

## ***Acarospora scotica*, *Anema tumidulum* and *Megaspora rimisorediata* – three newly recorded lichens for Turkey**

KENAN YAZICI  
Karadeniz Technical University  
Faculty of Science  
Biology Department  
61080, Trabzon, Turkey  
E-mail: kcagri\_1997@yahoo.com

ALI ASLAN  
Yüzüncü Yıl University  
Faculty of Pharmacy  
65080 Campus, Van, Turkey  
Faculty of Arts and Science  
Dept. of Biology  
Kyrgyz-Turkish Manas University  
Bishkek, Kyrgyzstan  
E-mail: aliaslani@yahoo.com

Accepted 14. January 2021. © Austrian Mycological Society, published online 15. February 2021

YAZICI, K., ASLAN, A., 2021: *Acarospora scotica*, *Anema tumidulum* and *Megaspora rimisorediata* – three newly recorded lichens for Turkey. – Austrian J. Mycol. 28: 115–121.

**Key words:** *Ascomycota*, biodiversity, crustose lichens, new records. – Lichen flora of Turkey.

**Zusammenfassung:** Drei Flechtenarten, nämlich *Acarospora scotica*, *Anema tumidulum* und *Megaspora rimisorediata*, gesammelt in den Provinzen Tunceli und Bingöl, werden neu für die Türkei gemeldet. *Acarospora scotica* ist auch neu für Asien. Kurze Beschreibungen, einschließlich der geographischen Verbreitung, und Vergleiche mit ähnlichen Taxa werden gegeben.

**Abstract:** Three lichen species, namely *Acarospora scotica*, *Anema tumidulum* and *Megaspora rimisorediata*, collected in Tunceli and Bingöl provinces are reported as new to Turkey. *Acarospora scotica* is also new to Asia. Short descriptions, including geographic distribution, and comparison with similar taxa are provided.

Approximately 1750 lichen taxa are known from Turkey and it is assumed that there are nearly 3000 lichen taxa (JOHN & TÜRK 2017, JOHN & al. 2020). In recent years, knowledge of the lichen flora of Turkey has significantly increased and substantial new lichen records of already known species and new lichen species have been added to Turkish lichen diversity census (JOHN & TÜRK 2017, JOHN & al. 2020) but more extensive surveys are still needed to unexplored regions of Turkey, especially those situated in east and south-east Anatolia (e.g. Tunceli, Bingöl, Batman, Hakkari, Siirt, Şırnak, Mardin). During the project "Lichen flora of Tunceli and Bingöl Provinces", some interesting lichen taxa were recorded. Previously, only 16 lichens have been reported from Bingöl province and 91 from Tunceli (ÇOBANOĞLU & DOĞAN 2010, ÇOBANOĞLU & YAVUZ 2007, SONG & al. 2019).

