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New Moss Records from Azerbaijan

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Abstract

As a result of bryological excursion to the Khizi region of Azerbaijan, *Mnium thomsonii* Schimp., *Racomitrium microcarpon* (Hedw.) Brid, *Grimmia longirostris* Hook., *Plagiothecium succulentum* (Wills.) Lindb *Tomentypnum nitens* (Hedw.) Loeske and *Sanionia uncinata* Loeske are reported as new for Azerbaijan. Illustrations, geographic distribution and comparisons with morphologically similar taxa are given.

Key words: Biodiversity, Moss, New Records, Khizi, Azerbaijan

Azerbaycan'dan Yeni Karayosunu Kayıtları

Öz

Azerbaycan'ın Khizi bölgesine yapılan briyolojik gezi sonucunda *Mnium thomsonii* Schimp., *Racomitrium microcarpon* (Hedw.) Brid, *Grimmia longirostris* Hook., *Plagiothecium succulentum* (Wills.) Lindb *Tomentypnum nitens* (Hedw.) Loeske ve *Sanionia uncinata* (Hedw.) Loeske Azerbaycan için yeni takson olarak tespit edilmiştir. Resimler, coğrafi dağılım ve morfolojik olarak benzer taksonlarla karşılaştırmaları verilmiştir.

Anahtar kelimeler: Biyoçeşitlilik, Karayosunu, Yeni Kayıt, Khizi, Azerbaycan.

1. Introduction

Bryophyte (Mosses, Liverworts and Hornworts) are the most ancient and primitive plants. Mosses occupy a special place in plant diversity and are of great importance in water and soil ecosystems despite being small organisms.

Bryophytes, especially mosses (Bryopyta) have a worldwide distribution, constitute the main part of biocoenosis and play the role of important part of flora and indicator in the environmental pollution

(Shevchenko, 2004). Mosses compose the largest group of bryophytes. The study of plant cover of any region as well as solution of issues with regards to genesis and future development of flora are not possible without considering the degree of participation of mosses in various plant groups. They are an integral part of the ecosystems and play an important role in the formation of vegetation. The comprehensive study of ecological properties of mosses of a particular areas and possibilities of application is important for the efficient use and

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protection of vegetation. Mosses constitute an integral part of the flora and participate actively in the nutrient. Besides, mosses protect soil from erosion by affecting its physical and chemical properties and have a positive effect on the regulation of the water balance and maintenance of a certain amount of water (Bardunov, 1984; URL 1).

The bryophyte flora of Azerbaijan is little known. Azerbaijan existing moss flora has reached 419 taxa including the studies conducted in the period from

1846 until the end of 2020 (368 species, 33 varieties, 18 formas) (Weinmann, 1846; Brotherus, 1892; Ignatov and Afonina, 1992; Ignatov et al., 2006; Gasimov and Novruzov, 2017).

Although investigations on systematical bryology have been carried out in different regions of Azerbaijan for this reason, the Khizi region has not been investigated up to date. The Khizi region where is study area is located in the Western of Azerbaijan and at a distance of 70 km from Baku (Figure 1).



Figure 1. Map of Study area.

The district is located in a multi-hilly plateau stretching from the southern slope of the Great Caucasus range to the Samur-Davachi valley. Most of the district is covered with forest. The district joins the Caspian Sea in the East. The foothills of the district have a 30 km boundary with the Caspian Sea. Altgaj which is one of the most beautiful, most admired, and picturesque places of Azerbaijan is located in the Khizi region. Khizi consists of

mountainous and foothills zones. The top of the mountainous zone “Dubrar” (Two brothers) is located at 2205 m a.s.l.. Dubrar (two brothers), the summit zone of the mountains, is 2205 m above sea level. Khizi is one of the great woodlands of Azerbaijan (9931 ha, 6%). Its climate is mild, and the weather is dry. The area has a rich bio-variety, landscape and ecosystems (forests, forest-steppe, steppe, grey mountains, subalpine and alpine

