



## A checklist of lichenized fungi of Kerman province, SE, Iran

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**Abstract:** The lichenized mycota of the southern part of Iran including Kerman province has been poorly studied compared to the Northern Iranian provinces such as Azerbaijan, Golestan or Mazandaran. Here we present the first lichen checklist for Kerman province, which comprises 57 species in 30 genera and 14 families. For this purpose, we reviewed both old and recent literature, examined herbarium collections and performed fieldwork in the province during 2009, 2010 and 2011. The results include 15 taxa new to the lichenized mycota of Kerman. *Acarospora impressula* Th. Fr., *Anaptychia bryorum* Poelt and *Sarcogyne similis* H. Magn. are new to the

lichenized mycota of Iran. The following new combinations are proposed: *Circinaria excrescens* (J. Steiner) Sohrabi, *C. scabridula* (H. Magn.) Sohrabi and *C. straussii* (J. Steiner) Sohrabi.

**Key words:** *Circinaria*, lichenized fungi, mycota, new combinations, new records

### INTRODUCTION

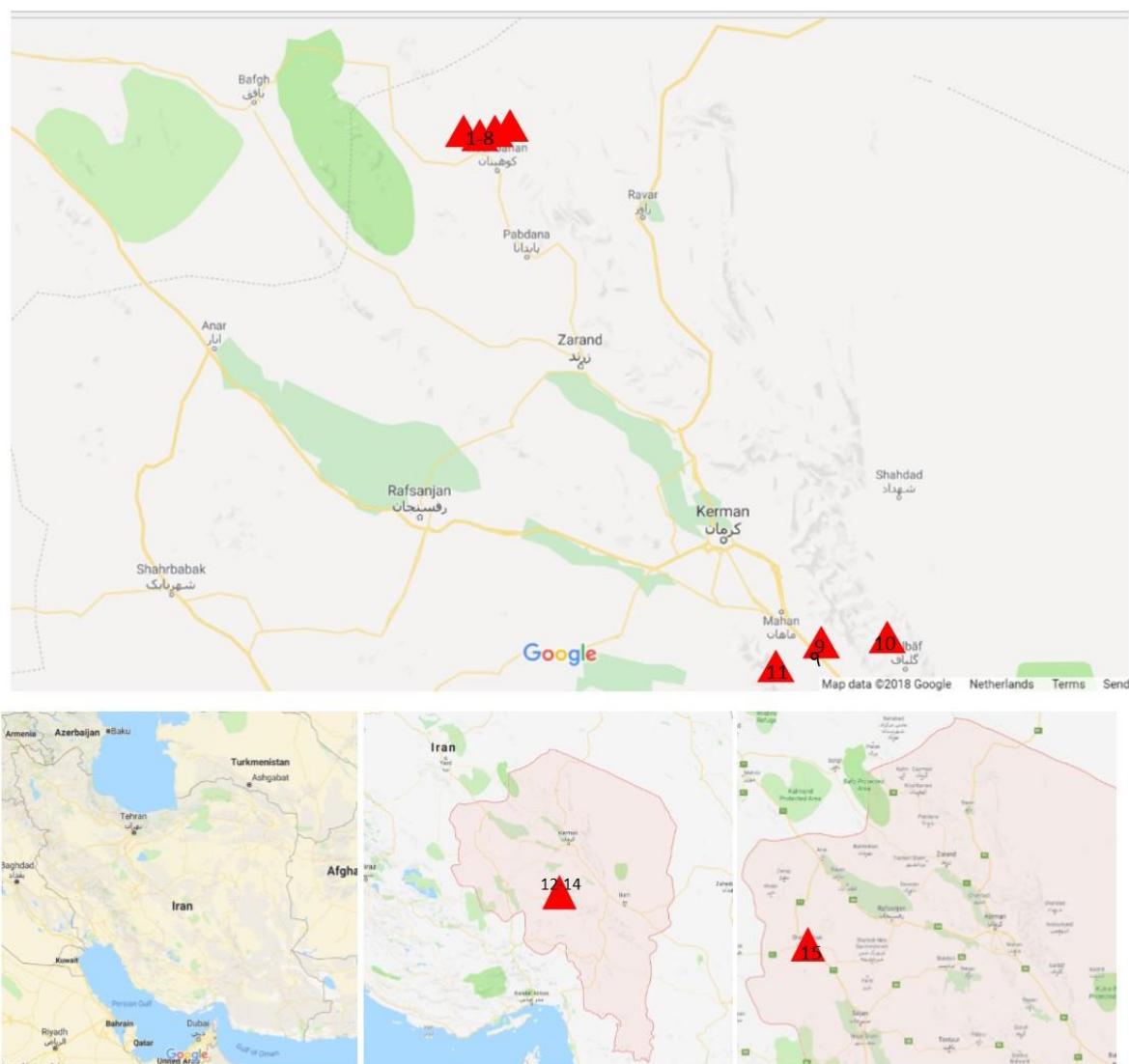
The last comprehensive list of lichenized, lichenicolous and allied fungi reported from Iran was published in 2008 (Seaward et al. 2008) and the 2010-2019 online version is available (Sohrabi et al. 2010a). Despite the considerable increase in Iranian lichenological studies during recent years, including the establishment of a massive lichen collection at ICH herbarium and the online database MYCOLICH ([www.mycolich.ir](http://www.mycolich.ir)), opening the Museum of Iranian Lichens at the Iranian Research Organization for Science and Technology (IROST) in Tehran in 2017, and numerous publications in various journals, large parts of Iran, including the provinces Gom, Kerman, Lorestan, Hormozghan, Markazi, Qazvin, Sistan and Baluchistan, South Khorasan and Yazd, are still poorly explored (Sohrabi et al. 2010b).

