

## Record of New Bryophytes for Iraqi Bryoflora<sup>♦</sup>

B. A. Basheer Al-N'ima<sup>(1)</sup> Abdul-Hussein Al-Khyat<sup>(2)</sup>

(1) Dept. of Biology, College of Sciences, University of Mosul,

(2) The Iraqi National Herbarium, Abu Graib, Baghdad.

### الخلاصة

تم خلال الأعوام (2000-2003) جمع ما يقارب من (450) عينة من الحزازيات المورقة (mosses) و الكبدية (liverworts) من شمال العراق. وبالدرجة الرئيسة من محافظات دهوك وأربيل ونيوى. وقد أظهر تشخيص العينات أنها تعود إلى (40) جنسا مختلفا تضم (79) نوعا. من ضمنها (6) أنواع (خمسة من الحزازيات المورقة و واحد كبدي) (كبدية) تعد تسجيلا جديدا على العراق. تضمن البحث الحالي ذكرا لطبيعة الأنواع الجديدة فضلا عن مواطنها البيئية و توزيعها في العالم وكذلك في المناطق الجغرافية الطبيعية للعراق. الأجناس المسجلة حديثا هي:

1- *Fossombronia* Raddi (Liverwort)

2- *Ditrichum* Hampe

3- *Phascum* Hedw.

4- *Racomitrium* Brid.

أما الأنواع الحديثة فهي:

1- *Brachythecium rutabulum* (Hedw.) Br. Eur.

2- *Ditrichum homomallum* (Hedw.) E.G. Britton

3- *Fossombronia caespitiformis* De Not.

4- *Phascum curvicolle* Hedw.

5- *Phascum cuspidatum* Hedw. var. *Piliferum* (Hedw.) Hook et Tayl.

6- *Racomitrium affine* (Schleich. ex Web. et Mohr) Lindb

### ABSTRACT

During the years (2000-2003) about (450) Specimens of mosses and liverworts have been collected from the north part of Iraq, mainly Dohuk, Erbil and Nineveh provinces. Identification revealed that they were belong to (40) genera and (79) species. Among them (4) genera and six species (5 mosses and one liverwort) were considered new record for Iraq. Habitat of the new taxa beside their distribution in the world and Iraqi physiographic regions & districts were included in the present work.

The new-recorded genera are:

1- *Fossombronia* Raddi (Liverwort)

2- *Ditrichum* Hampe

3- *Phascum* Hedw.

4- *Racomitrium*.Brid.

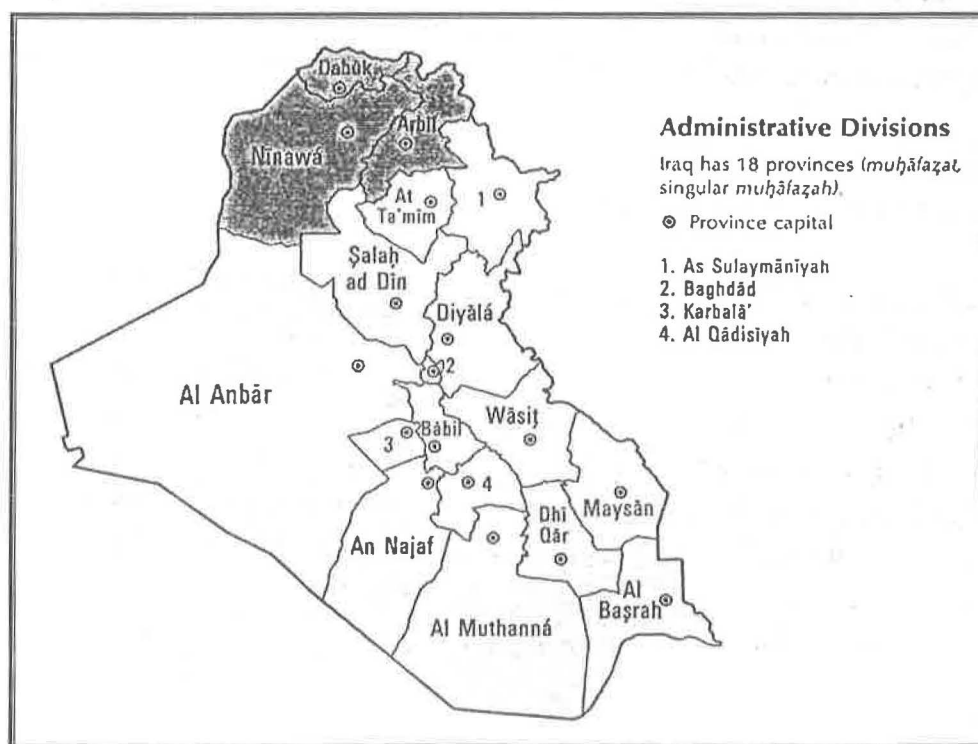
<sup>♦</sup>Presented at the first conference on Biology , University of Mosul ,college of Education , 4-5 September 2007