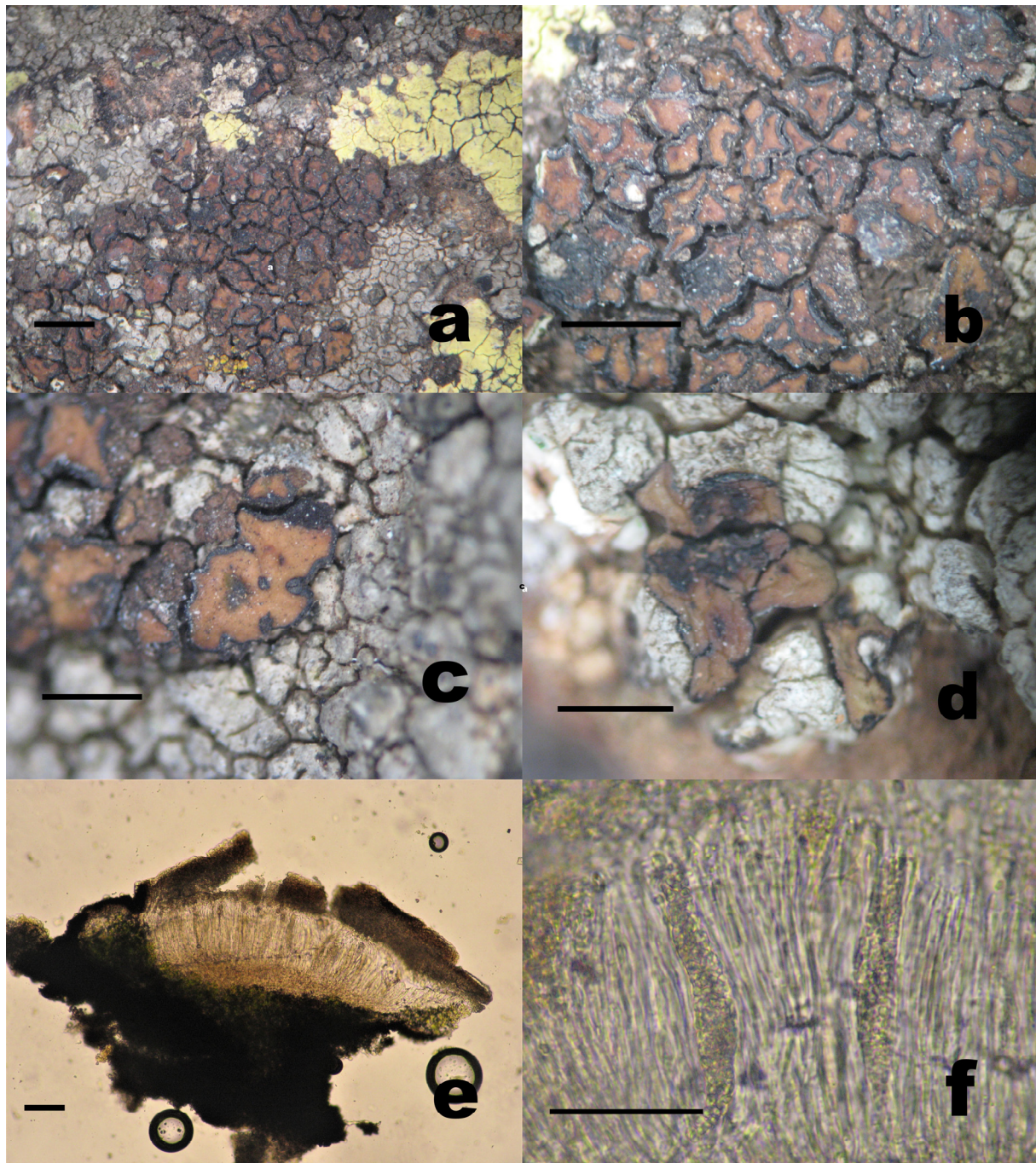


Fig. 1. *Acarospora scotica*. *a* Thallus with areoles and host *Circinaria caesiocinerea*. *b*, *c* Thallus and areoles with black edged. *d* Section through an apothecium with epihymenium, hymenium and hypothecium. (in water), *e* Section through an apothecium with epihymenium, hymenium and asci. *f* Section of apothecia with hymenium, asci and ascospores. *d*, *e*, *f* In water Bars *a* 2 mm, *b*, *c*, 1 mm, *d*, *e*, *f*, 50  $\mu$ m.

No specimens of *Anema* have been found in Turkey before, while 41 taxa from the genus *Acarospora*, and one *Megaspora* species were reported previously (JOHN & TÜRK 2017, JOHN & al. 2020). Here, we add three lichen species to the lichen flora of Turkey of which one is a new record for Asia.

## Materials and methods

**Material:** The lichen samples were collected in August 2018, June 2019 and August 2019. The descriptions are based on Turkish specimens and vouchers are stored in the Herbarium of the Biology Department, Karadeniz Technical University, Trabzon, Turkey (KTUB).

