Nova Biologica Reperta 3 (2): 163-166 (2016)

دو گونه جدید از تیره Grimmiaceae برای فلور خزه‌ای ایران

سعید شیرزادیان[۱*] و سمانه آخوندی درزیکلائی[۲]

دریافت: ۱۳۹۵/۰۲/۰۲ / پذیرش: ۱۳۹۵/۰۶/۰۹

[۱]مؤسسه تحقیقات گیاه‌پزشکی کشور، سازمان تحقیقات، آموزش و ترویج کشاورزی، تهران، ایران
[۲]گروه زیست شناسی دانشگاه آزاد اسلامی، واحد اسلامشهر، تهران، ایران
[*]مسئول مکاتبات: sa.shirzadian@areeo.ac.ir

چکیده. دو گونه خزه جدید به نام‌های *Grimmia dissimulata* و *Schistidium pruinosum* متعلق به تیره Grimmiaceae برای فلور خزه‌ای ایران از استان خراسان رضوی گزارش می‌شوند. براساس تحقیقات انجام شده، تا کنون ۱۶ گونه *گریمیا* و ۱۳ گونه *شیستیدیوم* از ایران گزارش شده است. در این تحقیق، صفات کلیدی، پراکنش جغرافیایی و همچنین شکل‌های هر دو گونه آورده شده است.

واژه‌های کلیدی. استان خراسان رضوی، ایران، خزه‌گیان، *گریمیا*، *شیستیدیوم*

Two new mosses of Grimmiaceae for Iranian bryoflora

Saeed Shirzadian[1*] & Samaneh Akhoondi Darzikolaei[2]
Received: 21.04.2016 / Accepted: 30.08.2016

[1]Iranian Research Institute of Plant Protection, Agricultural Research Education and Extension Organization (AREEO), Tehran, Iran
[2]Department 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.

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[DOI: 10.21859/acadpub.nbr.3.2.163]

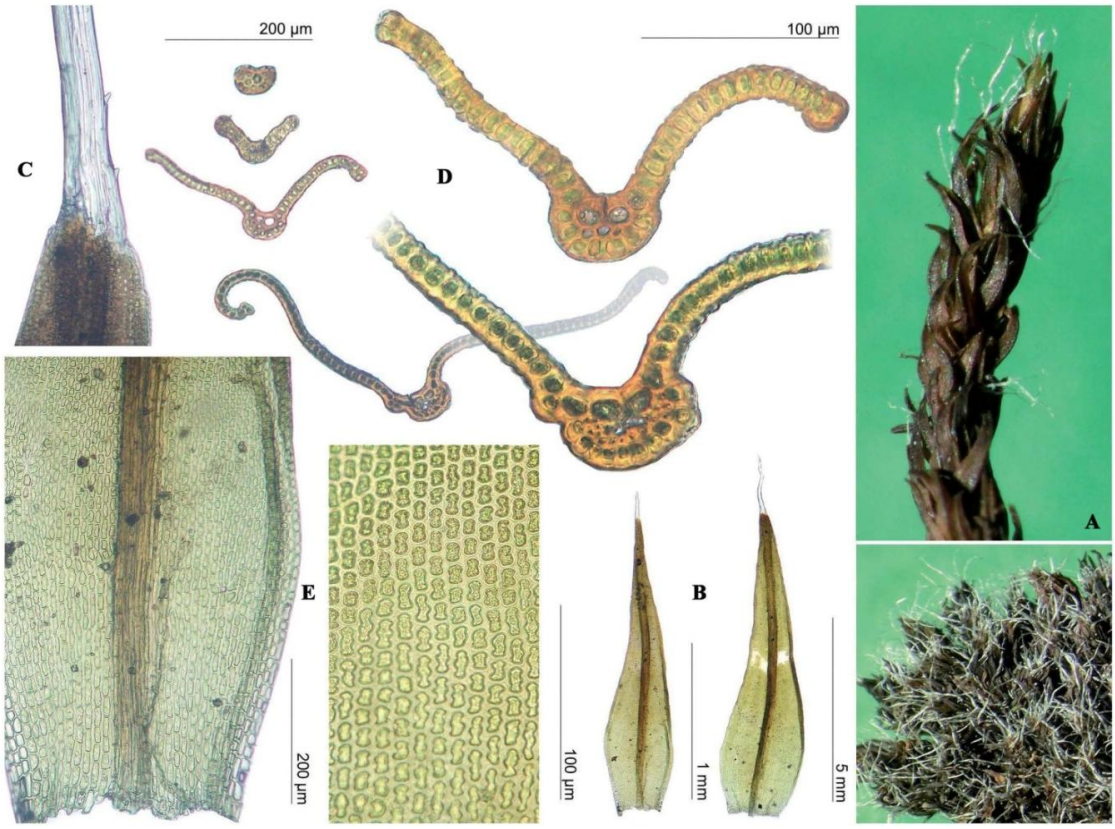

Fig. 1. *Grimmia dissimulata*. **A**: habit, **B**: leaves, **C**: hyaline hair point, **D**: cross sections of leaf at different portions, **E**: leaf cells (derived from M. Lüth, 2012).