While the New species are:

- 1-*Brachythecium rutabulum* (Hedw.) Br. Eur.
- 2-*Ditrichum homomallum* (Hedw.) E. G. Britton
- 3-*Fossombronia caespitiformis* De Not.
- 4-*Phascum curvicolle* Hedw.
- 5-*Phascum cuspidatum* Hedw. var. *Piliferum* (Hedw.) Hook et al.
- 6-*Racomitrium affine* (Schleich. ex Web. et Mohr) Lindb.

## INTRODUCTION:

In Iraq and adjacent Arabian countries, there was little interest in the bryophytes that reflected by the number of related studies especially by local scientists. The first paper included a sign for Iraqi Bryoflora has been published in (1870) by <sup>(1)</sup>. Since that time up to date (*i.e.* over 125 years) only (13) works have been occurred they are <sup>(1-13)</sup>. Those papers that published before (1991) had been reviewed by <sup>(14)</sup>. After them only two papers have been published <sup>(12&13)</sup>. Most of these works are actually a list of species and their distribution places, included no description and identification keys. Consequently, the bryoflora image of this country is still out of focus and many works have to be conducted to improve it. This fact draws our attention to consider this group of plants. The first stage of consideration must include, as we think, a series of surveying studies, like the present one, to cover all physiographic regions & districts of Iraq.



‘Figure. 1’ Iraqi Map showing studied area.

## MATERIALS AND METHODS:

During the years (2000- 2003) about (450) Specimens of mosses and liverworts were collected from the North part of Iraq mainly Dohuk, Erbil and Nineveh provinces (figure 1). The specimens were air dried, labeled, numbered and deposited at the herbarium of the College of Sciences, Department of Biology, University of Mosul (MUH). Then the taxa were examined and identified using the keys included in the following references (10,15,16,17&18).

To confirm the identification, the collected specimens have been compared with those found in Baghdad University Herbarium, and have been collected and identified by Agnew and Vondracek.

## RESULTS & DISSCUSSION:

Identification of the (450) mosses and liverworts specimens revealed that they are (79) different taxa belongs to (40) genera which intern belongs to (20) Families and (14) orders. Among them (4) genera and (6) species found to be new records for Iraqi bryoflora, since they have not been collected or mentioned before by any author of the (13) published works. Within the records, there is only one genus and one species of liverworts.

The new-recorded genera are:

- |  |                                    |
|--|------------------------------------|
| 1- <i>Fossombronia</i> Raddi, 1818 (Liverwort) | 2- <i>Ditrichum</i> Hampe, 1867    |
| 3- <i>Phascum</i> Hedwig., 1801                | 4- <i>Racomitrium</i> Bridle, 1818 |

While the New species are:

- 1- *Brachythecium rutabulum* (Hedwig.) B. S. G., 1853.
- 2- *Ditrichum homomallum* (Hedwig.) Hampe, 1867.
- 3- *Fossombronia caespitiformis* (Raddi) Dumortier,
- 4- *Phascum curvicolle* Hedwig. 1801.
- 5- *Phascum cuspidatum* Hedwig. 1801 var. *Piliferum* (Hedwig.) W. J. Hooker et Taylor, 1818.
- 6- *Racomitrium affine* (Schleicher ex Weber et Mohr) Lindberg. 1875

The present study will be concentrated, mainly, on the new taxa. Therefore, their habitat and distribution in the world beside physiographic regions & districts of Iraq will be given below.