Air dried samples were studied with a Nikon Zeiss Stemi 2000-c stereomicroscope and a Zeiss Axio Imager A2 light microscope. Microscopical examination of hand-made sections was done in water (incl. all measurements). Macrophotographs and microphotographs were taken with the digital camera Zeiss AxioCam ERc5s. The nomenclature follows JØRGENSEN & al. (2013), NASH & al. (2007), SMITH & al. (2009), and VALADBEIGI & al. (2011).

**Study area:** The study area in Tunceli is mountainous with mostly open areas and poor forests dominated by *Quercus*, but slopes of the valleys are covered by *Platanus*, *Fraxinus*, *Juniperus*, *Carpinus*, *Salix*, and grassland includes also bushes and weeds. Forest understory flora is very poor in these areas while all nearby mountains have a lot of rock habitats (BAYTOP & DENIZCI 1963). The climate is characterized by long, very cold and snowy winters, and short cool summers, with a temperature range of  $-5.4^{\circ}\text{C}$  to  $35^{\circ}\text{C}$ , and a mean annual rainfall of around 816 mm (AKMAN 1999).

Bingöl region occupies several stream valleys with a poor plant cover. Only 15 % of it is covered by forests, and additional 75 % by meadows and grasslands. This area has a severe continental climate with rather plenty of rain and snow but hot and dry summers and long snowy winters. The mean annual temperature is  $8.7^{\circ}\text{C}$  and the temperature ranges from  $-9^{\circ}\text{C}$  to  $39^{\circ}\text{C}$ . The mean annual rainfall is about 900 mm (AKMAN 1999). Tree communities in the study area are formed by mostly *Quercus*, but some areas are completely treeless (BAYTOP & DENIZCI 1963).

These investigated regions are located in the Taurus orogenic belt of the highland district of Eastern Turkey. Lower Permian metasediments and Upper Permian subcrystalline limestone are the oldest exposed formations. Lower Cretaceous flysch overlies partly eroded Upper Permian limestone discordantly. The enormous thickness of flysch, tuffs, basaltic - andesitic flows, and limestones constitute deposits of Lower Cretaceous, Upper Cretaceous, and Lower Eocene; the deposits of each of these periods are separated from the others by an unconformity. Middle Eocene limestone is overlain discordantly by Lower Miocene marine limestone which grades upward into lignite-bearing marls of Middle Miocene and red beds of Upper Miocene (AFSHAR 1965).

## Species records

*Acarospora scotica* HUE, Nouv. Arch. Mus. Hist. Nat., Paris, 5 sér. 1: 147 (1909) – Fig. 1

According to JOHN & TÜRK (2017) and JOHN & al. (2020), this species is new for Turkey. Additionally, it is new for Asia since it was not reported previously (SMITH & al. 2009). The sample was slightly deviating from the description in NASH & al. (2007), and the details are given below.

**Description:** Thallus crustose, areolate, up to 1.5–2 cm in diam.; areolae 0.5–0.6 (–1) mm across, with black edges, sometimes scattered, edges of the areolae sometimes wavy and curled upwards; usually without apothecia growing on *Circinaria caesiocinerea*, one sample with apothecia, growing on *Lecanora cenisia* ACH.; disc 0.1–0.2 mm across; hypothecium ±light brown; hymenium 140–150  $\mu\text{m}$  high; asci 80–90  $\times$  9–12  $\mu\text{m}$ ; ascospores 3–3.4  $\times$  1.2–1.5  $\mu\text{m}$ .

**Specimen examined:** Turkey, Bingöl: on the road Karlıova, exit of Kalencik village, main roadside, 39° 09' 41" N, 40° 54' 07" E, 1752 m s.m., on *Circinaria caesiocinerea* (NYL. ex MALBR.) A. NORDIN, SAVIĆ & TIBELL and on *Lecanora cenisia*, 24. August 2019, K. YAZICI & A. ASLAN (KTUB-2470). Accompanying species: *Candelariella vitellina*, *Lecanora cenisia*, *L. polytropa*, *L. rupicola*, *Physcia dubia*, *Rhizocarpon geographicum* and *Rinodina milvina*.



