



First record of *Rhabdoweisia fugax* (*Rhabdoweisiaceae*) for Iraq and Middle Eastern countries and of the genus *Rhabdoweisia* for Iraq

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ABSTRACT

The moss *Rhabdoweisia fugax* (Hedw.) Bruch & Schimp. found in a specimen collected from Nursery of Forestry Department, college of Agriculture, University of Mosul, Iraq during a preliminary survey for the bryophytes that live in nurseries, as a manmade ecosystem. According to the previously published works on Iraqi mosses and the annotated catalogue of the Middle East bryophytes, the present paper is considered first record for the presence of this species in Middle East region including Iraq and it is, also, considered first record for the genus *Rhabdoweisia* Bruch & Schimp. for Iraq and the rest middle east countries except Lebanon.

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1. INTRODUCTION

Moss flora of Iraq that published in (1975) [1], included 145 species. The authors, Agnew and Vondracek, mentioned that more collection, particularly in the South of the country and along the border with Iran should yield some new records and extension of range and probably some species new to science. Number of the recorded species and infra specie rises to (193), according to Al-Ni'ma [2] and he stated that this number is not fixed and is likely to increase, since there are still many sites, within the vast and ecologically diverse Iraqi lands, have not been visited yet by moss collectors.

For the purpose of completing the available knowledge about bryoflora of the country, the present contribution is directed towards study of mosses in artificial ecosystems (i.e.) the nurseries, to which bryophytes spores and other reproductive propagate my reach, grow and blooming in the pots, with ornamental plants, due to availability of suitable conditions for their growth. The major sources of contamination in greenhouses were used containers and airborne spores [3]. The other probable source for spores, in Mosul city nurseries, is the loamy soil which the nurseries owners brought from the quarry located at left bank of Tigris River near Wanah village.

2. METHOD

In the nurseries (a manmade ecosystem) and on soil surfaces, of the pots with ornament plants, there is high probability for the bryophytes to grow accidentally due to availability the conditions for their growth. On 7th of May 2024, a total of 10 bryophyte specimens that grown on soil surfaces of pots were collected from nursery of the Forestry Department, College of Agriculture, and University of Mosul in Iraq. Elevation of the university's campus is 223 m.. About 1.0 centimeter thick layer of the soil with the bryophyte were scraped off using a blunt knife and placed in paper envelopes. In the laboratory, the specimens were air dried for 24 hours and placed in a new paper envelopes labeled with necessary information. The specimen examined and imaged using compound microscope model OMAX with digital camera model A59.4910. Identification performed depending on the keys mentioned in [4 & 5].

3. RESULTS AND DISCUSSION

Of the 10 collected specimens, the dwarf streak-moss *Rhabdoweisia fugax* (Hedw.) Bruch. & Schimp. Cited in Burch et al. [6], found, in one specimen only, grown with *Bryum caespitium* Hedw., *Microbryum davallianum* (Sm.) R. H. Zander and *Leptobryum pyriforme* (Hedw.) Wilson in a pot with the *Trifolium repens* as a weed.

Reviewing the annotated catalogue of the Bryophytes in Southwest Asia, by Al-Ni'ma in addition Frey & Kurschner [2 & 7] make sure that the present work is considered the first record for the species, not only in Iraq, but also in the other (17) countries of the South West Asia (Middle East). Furthermore it is considered, also, the first record for the genus *Rhabdoweisia* Bruch & Schimp. in the Middle Eastern countries except Lebanon, since Bizot [8] record the existence of *Rhabdoweisia crispate*, in that country, for a single occasion, as cited in Frey & Kurschner [7].

3.1. Classification:

According to [9] the species is classified as follow:

Class: Bryopsida

Order: Rhabdoweisiales D. Bell & Goffinet ord. nov.

Family: Rhabdoweisiaceae Limpr.

Genus: Rhabdoweisia Bruch & Schimp..

Species: *Rhabdoweisia fugax* (Hedw.) Bruch. & Schimp

The synonyms: after Lawton [4] are:

Weissia fugax Hedw., Sp. Musc. 64-65, t. 13. 1801.

