Two new mosses of Grimmiaceae for Iranian bryoflora

Saeed Shirzadian1* & Samaneh Akhoondi Darzikolaei2

Received: 21.04.2016 / Accepted: 30.08.2016

1Iranian Research Institute of Plant Protection, Agricultural Research Education and Extension Organization (AREEO), Tehran, Iran
2Department of Biology, College of Basic Sciences, Islamic Azad University, Islamshahr Branch, Tehran, Iran
*Correspondent author: sa.shirzadian@areeo.ac.ir

Abstract. Two species of mosses, namely, *Grimmia dissimulata* and *Schistidium pruinosum*, belonging to the family Grimmiaceae collected from Khorassan Razavi province (NE Iran) are found new for the Iranian bryoflora. Based on the recent literature, 16 species of *Grimmia* and 13 species of *Schistidium* have been reported from Iran so far. Diagnostic characters, geographical distribution and illustrations are provided herewith.

Keywords. bryophytes, *Grimmia*, Iran, Khorassan Razavi province, *Schistidium*

INTRODUCTION

The family Grimmiaceae is commonly found growing in temperate to polar zones and tropics to alpine regions including about 200 species in 10 genera (Streiff, 2005) distributed all over the world. They are xerophytic and colonizers of bare, usually dry and exposed rocks and stones, forming predominantly dark green to blackish cushions or tufts with a marked preference for acidic bedrock. In Iran, this widely distributed family embraces 5-genera, i.e. *Niphotrichum* (Bednarek-Ochyra) Bednarek-Ochyra & Ochyra, *Coscinodon* Spreng., *Grimmia* Hedw., *Schistidium* Bruch & Schimp. and *Racomitrium* Brid. (Smith, 2004). According to the checklist of the Iranian bryoflora published by Akhani & Kürschner (2004), 13 species of *Grimmia* Hedw., are introduced to Iran while Kürschner & Frey (2011) considered 14 species for this genus from Iran.
Fereidounfar et al. (2011) recorded *Grimmia longirostris* Hook. from Hamedan province while Shirzadian (2011) recorded another species of the genus i.e. *G. montana* Bruch & Schimp. from Tehran province and later, he also reported *G. plagiopodia* Hedw. from Yazd province (Shirzadian et al., 2014). In this way, the quantity of Iranian Grimmiaceae reached 16 in number.

On the other hand, 13 species of *Schistidium* Bruch & Schimp. (another member of the family) are so far found in Iran (Akhani & Kürschner, 2004, Kürschner & Frey, 2011; Zare et al., 2011). *Schistidium* differs from *Grimmia* mainly by its columella which in former, it remains attached to the operculum (Bremer, 1980). Recently, (Akhoondi et al., 2014) have reported *Syntrichia sinensis* (Müll. Hal.) Ochyra from Azarbayejan province (NW Iran). For an updated list of the bryological literature on Iran, which would be of great interest to the bryologists, reference should be made to the recent work of Ghahremaninejad et al. (2016).

**MATERIAL AND METHODS**

Moss samples were collected from Khorassan Razavi province (NE Iran) in summer 2015. The samples were air-dried in room temperature and stored in the standard paper packets. For morphological observations, the samples were soaked in water for a few minutes for revival. Different plant parts were observed under the microscope (Olympus-BH2) and photographed. Identification was made by the help of Smith (2004) and Kürschner & Frey (2011). Voucher specimens are preserved in the herbarium of the Ministry of Jihad-e-Agriculture ("IRAN") at the Iranian Research Institute of Plant Protection (Tehran, Iran).

**RESULTS**

Following two species, namely, *Grimmia dissimulata* E.Maier and *Schistidium pruinoseum* (Wilson ex Schimp.) G.Roth. are discovered for the first time in Iran.