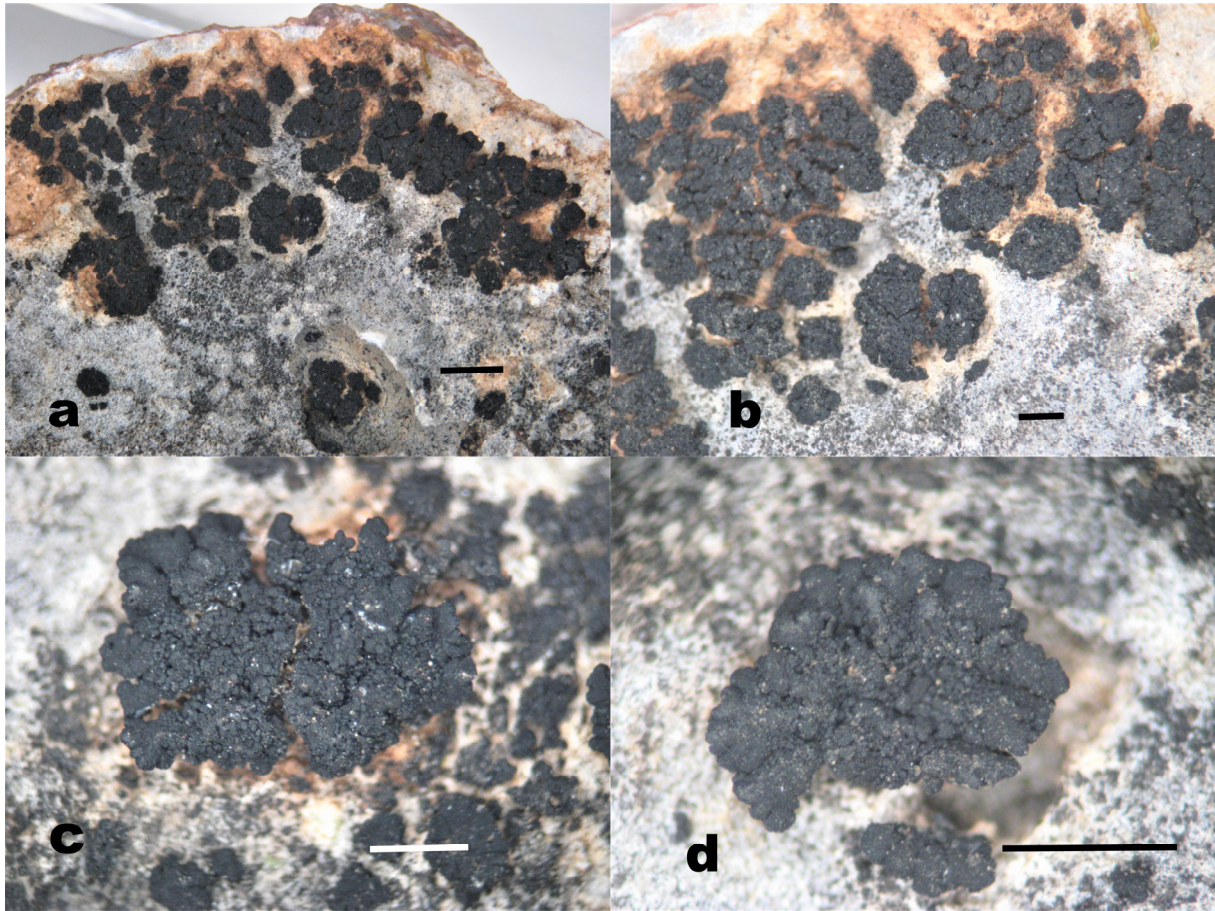


Fig. 2. *Anema tumidulum*, habitus. *a, b* Squamules with granulose surface and black-brown crust. *c, d* Single rosette shaped squamule with short marginal incised lobules and characteristic outgrowths on the surface in the centre. Bars *a* 2 mm, *b, c, d* 1 mm.