### 1-*Brachythecium rutabulum* (Plate, 1 a&b)

Habitat: Lax tufts or scattered shoot on soil under tree trunks and may be submerged in water.

-In the World; Europe, Iceland, Farose, Algeria, Micronesia, America, Tasmania, New Zeland, Hawaii, Syria, Lebanon, Palestine, Iran, Turkey, Aphganistan.

-In Iraq; 1-Mountain Region-Amadiya District: Dohuk Gali by dam body, Al-Ni'ma 26 March 2003 no. 208 MUH.

2-Upper Plain and Foothill Region-Nineveh District: Water Purification plant on left bank of Tigris River at Mosul city, Al-Ni'ma 15 May 2002 no. 365 MUH.

**2- *Ditrichum homomallum* (Plate,1 c&d)**

Habitat: Slightly silky, Yellowish green tufts on sandy soil.

-In the world; Turkey, Iceland, North America and Europe.

-In Iraq; Mountain Region-Amadiya District: Zawita, Al-Ni'ma 17 March 2002 no. 260 MUH

**3- *Fossombronia caespitiformis* (Plate,1 e&f)**

Habitat: On shaded sandy soils and on soil under the rocks

-In the world; Lebanon, Jordan, Palestine, Oman, Cyprus, Turkey, Iran and Britain.

-In Iraq; Mountain Region-Amadiya District: Gali Zanta, Al-Ni'ma 4 June 2002 no. 394 & 395 MUH.

**4- *Phascum curvicolle* (Plate,2 a)**

Habitat: On calcareous soil.

-In the world; Palestine, Turkey, Greece, Spain, Central and North Europe.

-In Iraq ; Mountain Region-Amadiya District: Dohuk Gali, by dam body, Al-Ni'ma 26 March 2002 no. 436 MUH.

**5- *Phascum cuspidatum* var. *Piliferum* (Plate,2 b&c)**

Habitat: Small plant look as an immature moss grows on soil in an open area.

-In the world; Syria, Jordan, Palestine, Iran, Turkey, Algeria, Morocco and North America.

-In Iraq; Upper Plain and Foothills Region-Upper Jazira District, Jadala, Al-ni'ma 14 March 2002 no. 105 MUH.

**6- *Racomitrium affine* (Plate, 2 d-f)**

Habitat: erect moss forming small cushions in the mountain regions mainly on rocks, May be found also on tree trunks in the very humid areas.

-In the world; Turkey, Greece; North, West and Central Asia, Japan, Iceland, Greenland, North America and Europe.

-In Iraq; Mountain Region-Amadiya District: Denarta, Al-Ni'ma 4 June 2002 no. 180 MUH; Gali Zanta, Al-Ni'ma 4 June 2002 no. 194 MUH; Dohuk Gali by dam body, Al-Ni'ma 26 March 2002 no. 204 MUH;

Zawita, Al-Ni'ma 17 March 2002 no. 262 MUH; Al-Shaikh Adi, Al-Ni'ma 16 April 2002 no. 284 & 285 MUH.

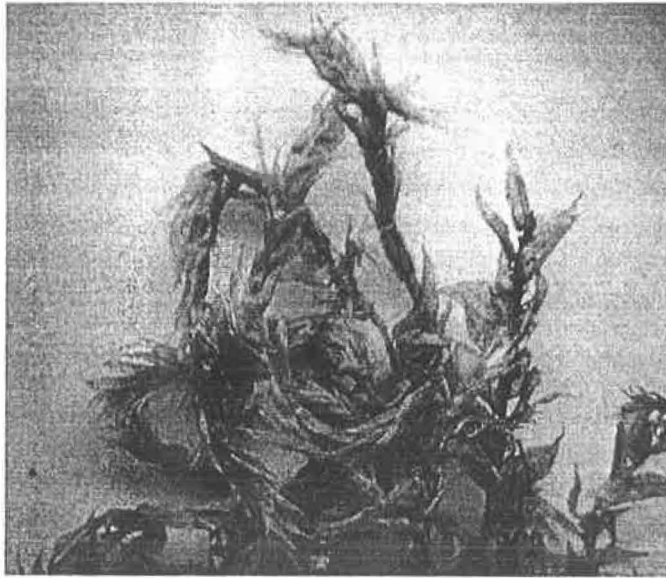
Mountain Region-Rwanduz District: Betwana, Al-Ni'ma 16 April 1992 no. 15 MUH, Baikhal village, Al-Khayat 10 March 2001 no. 39 MUH.