**Grimmia dissimulata** E.Maier (Fig. 1)

Plants in lax, readily blackish green tufts, hoary when dry with shoots up to 2 cm long. Leaves loosely appressed to imbricate, ± straight and flat when dry, patent to spreading when moist, lanceolate, tapering to acute at apex, minutely denticulate. Cross section of costa with 4 cells wide on adaxial side, having single layer of 4 guide cells at extreme base.
Basal laminal cells near costa 4-6 times as long as wide, leaf basal cells nodulose, above cells quadrate to rounded-quadrate, sinuose, bistratose at margins. The specimen was found sterile. Grimmia dissimulata is often confused with G. trichophylla Grev. while the nature of costa cross section is the best character for differentiation between the two (Smith, 2004). In addition, G. dissimulata usually grows on pure limestone, while the latter mostly grows in siliceous habitats. The following are some remarkable differences that can easily separate the two species:

1. Grimmia dissimulata is in loose cushions and mats habits, but G. trichophylla could be found in dense cushions; 2. cells in the basal part of leaf in G. dissimulata are short rectangular with thick and often sinuous walls and only have one or two rows of smooth and hyaline cells at the border, whereas, G. trichophylla possesses elongate basal cells with thin and smooth walls and the hyaline border often consists of many rows of cells; 3. in G. dissimulata, the thickened cell walls bulges in the cross section of leaf, hence it appears as if the cells are papillose while this character is not found in G. trichophylla; and 4. two rows of guide cells can be seen in G. trichophylla but G. dissimulata has just one row (Lüth, 2012). According to Greven (2003), G. dissimulata is synonymous to G. austrofunalis Müll. Hal., however, this is not accepted by Smith (2004) who believes the latter does not occur in the northern hemisphere.

Grimmia dissimulata is calcicolous and grows
Shirzadian & Akhoondi Darzikolaei. Two new mosses of Grimmiaeace from Iran

on limestone walls, tombs and rocks.

Specimen seen. Iran: Khorassan Razavi province, Kalat, Zavin, 59° 54’ 36’’ 44’, 1260 m, on rocks, 02.06.2015, 0551 B (IRAN).

Distribution. Northern and montane Europe, Iceland, Caucasus, Asia (Smith, 2004) and Iran.

**Schistidium pruinorum** (Wilson ex Schimp.) G.Roth (Fig. 2)

Plants in dense olivaceous to brownish tufts, rarely in patches, often hoary and dry, shoots 1.5-3.0 (-4.5) cm long. Leaves appressed when dry, erect-patent when moist, straight, lanceolate to ovate, acute to obtuse, keeled. Leaves with stiff hair points reaching up to 1.6 mm long, terete, straight, entire to spinolose below; margins mostly decurrent to basal part of the leaf. Costa papillose above on abaxial side; leaf basal cells rectangular, chlorophyllous, walls moderately thickened, sinuous or not, basal marginal cells quadrature or wider than long, walls with ± uniform thickness, cells above rounded, slightly sinuose or not, coarsely papillose on both surfaces, partly bistratose, opaque in upper part of leaf, 6-9 µm wide in upper and mid-leaf. The specimen was found sterile. **Schistidium pruinorum** grows on dry or seasonally moist, usually exposed calcareous rocks and cliffs.

Specimen seen. Iran: Khorassan Razavi province, Kalat, Zavin, 59° 54’ 36’’ 44’, 1260 m, on rocks, 02.06.2015, 0552 B (IRAN).

Distribution. Northern and montane Europe, Iceland, Caucasus, Asia (Smith, 2004) and Iran.

ACKNOWLEDGEMENT

The authors would like to thank Prof. F. Ghahremaninejad for editing the manuscript.

REFERENCES


Bremer, B. 1980. A taxonomic revision of **Schistidium** (Grimmiaeaceae, Bryophyta) 1. – Lindbergia 6: 1-16.


Streiff, A. 2005. Phylogenetic study of the **Grimmia** Hedw. (Grimmiales, Bryopsida) based on a combination of morphological and molecular characters. – Thèse de Doctorat ès Sciences de la Vie (PhD), Faculté de Biologie et Médecine de l’Université de Lausanne.


****