**Notes:** *Acarospora scotica*, which is a mainly Mediterranean-Atlantic species with occurrences in the Alps, grows mostly as small pieces on lichens such as *Protoparmelia montagnei* and *Acarospora* sp., as well as on granitic, siliceous and volcanic rocks (NASH & al. 2007). We found it on *Circinaria caesiocinerea* and also *Lecanora cenisia*. *Acarospora scotica* was previously known from North America, Mexico and Europe (Greece, Italy, Spain, Switzerland). (NASH & al. 2007, SIPMAN & RAUS 2002).

This lichenised fungus has the appearance of *Acarospora pseudofuscata*; but blackened edges of the areoles in *A. scotica* help to differentiate it from *A. pseudofuscata* (KTUB-2461) with concolorous or somewhat darker margins of areoles (YAZICI & al. 2018).

***Anema tumidulum*** HENSSEN ex P. M. JØRG, M. SCHULTZ & GUTTAVÁ, *Herzogia* 26(1): 2 (2013) – Fig. 2

According to JOHN & TÜRK (2017) and JOHN & al. (2020), this species is new for Turkey. The sample is slightly deviating from the description in JØRGENSEN & al. (2013) and the details are given below.



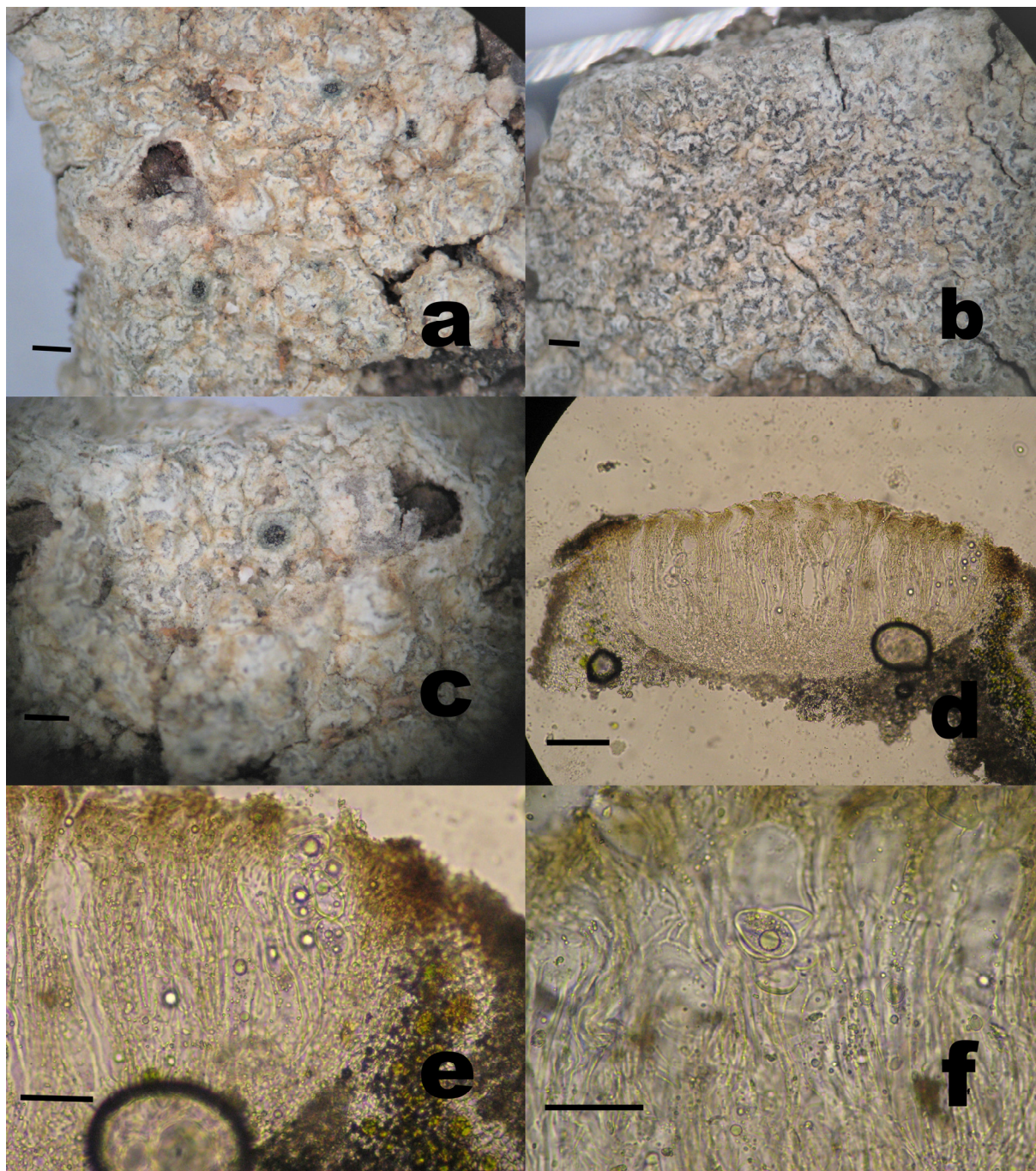


Fig. 3. *Megaspora rimisorediata*: a Thallus with apothecia and elongated soralia. b Thallus without apothecia and with elongated soralia. c Thallus and elongated soralia and apothecium. d Section through an apothecium with epihymenium, hymenium, hypothecium, asci and oil droplets. e Section through an apothecium with epihymenium, hymenium, hypothecium, ascus, ascospores and oil droplets. f Section through an apothecium with epihymenium, hymenium, ascus, ascospores and oil droplets. d, e, f In water. Bars a, b, c 1 mm, d 100  $\mu$ m, e, f 50  $\mu$ m.