Richness degree of any bryoflora with plant species depends mainly upon availability and diversity of the suitable habitat. Scarcity of rain, low relative humidity and high temperature are considered as the most important factors affecting growth and distribution of Bryophytes. The climate of Iraq is of semi-arid type characterized by high mean annual air temperature, low atmospheric humidity and scanty rainfall <sup>(19)</sup>. Iraqi bryophytes flora considered poor <sup>(10)</sup>. Number of the Mosses and liverworts species recorded in Iraq and adjacent regions up to (1991) summarized in 'Table 1'. In comparing, one can easily find that Iraq occupies middle situation. In one

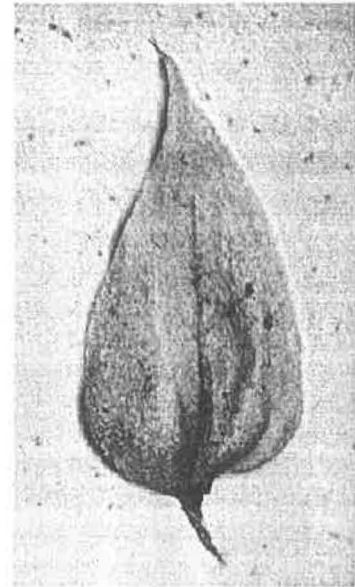
'Table 1' Numbers of the liverworts and moss species in Iraq and adjacent countries. The numbers computed from <sup>(2)</sup>.

The Country	Liverworts	Mosses	Total
Iran	065	297	362
Iraq	008	167	175
Jordan	012	105	117
Kuwait	000	019	019
Saudia Arabia	023	098	121
Syria	012	109	121
Turkey	155	670	825

Hand, it is poorer than Turkey & Iran and, in the other, is richer than Syria & Jordan. The sum of recorded taxa in the country, tends to increase with passing time, since very vast area of different habitat have never been visited by researchers yet, but the increasing number will not approach the Turkey one.



(A)



(B)



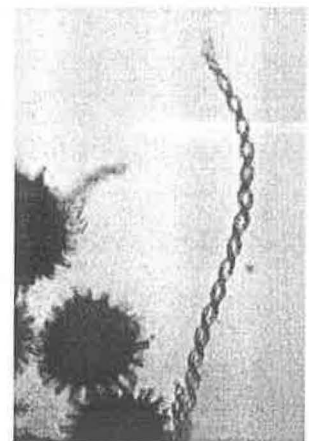
(C)



(D)



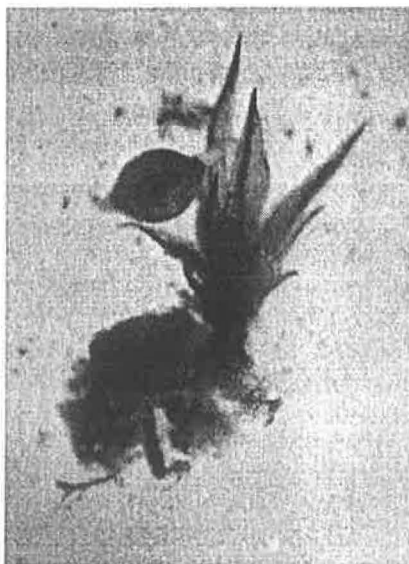
(E)



