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 Kürsch-ner & 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 Azarbeyjan 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).

**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.

**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).
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 Grev-en (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
on limestone walls, tombstones 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.** Syria, Turkey, Morocco and 12 European countries up to Scotland in the north (Maier, 2002, 2010) and Iran.

**Schistidium pruinosum** (Wilson ex Schimp.) G.Roth (Fig. 2)
Plants in dense ovovise 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 spinulose 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 quadrate or wider than long, walls with ± uniform thickness, cells above rounded, slightly sinuous 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 pruinosum** 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, Ice-land, Caucasus, Asia (Smith, 2004) and Iran.

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

**REFERENCES**


****