**Description:** Thallus crustose, squamulose, developing into a diffuse black-brown to black crust; squamules, up to 3.5(+4.5) mm in diam., erect, shield-like rosettes, with mostly granular isidia-like outgrowths concentrated in the centre, attached by a central holdfast, not pruinose, lobulate; lobes about 10–15 pieces with incised margins, often shiny. Apothecia absent; photobiont chroococcoid.

**Specimen examined:** Turkey, Tunceli: Tunceli-Pülümür-Nazimiye road, side of Munzur river, opposite of Gökçek village (east), 39° 11' 25" N, 39° 41' 29" E, 980 m s.m., 16. August 2019, K. YAZICI & A. ASLAN (KTUB-2472). Accompanying species *Placynthium nigrum*.

**Notes:** *Anema tumidulum*, a common species in Central Europe (JØRGENSEN & al. 2013), grows mostly on steeply inclined, sunny surfaces of calcareous or basic siliceous rocks with periodical water seepage after rain, with optimum in upland areas (JØRGENSEN & al. 2013). It was previously known from Europe (Austria, Germany, Czech Republic, France, Hungary, Italy, Norway, Slovakia and Switzerland) and Asia (Kazakhstan) (JØRGENSEN & al. 2013).

*Anema tumidulum* has the appearance of *Anema moedlingense*, but the latter lacks spherical outgrowths and its squamules are suberect and deeply sulcate with a reticulate surface (KTUB-2471).

***Megaspora rimisorediata*** VALADB. & A. NORDIN, Lichenologist 43 (4): 287 (2011). – Fig. 3

According to JOHN & TÜRK (2017) and JOHN & al. (2020), this species is new for Turkey. The sample is slightly deviating from the description in VALADBEIGI & al. (2011), and the details are given below.

