 Od.	3	17
	4 Os.	5 Os.	6 OS.	2 Os.		
Ceratonia siliqua L.	1 Od.		1 Od.		2	14
	3 Os.	5 Os.	3 Os.	3 Os.		
Juniperus phoenicea L.		3 Od.			3	10
	1 Os.	4 Os.	4 Os.	1 Os.		
Pistacia lentscus L.	3 Od.		1 Od.		4	5
	1 Os.	1 Os.	2 Os.	1 Os.		
Phillyrea latifolia L.	1 Od.		2 Od.		3	2
			1Os.	1 Os.		

Orthotrichum schimperi Hammar (Fig. 3a-u, 4a-p).

- *O. affine* var. *fallax* (Bridel) Hampe
- *O. brachytrichum* Lesquereux and James
- *O. fallax* Bridel
- *O. fallax* var. *truncatulum* Austin
- *O. schimperi* Hammar var. *americanum* Venturi

• *O. schimperi* Hammar var. *fallax* (Bridel) J. Kickx f
• *O. schimperi* Hammar var. *fallax* (Bridel) Bertsch
• *O. schimperi* Hammar
• *O. schimperi* var. *truncatulum* (Austin) Paris and
• *O. tenellum* var. *pumilum* (Swartz) Boulin

Plants very small, branched, green above, brownish bellow, autoicous, 3-4 mm long. leaves erect and loosely-appressed when dry, ovate-oblong to lanceolate, 1-2 mm, acute to acuminate, apiculate, margins revolute, entire or rough by means of projecting papillae near apex; upper laminal cells, circular-quadrate with thick walled, 8x10-10x10 µm in size, 1-stratose, with 1 or 2, small, conical papillae, basal laminal cells rectangular to short-rectangular or quadrate especially near the margin, weakly nodose or non-nodose, up to 15x50 in size. Costa strong ending below the leaf apical, in cross section with a strongly differentiated double layers of guide cells, without steroids bands and inconspicuous abaxial and adaxial epidermis. Stem cross section rounded triangular, with a brownish central strand. Seta 0.25-0.5 mm in long. Capsule immersed or shortly emergent, fusiform-cylindric to oblong when mature,1.5 mm long, strongly 8-ribbed, stomata immersed, at middle of the capsule, half guard cells covered by subsidiary cells, pristome teeth double, 8 endostome segments, usually of 1 or 2 rows of cells, 125 µm long and 8 exostome teeth, reflexed, densely papillose or papillose-striate above, 150 µm long. Calyptra oblong and naked, 1-1.5 mm in long. Spores 10x10-13x13 µm in size.

DISCUSSION

About the habitat of *Orthotrichum*, epiphytic, on branches and trunks of some shrubs and the trees especially, *Quercus coccifera* L., *Olea europaea* L., *Ceratonia siliqua* L., *Juniperus phoenicea* L., *Pistacia lentscus* L. and *Phillyrea latifolia* L. in humid Wadi Kouf valley sometimes found on lightly shaded rocks and in rock crevices, especially limestone, and is sometimes found on walls of stone or brick (Vitt, 1973).

Orthotrichum schimperi Hammar was recorded throughout the world on the trunks of trees and/or on the soil (Vitt, 1973, 1993; Weber, 1973; Lewinsky, 1984, 1993; Anderson *et al.,* 1990) this indicates that this taxa have the ability to grow and adapt different kinds of habitats.

Gametophytically, *Orthotrichum schimperi* Hammar is most closely related to *O. diaphanum* Brid., with which it shares the following characters: large chlorophyllose leaf cells that lack large papillae, presence of numerous gemmae, and ovate-lanceolate leaves. It worthy to mention that, *Orthotrichum schimperi* Hammar has apiculate leaf apices that often are similar to those found on the young plants of *O. diaphanum* Brid. But *Orthotrichum niaphanium* Brid. is distinguished by the hyaline awn of the distal stem leaves.

CONCLUSION

In conclusion, *Orthotrichum schimperi* Hammar having very short sea, capsule with strongly 8-ribbed after drying and immersed stomata as well as oblong smooth wall calypra. This is an agreement with the previous study on *Orthotrichum* e.g., (Vitt, 1973, 1993; Weber, 1973; Lewinsky, 1984, 1993; Anderson *et al.,* 1990).