ecosystems). Woody flora of the forest consists of such trees and bushes as *Quercus iberica* Stev., *Quercus macranthera* F.et M., *Carpinus orientalis* Mill., *Fagus orientalis* Lipsky, *Fraxinus excelsior* L., *Ulmus laevis* Pall., *Pyrus communis* L., *Acer platanoides* L., *Juniperus communis* L., *Lonicera racapriofolium* L., *Ligustrum vulgare* L. There are *Pyrus salicifolia* Pall., pomegranate, agkist-rodon halys, tamarix bushes on the banks of the rivers. Tree-bush species such as willow-leaved pear, *Crataegus oxyacantha* L., *Paliurus spina-christi* Mill., *Cotoneaster racemiflora* (Dsf.) Koch., *Malva alcea* L., *Berberis vulgaris* L., *Rosa cinnamomea* L. grow in mountainous sparse woods. Edge of rivers consists of *Punica granatum* L., *Rhamnus pallasii* Fisch. & C.A.Mey., *Hippophae rhamnoides* L., *Lycium russian* L. box-thorn (Prilipko, 1970; Gadjiev, 1970).

2. Material and Methods

Bryophyte specimens were collected from different localities in May and June, 2019 in Khizi region (Azerbaijan). Bryophyte samples were examined with stereomicroscope and light microscope. The samples were identified by consulting keys (Nyholm, 1993, 1998; Smith, 2004; Cortini-Pedrotti, 2001, 2006; Frey et al., 2006; Brugués et al., 2007; Atherton et al., 2010; Guerra et al., 2010, 2018; Brugués et al., 2015.). Collected samples were stored in the personal collection at the Institute of Botany, Azerbaijan National Academy of Sciences, Baku, Azerbaijan and duplets of these moss samples were stored at the Biology Department, Faculty of Science, Karadeniz Technical University, Turkey.

3. Results and Discussion

Mnium thomsonii Schimp. (Figure 2)

Specimens examined: Azerbaijan (Khizi region): Gizilgazma village 1, 49°54'37"N, 19° 02'43"E, 1247 m.a. s. l.

Plant, dense, dark or pale green, up to 6 cm high. Stems erect. Leaves incurved ovate to ovate-lanceolate, margins plane and double spinose teeth from middle to apex. Costa excurrent, cells of leaves quadrate-hexagonal. *M. thomsonii* is similar to *Mnium marginatum* (With.) P. Beauv., but differs in having toothless on abaxial side at above and costa reaching apex, excurrent. *M. thomsonii* grows in crevices of rocks and on base-rich soil.

Racomitrium microcarpon (Hedw.) Brid. (Figure 3)

Specimens examined: Azerbaijan (Khizi region): Gizilgazma village 2, 40° 52'78.8"N, 48°56'86.2"E, 1276 m.a.s. l.

Plant greenish to blackish and up to 4 cm. high. Leave lanceolate. Costa extends to the apex. Cells bistratose. Basal cells thick walled, Leaf margin unistratose. hair point present and serrate. This species is closely related to *R. macounii*, but *R. microcarpon* is distinguished from *R. macounii* in having bistratose or unistratose in two rows, and hair point serrate. *R. microcarpon* grows on siliceous rocks.

Grimmia longirostris Hook. (Figure 4)

Specimens examined: Azerbaijan (Khizi region): Gizilgazma village 1, 40° 54'37"N, 19° 02'43.0"E, 1247 m.a.s. l.

Plant grey cushions, up to 1,5 cm high. Leaves erect, ovate or lanceolate. Costa, strong at base, extends to apex. Cells above rectangular to quadrate, unistratose, at base 1–2-stratose. This species is distinguished from other *Grimmia* species in having the costa reniform with U-shaped adaxial sinus in cross section. *G. longirostris* grows on acidic or basic rocks.