**Description:** Thallus crustose, up to 4 cm across, greyer than others in Asia; soralia 0.3–0.5(–0.7) mm long, up to 0.1 mm wide; soredia darker than thallus; Apothecia up to 0.8 mm across (only one out of four Turkish samples with apothecia); disc black or bluish black, up to 0.3 (–0.4) mm across; hypothecium 90–10 µm high; hymenium colourless, 250 µm high; epihymenium light brown-yellow with oil droplets, 35–40 µm high; asci *Aspicilia*-type, 58 × 150 (–190) µm, ascospores 32.5–35 × 16–25 µ. Chemistry K–, C–, P–.

**Specimen examined:** Turkey, Tunceli: center, on the way Sütlüce village, 2 km to Sütlüce village, 39° 07' 19" N, 39° 34' 12" E, 1095 m s.m., on *Quercus*, 17. July 2018, K. YAZICI & A. ASLAN (KTUB-2473); Nazimiye, between Tunceli-Nazimiye mainroad, Hanköyü (Uzuntarla) village, 39° 20' 01" N, 39° 47' 10" E, 1160 m s.m., on *Quercus*, 16. August 2019, K. YAZICI & A. ASLAN (KTUB-2474); surrounding Dereoba waterfalls, 39° 16' 06" N, 39° 52' 37" E, 1667 m s.m., on *Quercus*, 19. July 2018, K. YAZICI & A. ASLAN (KTUB-2475); Bingöl: Yayladere, center, on the way Akçada-mar-Yolgüden village, roadside, near the stream, 39° 12' 14" N, 40° 03' 38" E, 1494 m s.m., on *Juglans*, 23. August 2019, K. YAZICI & A. ASLAN (KTUB-2476), Accompanying species: *Caloplaca cerina*, *Candelariella aurella*, *Gallowayella fulva*, *Lecidella elaeochroma*, *Phaeophyscia orbicularis*, *Physcia adscendens*, *Ph. aipolia*, *Physconia detersa*, *Phy. distorta*, *Phy. enteroxantha*, *Polyozosia hagenii* and *Rinodina pyrina*.

**Notes:** *Megaspora rimisorediata* grows mainly on bark of *Juniperus* and *Quercus* in Asia (VALADBEIGI & al. 2011). It has previously been known from Armenia, China, Dagestan, Iran, Russia and Ukraine (GASPARYAN & SIPMAN 2016, ISMAILOV & al. 2019, MONIRI & al. 2017, VALADBEIGI & al. 2011, ZAKERI & al. 2016).

*Megaspora rimisorediata* is similar to *M. verrucosa*, a turkish specimen was found in Iğdır province near Bingöl region (YAZICI & al. 2013), but *M. verrucosa* has abundant apothecia, no soralia, taller hymenium and larger asci and ascospores (YAZICI & al. 2013).

This study was financially supported by TUBITAK (Project 117Z976).