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 Grimmias 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 pruinosum* (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, channeled above; margins recurved below with hyaline points to ½ length of lamina in upper leaves, minutely denticulate. Cross section of costa with 4 cells wide on-adaxial side, having single layer of 4 guide cells at extreme base.

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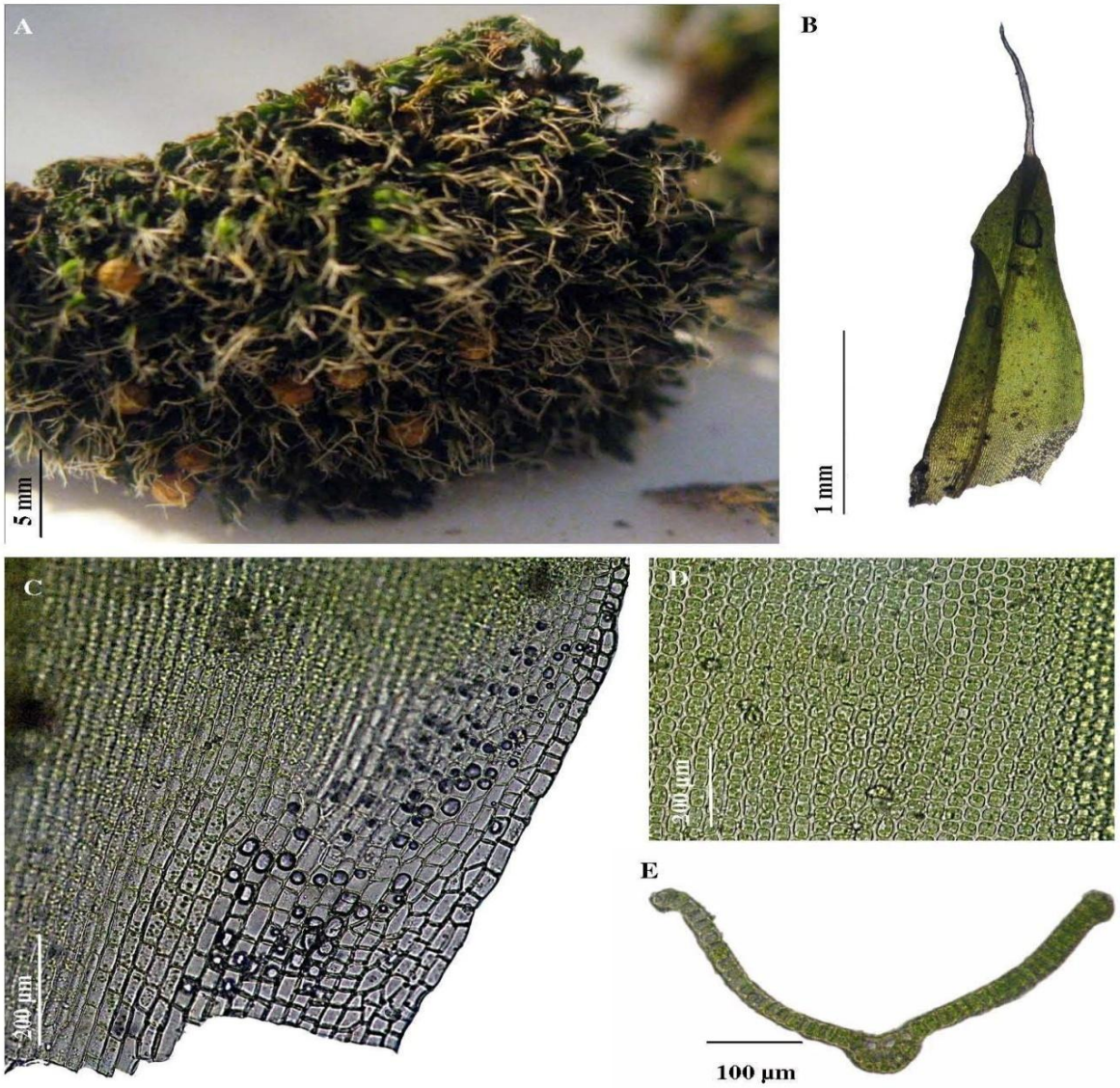

Fig. 2. *Schistidium pruinosum*. **A**: habit, **B**: leaf, **C**: lower laminal cells, **D**: mid-leaf cells, **E**: cross section of leaf (photo: S. Akhoondi).

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

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, Marocco 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 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 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 editting the manuscript.

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