Plagiothecium succulentum (Wills.) Lindb. (Figure 5)

Specimens examined: Azerbaijan (Khizi region): Khalanj village, 40°54'37"N, E 19° 02'43.0"E, 733 m.a.s. l.

Plant golden green, very glossy. Leaves weakly asymmetric or symmetric. Leaf margins plane, apex entirely. Costa double, extend to half of the leaves. Alar cells are rectangular, cells of leaves linear-rhomboidal. This species is similar to *Plagiothecium nemorale* (Mitt.) A. Jaeger, *P. succulentum* is distinguished from *P. nemorale* in having the overlapping leaf cells in transverse rows. *P. succulentum* grows on wet soil in woods, on wet rocks, and tree bases.

Tomentypnum nitens (Hedw.) Loeske (Figure 6)

Specimens examined: Azerbaijan (Khizi region): Khalanj village, 40°54'37"N, E 19° 02'43.0"E, 733 m.a.s. l.

Plants robust, yellowish green, Stems erect or tomentose with rhizoids. Leaves erect, lanceolate-triangular, tapering. Costa ending below apex, up to ¾ of leaf. cells rounded-rectangular at base, linear-vermicular at above. *T. nitens* is close to *T. falcifolium*, but different in having the leaves are lanceolate-triangular. Also, this species is distinguished from *Homalothecium* species, in having stems erect or tomentose with rhizoids and leaf margin entirely. *T. nitens* grows in calcareous fens and wet fields.

***Sanionia uncinata* (Hedw.) Loeske (Figure 7)**

Specimens examined: Azerbaijan (Khizi region):
Altiagaj National Park, 40°54'37.0"N,
19°02'43.0"E, 1300 m.a.s.l. 40°54'37"N,

rectangular, porose, cells above linear. *S. uncinata* is distinguished from *S. orthothecioides*, by regularly pinnately branched, and margins plane or rarely partly recurved. *S. uncinata* grows on rocks, on wood, in moist turf.

Plant yellowish green and up to 10 cm high. Leaves falcate, plicate. margins plane. Basal cells are

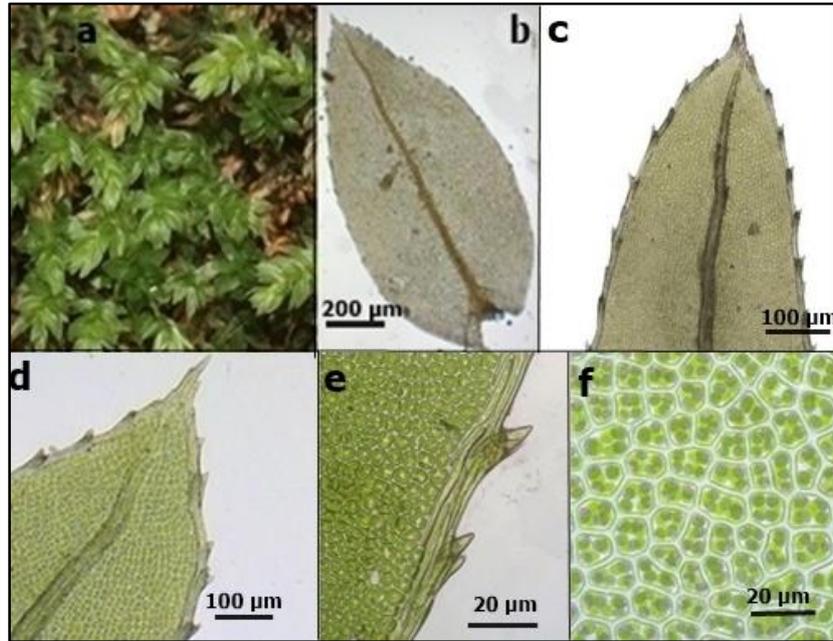


Figure 2. *Mnium thomsonii*: a) Habit, b) Leaf, c-d) Upper part of leaf, e) Leaf margin, f) Mid-leaf cells
M. thomsonii grows in crevices of rocks and on base-rich soil.