## References

- AFSHAR, F., 1965: Geology of Tunceli-Bingöl Region of Turkey. – Maden Tetkik ve Arama Dergisi **65**: 33–34.
- AKMAN, Y., 1999: İklim ve Biyoiklim (Biyoiklim Metodları ve Türkiye İklimleri). 1. Baskı, Kariyer Matbaacılık Ltd. Şti. – Ankara.
- BAYTOP, A., DENİZCI, R., 1963: Türkiye'nin Flora ve Vegetasyonuna Genel Bakış. – Ege Üniversitesi Matbaası. – İzmir.
- ÇOBANOĞLU, G., YAVUZ, M., 2007: Lichen records from South-East Anatolia (Bingöl and Şırnak). – Oltenia **23**: 23–26.
- ÇOBANOĞLU, G., DOĞAN, A., 2010: Lichen records from Tunceli Munzur Valley National Park (Turkey). – J. Bot. Pl. Biol. **5**(2): 38–41.
- GASPARYAN, A., SIPMAN, H. J. M., 2016: The epiphytic lichenized fungi in Armenia: diversity and conservation. – Phytotaxa **281**(1): 1–68. <https://doi.org/10.11646/phytotaxa.281.1.1>
- ISMAILOV, A. B., URBANAVICHUS, G. P., VONDRAK, J., 2019: New lichenized fungi for Russia from Dagestan (East Caucasus). – Folia Cryptog. Estonica **56**: 7–10.
- JOHN, V., TÜRK, A., 2017: Türkiye Likenleri Listesi. [A Checklist of the Lichens of Turkey]. – İstanbul: Nezahat Gökyiğit Botanik Bahçesi Yayın.
- JOHN, V., GÜVENÇ, Ş., TÜRK, A., 2020: Additions to the checklist and bibliography of the lichens and lichenicolous fungi of Turkey. – Archive Lichenol. **19**: 1–32.
- JØRGENSEN, P. M., SCHULTZ, M., GUTTOVÁ, A., 2013: Validation of *Anema tumidulum* (Lichinaceae, lichenized Ascomycota), a widespread cyanophilic lichen. – Herzogia **26**: 1–7.
- MONIRI, M. H., GROMAKOVA, A. B., LÖKÖS, L., KONDRATYUK, S. Y., 2017: New members of the *Megasporaceae* (Pertusariales, lichen-forming Ascomycota): *Megaspora iranica* spec. nova and *Oxneriaria* gen. nova. – Acta Bot. Hungarica **59**(3–4): 343–370.
- NASH, T. H., RYAN, B. D., GRIES, C., BUNGARTZ, F., (Eds.) 2007: Lichen Flora of the Greater Sonoran Desert Region. 3. – Arizona State University: Lichens Unlimited.
- SIPMAN, H., RAUS, T., 2002: An inventory of the lichen flora of Kalimnos and parts of Kos (Dodecanisos, Greece). – Willdenowia **32**: 351–392.
- SMITH, C. W., APTROOT, A., COPPINS, B. J., FLETCHER, A., GILBERT, O. L., JAMES, P. W., WOLSELEY, P. A., ORANGE, A., 2009: The Lichens of Great Britain and Ireland. – London: The British Lichen Society.
- SONG, J., LIANG, J. F., MEHRABI-KOUSHKI, M., KRISAI-GREILHUBER, I., ALI, B., BHATT, V. K., & al., 2019: Fungal systematics and evolution 5. – Sydowia **71**: 141–241.
- VALADBEIGI, T., NORDIN, A., TIBELL, L., 2011: *Megaspora rimisorediata* (Pertusariales, Megasporaceae), a new sorediate species from Iran and its affinities with *Aspicilia* sensu lato. – The Lichenologist. **43**(4): 285–291.
- YAZICI, K., APTROOT, A., ASLAN, A., 2013: The lichen biota of Iğdır province (Turkey). – Mycotaxon link page **123**: 492.
- YAZICI, K., APTROOT, A., KARAHAN, D., 2018: New lichen records of *Acarospora* and *Lecidea* species for Turkey and Asia. – Austrian J. Mycol. **27**: 5–10.
- ZAKERI, Z., GASPARYAN, A., APTROOT, A., 2016: A new corticolous *Megaspora* (Megasporaceae) species from Armenia. – Willdenowia **46**: 245–251. doi: <http://dx.doi.org/10.3372/wi.46.46205>.

# ZOBODAT - [www.zobodat.at](http://www.zobodat.at)

Zoologisch-Botanische Datenbank/Zoological-Botanical Database

Digitale Literatur/Digital Literature

Zeitschrift/Journal: [Österreichische Zeitschrift für Pilzkunde](#)

Jahr/Year: 2020

Band/Volume: [28](#)

Autor(en)/Author(s): Yazici Kenan, Aslan Ali

Artikel/Article: [Acarospora scotica, Anema tumidulum and Megaspora rimisorediata – three newly recorded lichens for Turkey 115-121](#)