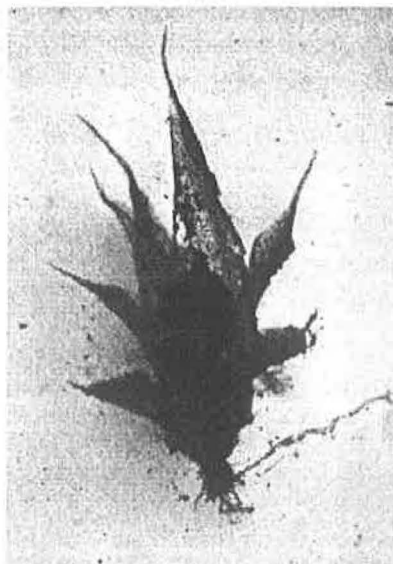
(F)

(Plate,1): A&B, *Brachythecium rutabulum* gametophyte plant (x6) & Leaf (x25); C & D, *Ditrichum homomallum* gametophyte plant (x7.5) & leaf (x35); E&F, *Fossombronia caespitiformis* whole plant (x13) & spores with elater (x200).

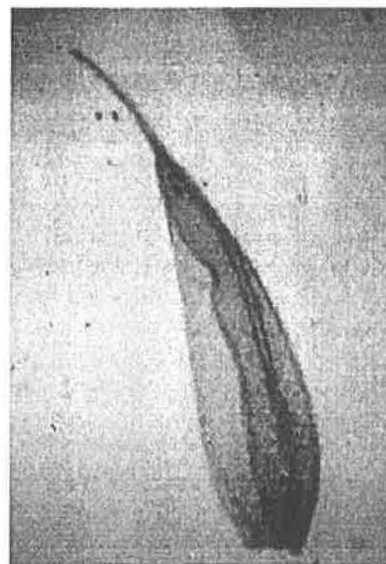




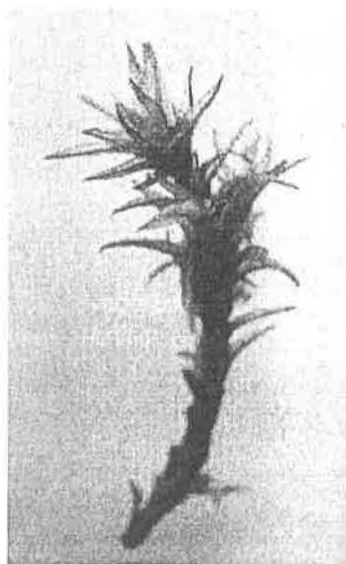
(A)



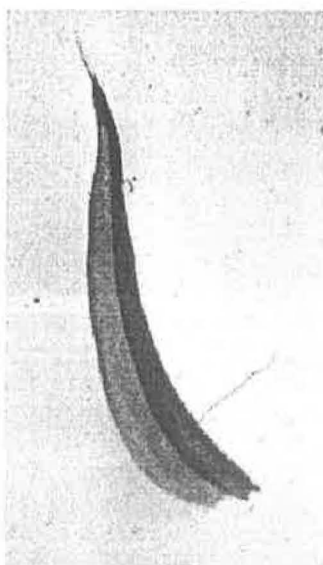
(B)



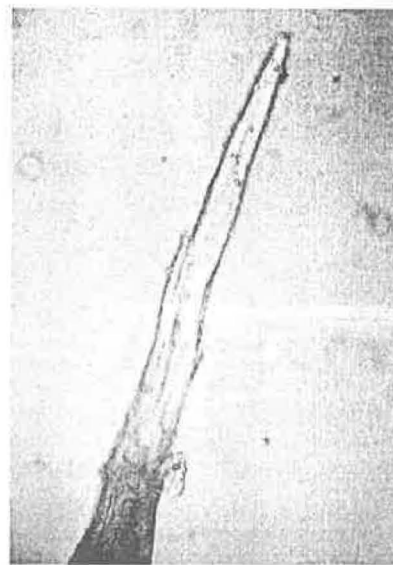
(C)



(D)



(E)



(F)

(Plate,2): A, *Phascum curvicolle* (x30); B&C, *Phascum cuspidatum* var. *Piliferum* gametophyte plant (x20) & leaf (x35); D-F, *Racomitrium affine* gametophyte plant (x37.5), leaf (x30) & hyaline leaf apex (x300).

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