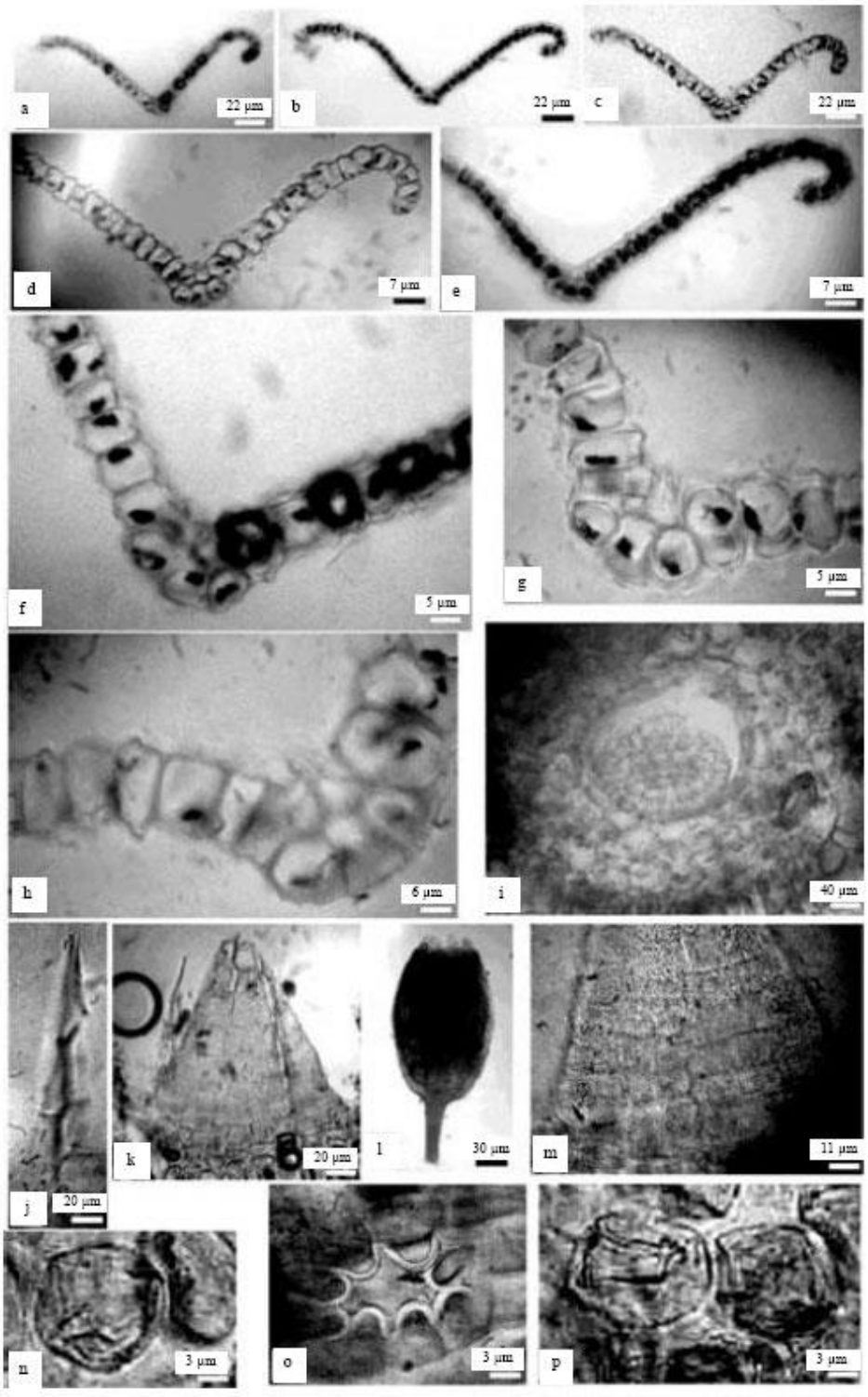

Fig. 3: *Orthotrichum schimperi* Hammar. (a-c) Dry gametophyte carrying sporophyte. (d) Wet gametophyte carrying sporophyte. (e-i) Different shapes of leaf stem. (J-m) Different shapes of leaf stem apices. (n-q) Cells, margin and costa at middle part of leaf stem. (r-u) Cells, margins and costa at leaf base