The first lichen record from Kerman province is *Xanthoria polycarpoides* var. *persica* J. Steiner (see *Calogaya persica*), that was published (Steiner 1916) based on the material collected on *Salix* sp., by a German botanist, Joseph Friedrich Nicolaus Bornmüller (February 6, 1862 – December 19, 1948). The second small collection from Kerman province was made by the Austrian mycologist, Dr. Harald Riedl, who travelled to Iran in spring 1974 in order to collect plants, fungi and lichens (Ershad & Zare 2014; Riedl 1979) and accompanied with some Iranian botanists including Dr. Musa Iranshahr. Hence, Kerman province, certainly belongs to the poorly investigated regions of Iran. Apparently, very few studies have ever been published on the lichens of Kerman province (Ghiyasi et al. 2019; Lotfian et al. 2016; Riedl 1979; Steiner 1916; Szatala 1957; Valadbeigi et al. 2009; Valadbeigi & Sipman 2010). The few records showed that various parts of this

large province have never been investigated by botanists or lichenologists.

The province Kerman (Fig. 1) is located in the central to southeast of Iran. It consists of different climatic regions. The north, northwest, and central areas experience a dry and temperate climate, whereas in the south and southeast, the weather is warm and relatively humid (Beckett & Gordon 1956). Its main part belongs to the Irano-turanian phytogeographical region (Shahrbabaki 2013; Zohary 1973) and has a semi-temperate and dry climate, with a maximum and minimum temperature of 40 °C, and -7 °C, respectively. The average temperature during

the months of March-June has been recorded as 20-25 °C. Outposts of the Sahara-Arabian region occur in the southern slopes of the Makaran Mountains rise (Rahbar Dehghan 2007). Most of the province consists of steppe or sandy desert, but there are also extensive mountain ranges reaching over 2500 m with much higher precipitation, so that a wide range of lichen habitats can be expected. The geologic structure and soil diversity of Kerman province was discussed in (Beckett 1958). The areas of the present study belong to the highlands of the Irano-Turanian region in Kerman province (Zohary 1973).



**Fig. 1.** Location of the collection sites (indicated by red triangle 1-15 sites) in Kerman province.

The aim of this study was to compile a checklist of lichens of Kerman and contribute to the basic knowledge of lichenology in the area. Therefore, some of the recent collections were examined and their results were added to the list. No attempt has been made to verify the published records by checking the specimens upon which they are based. The only validation is that some of the old reports were re-discovered by our group. Many additions to this list are to be expected since many areas and habitat types in the province remain unexplored.