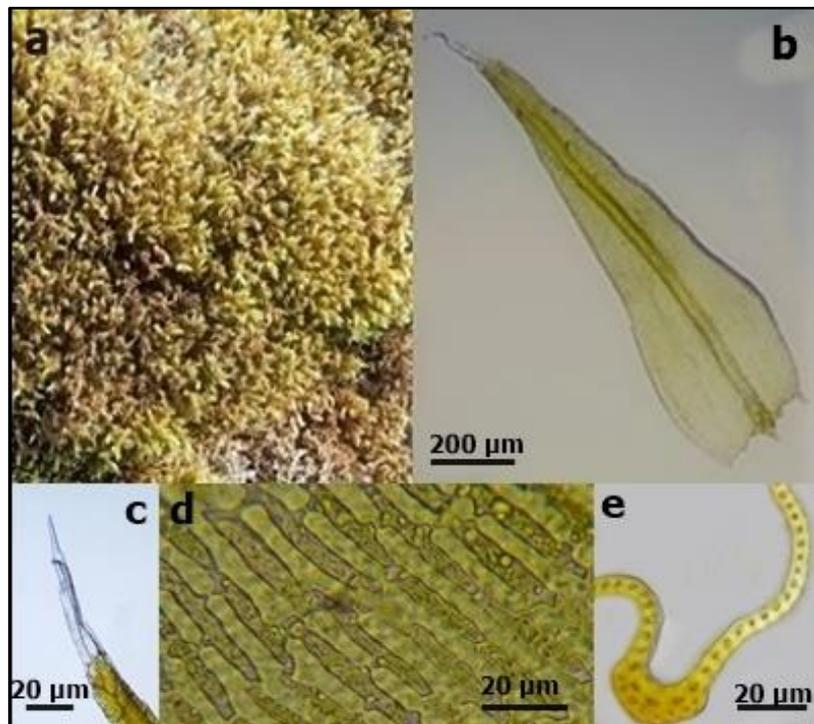


Figure 3. *Racomitrium microcarpon*: a) Habit, b) Leaf, c) Hair point, d) Basal cells, e) Leaf cross section