Grimmia striata Web. & Mohr, Bot. Tasch. 143. 1807.

Weissia striata minor Hook. & Tayl., Musc. Brit. 45. 1818.

Weissia pumila Brid., Bryol. Univ. 1: 338-339. 1826.

Weissia leptodon Plaubel in Brid., Bryol. Univ. 1: 341-342. 1826.

Weissia fugax - gymnostoma Hartm., Skand. Fl. ed. 5. 396. 1849.

Weissia lindigiana Hampe, Ann. Sci. Nat. 5, 3: 352. 1865.

Rhabdoweisia lindigiana (Hampe) Mitt., Jour. Linn. Soc. 12: 54- 55. 1869.

3.2. Description:

3.2.1 Description for the genus *Rhabdoweisia*:

It was established in 1846 by Bruch, Schimper and Gumbel for three species of small mosses and belongs to the family Rhabdoweisiaceae [4].

Autoecious, Stem with central strand, leaves spreading when moist, crisped when dry, narrowly linear-lanceolate to lingulate, acute to obtuse, margin plane or recurved below, entire or toothed above; nerve ending below apex; basal cells rectangular, angular not differentiated cells above more or less quadrate, slightly mamillate or not, seta short; capsule erect, ovoid, striate; lid with oblique beak; annulus absent; peristome teeth 16, not divided; calyptra cucullate. A small genus of 5 species occurring in Europe, E. & C. Asia, Congo, Cameroon, Micronesia, In addition to S. & N. America [5]

3.2.2 Description for the species *R. fugax* Figure (1 a-c)

Small acrocarpic mosses, tall ranged between (0.5-1.0 cm), yellow green in color; Leaves crisped when dry spreading when moist, lower leaves slightly shorter than the upper one, linear lanceolate, very gradually tapering from narrow base to sharp point, leaf length (1.0 mm), Lamina (6-9) cells wide on each side of the nerve at middle of the leaf and (4-5); cells wide below leaf tip by ca. 200 µm, margin plain, minutely crenulated above, nerve ending below apex; cells in upper part of leaf rounded-quadrate, (12-14) µm, incrassate, bulging, basal cells rectangular, have same color as the rest cells. The specimen without capsule.