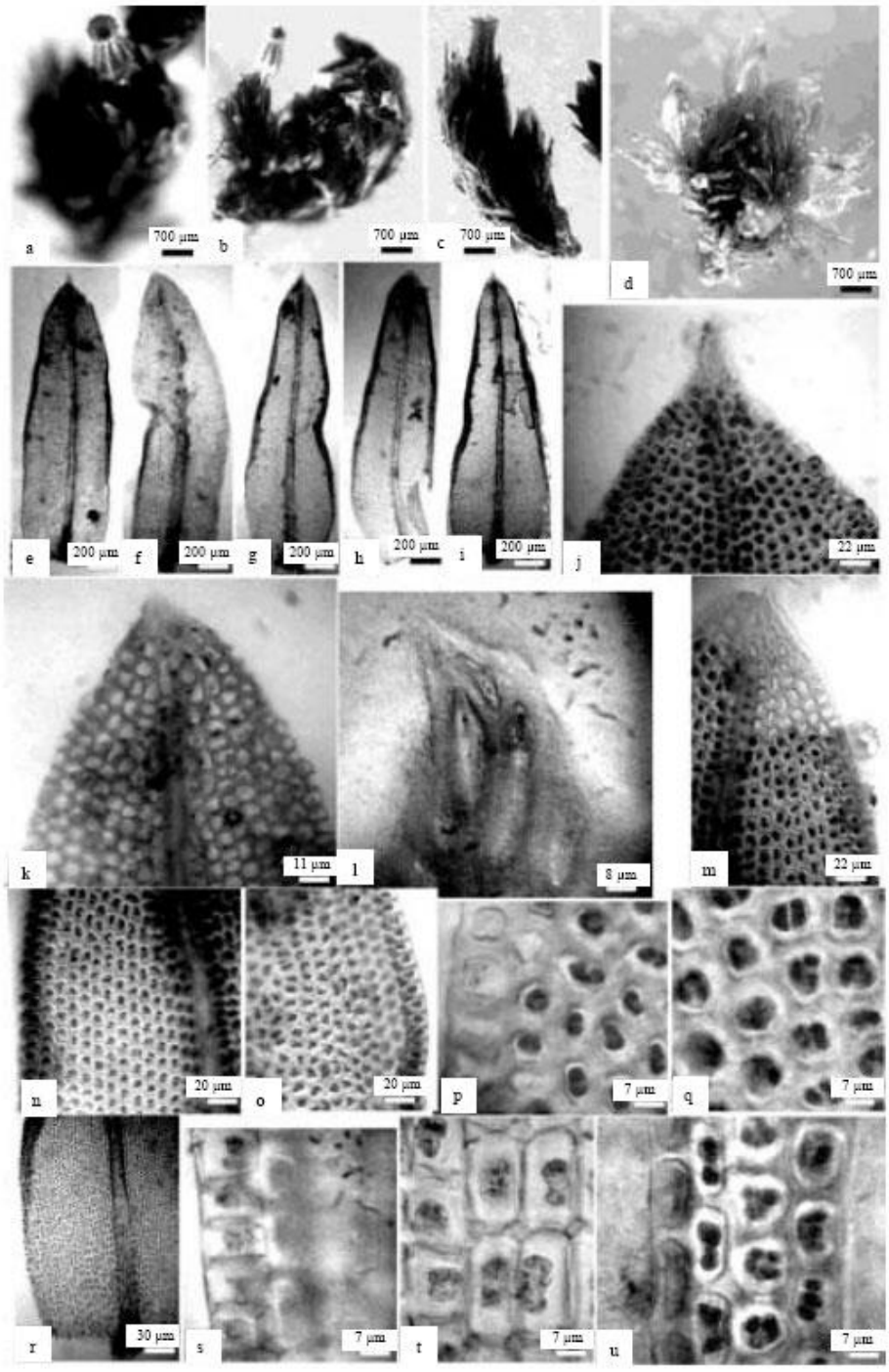

Fig. 4: *Orthotrichum schimperi* Hammar (a-h) Cross-sections of leaf stem. (i) Rosssections of stem. (j, k, m) Pristome teeth. (l) Capsule shape. (n, p) Spores. (o) Stomata of capsule

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