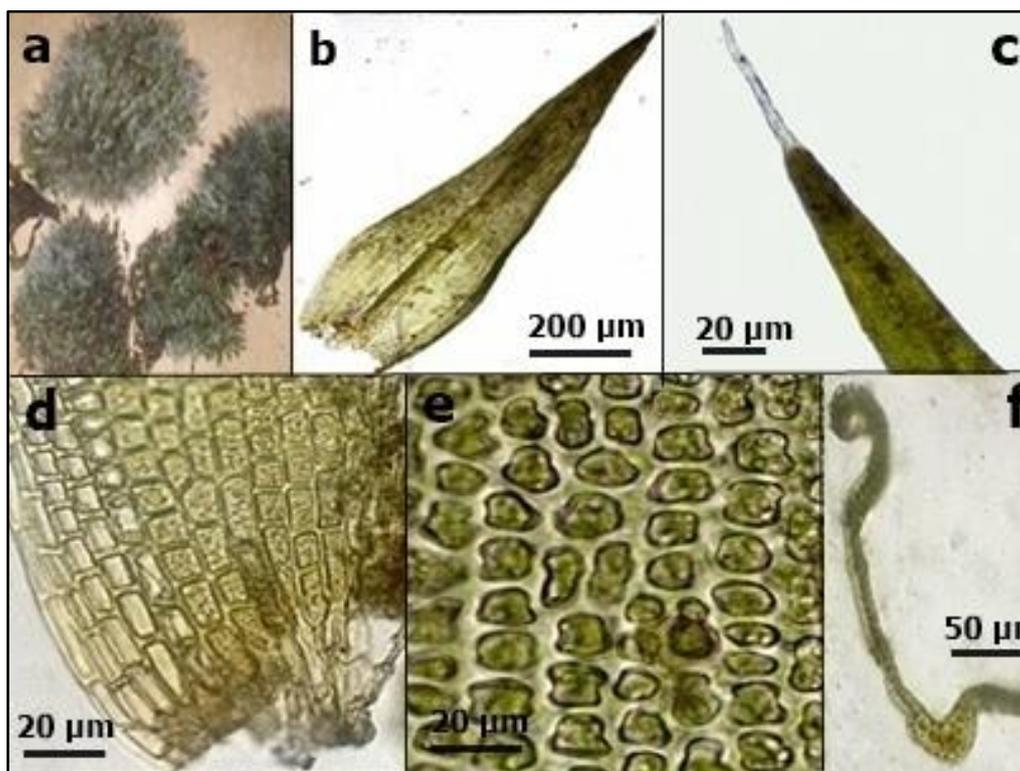


Figure 4. *Grimmia longirostris*: a) Habit, b) Leaf, c) Hair point, d) Basal cells, e) Mid-leaf cells, f) Leaf cross section.