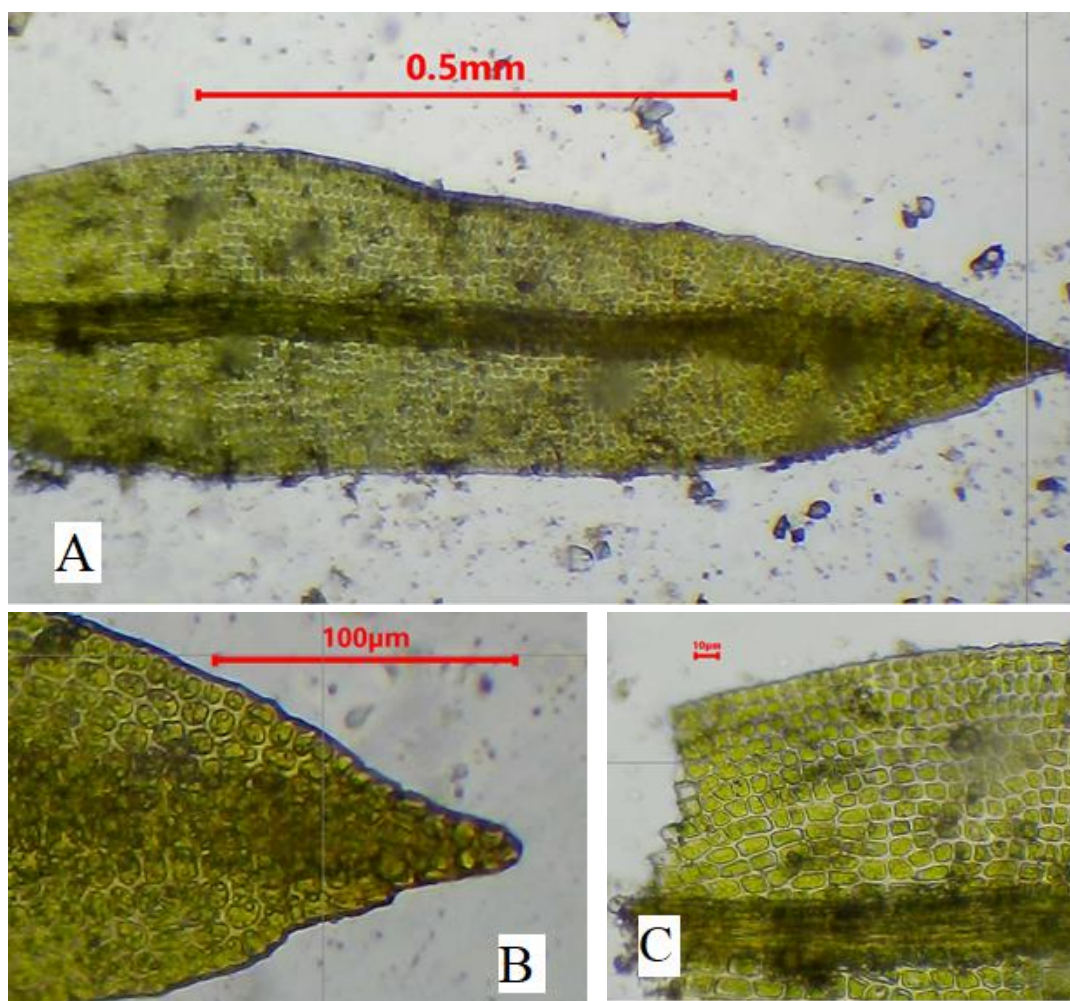


Figure (1 a-c). *R. fugax*: (A) leaf, (B) leaf apex and apical cells, (C) basal cells

3.3 Distinguishing between *Rhabdoweisia* species:

It depend mainly on characteristic features for the leaf as leaf shape, leaf margins and leaf cells, and to a less extent to the habitat and morphology of the capsule. Table 1.

Table 1. Identification key for 3 European species of *Rhabdoweisia*, modified after Smith [4]

A1	Cells in upper part of leaf 10-20 um wide, margin toothed margin toothed	<i>R. crenulata</i>
A2	Cells in upper part of leaf 8-12 (14) um wide, margin entire or denticulate above	B
B1	Lamina 3-4 (5) cells wide on either side of nerve 220 um from apex.	<i>R. fugax</i>
B2	Lamina 5-7 cells wide on either side of nerve 220 um from apex,	<i>R. crispata</i>

3.4. Taxonomic notes:

Classification of the Bryophyte is undergoing constant revisions, particularly in the light of phylogenetic inferences [9] Taxonomical position for the genus *Rhabdoweisia* changed over time. The most important changes were summarized in Table 2.

Table 2. The most important changes in the taxonomical position of *Rhabdowisia*

Classification System	Family	Order
Engler's system[10]	Dicranaceae Schimp.	Dicranales H. Philib. ex M. Fleisch.
Magill and Schlepe [11]	Rhabdoweisiaceae Limpr.	Dicranales H. Philib. ex M. Fleisch.
Bechteler et al.[9]	Rhabdoweisiaceae Limpr.	Rhabdoweisiales D. Bell & Goffinet ord. nov.

3.5. Distribution in the world:

R. fugax is widespread in Europe, north to N Fennoscandia and Arctic Russia, east to the Ural mountains, Portugal and Central Spain, Corsica, Sardinia and Bulgaria, Macaronesia, Sri Lanka, China, neotropic, Caucasus, Georgia. Central and South Africa. Central and South America. [12] in addition to West & North Britain and Ireland, Madiera, Azores, Guatemala [5] and [13].

4. CONCLUSION

There is a gap in the available information about Iraqi Bryophytes, since vast and diverse areas have not been visited yet by the researchers. Hence there is always a great probability to find a new species for the country or even for the science. The local researchers pay, almost, no attention to the bryophyte of the manmade ecosystems.

Conflict of interest

Author declares no conflicts of interest" or "We have no conflicts of interest to disclose.

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Ethical clearance

No ethical approval was required for this study as it did not involve human or animal subjects.

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