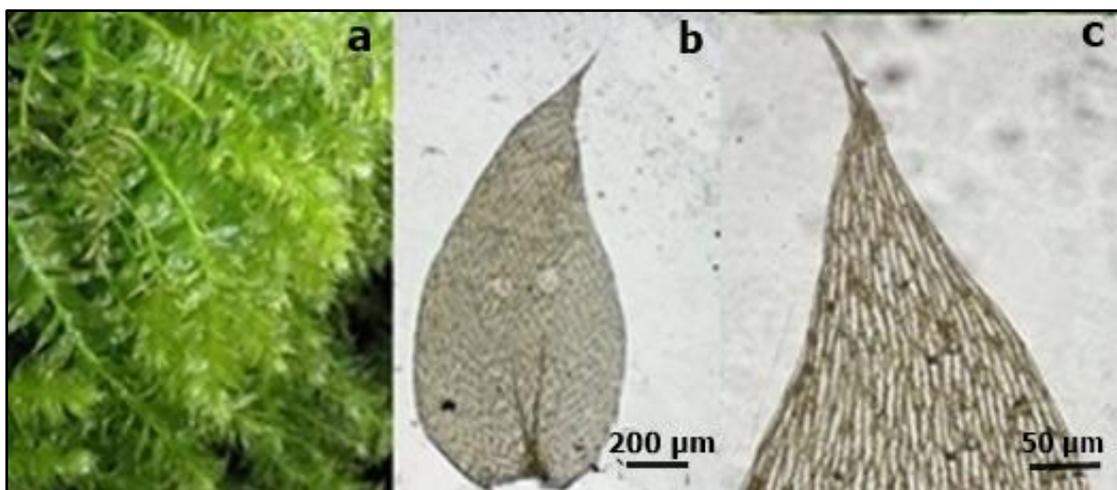


Figure 5. *Plagiothecium succulentum*: a) Habit, b) Leaf, c) Leaf apex

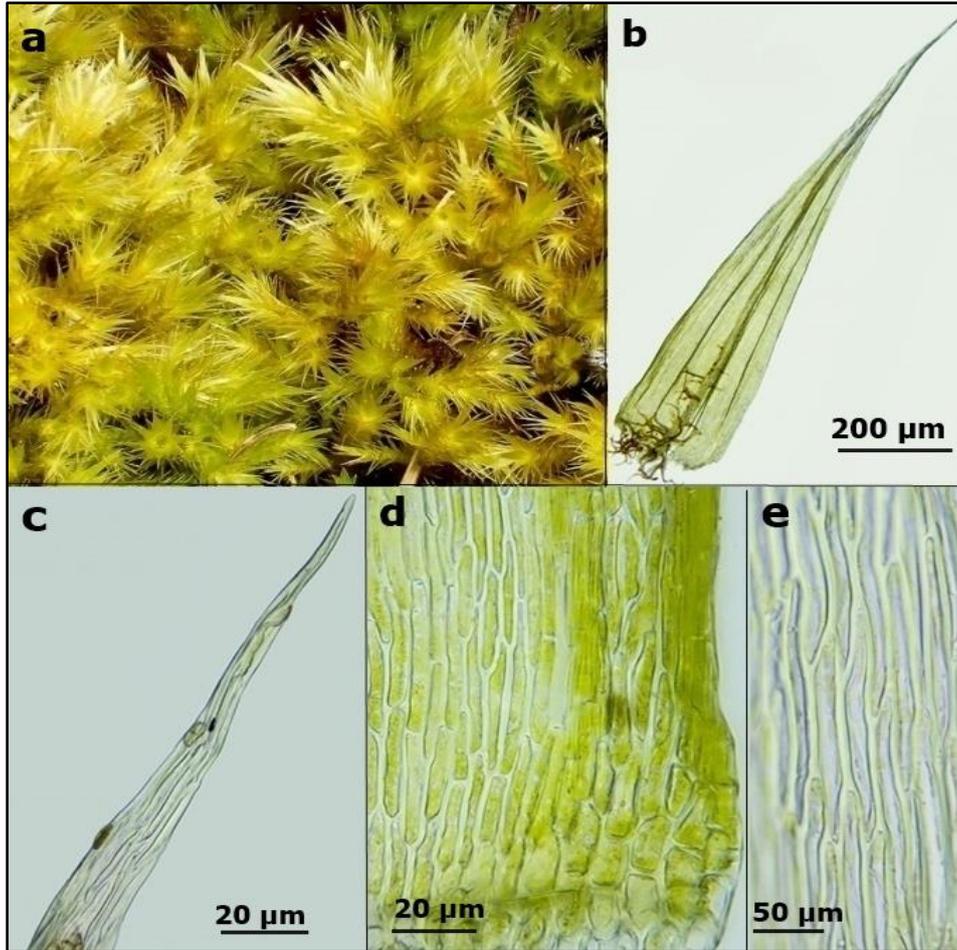


Figure 6. *Tomentypnum nitens*: a) Habit, b) Leaf, c) Leaf apex, d) Basal cells, e) Mid-leaf cells.

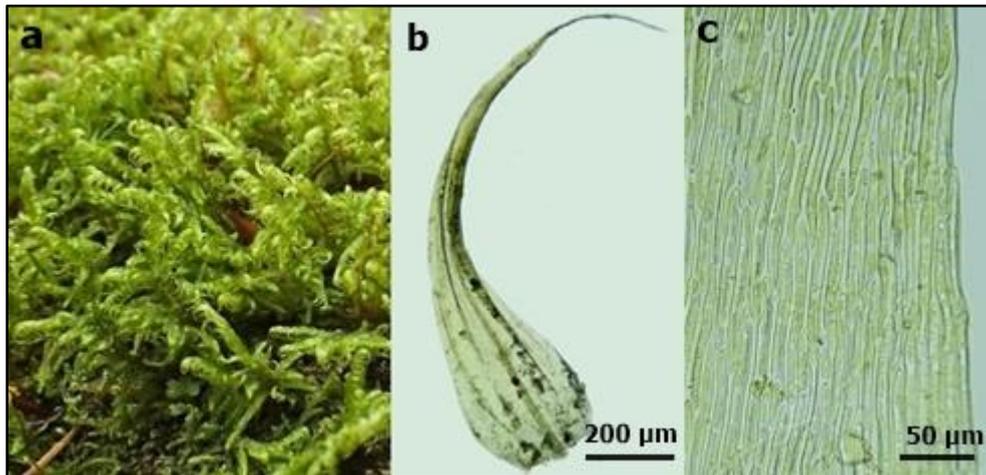


Figure 7. *Sanionia uncinata*: a) Habit, b) Leaf, c) Leaf margin cells

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