## MATERIALS AND METHODS

The present study is mainly based on examination of herbarium specimens from the herbaria ICH, TARI, B and IRAN, and recent collections by M. Sohrabi. and A. Ghiyasi were deposited in ICH Herbarium at the Iranian research organization for Science and Technology (IROST) in Tehran.

All specimens were examined and their accession numbers and herbaria where deposited are given in parentheses after the locality numbers. The material was examined using standard microscopic techniques. Specimens were managed according to Obermayer 2002 and identified by examination of their morphological characteristics with a dissecting microscope according to valid references (Dobson 2011; Malcolm & Galloway 1997; Ryan et al. 2002). Anatomical features were studied by preparing thin sections of the thallus and fruiting bodies. Moreover, the chemical characters were studied by using spot tests. In special cases, thin layer chromatography was performed. The employed principal identification keys were as follow : Awasthi 1991; Gaya 2009; Krzemińska 2012; Nash et al. 2002, 2007; Sliwa 2007; Smith et al. 2009; Temina et al. 2005.. The species names were checked against Index Fungorum (<http://www.speciesfungorum.org/names/names.asp>) and Mycobank (Crous et al. 2004) to ensure their orthography.

### Collection sites

- (1) IRAN: Kerman, 180 km., NW Kerman, Kuhbanan district, 15 km north of Kuhbanan, East of Naser Abad village, 1985 m, 31.405°, 56.279°, 2 Nov. 2010, A. Ghiyasi
- (2) IRAN: Kerman, 175 km., NW Kerman, Kuhbanan district, 8 km north of Kuhbanan, west of Darehoud village, 2237 m, 31.464°, 56.263°, 11 Jan. 2009, A. Ghiyasi
- (3) IRAN: Kerman, 177 km., NW Kerman, Kuhbanan district, 10 km north of Kuhbanan, NE of Aab Koric village, 2329 m, 31.472°, 56.259°, 10 Aug. 2010, A. Ghiyasi
- (4) IRAN: Kerman, 178 km., NW Kerman, Kuhbanan district, 12 km north of Kuhbanan, North of Naser Abad village, 2255 m, 31.469°, 56.254°, 5 Oct. 2009, A. Ghiyasi
- (5) IRAN: Kerman, 175 km., NW Kerman, Kuhbanan district, 8 km north of Kuhbanan, SW of Aab Koric village, 1500-1672 m, 31.464°, 56.263° on fine dolomite, 25 Apr. 2009, A. Ghiyasi
- (6) IRAN: Kerman, 176 km., NW Kerman, Kuhbanan district, 9 km north of Kuhbanan, East of Darehoud village, 2100-2480 m, 31.495°, 56.242°, 16 Aug. 2010, A. Ghiyasi
- (7) IRAN: Kerman, 172 km., NW Kerman, Kuhbanan district, 6 km north of Kuhbanan, NE of Darbe-Jezzy village, 2236 m, 31.464°, 56.263°, 21 May 2010, A. Ghiyasi
- (8) IRAN: Kerman, 174 km., NW Kerman, Kuhbanan district, 7 km north of Kuhbanan, NE of Aab-Shengan village, 2513 m, 31.495°, 56.242°, 18 June 2010, A. Ghiyasi
- (9) IRAN: Kerman, Mahan district, 1 km., East of Kerman Graduate University of Technology (KGUT), 1850 m, 30.091°, 57.013°, 13 Apr. 2012, M. Sohrabi
- (10) IRAN: Kerman, Mahan district, Sekonj village, ca. 1 km., E of village, 2300 m, 29.987°, 57.445°, 13 Apr. 2012, M. Sohrabi
- (11) IRAN: Kerman: area south of Kerman, 2000 m., 30.190°, 57.055°, 2 Aug. 2007, T. Valadbeigi
- (12) IRAN: Kerman, Jiroft, Jebal-eBarez mountains. 1200-2000 m. 2 Mar 2012, M. Eskandari
- (13) IRAN: Kerman, 40 km of Jiroft to Baft, Dalfard. 1300 m. 10 Aug. 2010, M. Eskandari & A. Torabi
- (14) IRAN: Kerman, Summit region of the Jebal-eBarez north of Jiroft, (Sabzevaran), 28 Apr. 1977, H. Riedl
- (15) IRAN: Kerman, 40 km on the road from Shahr Babak to Anar, 1 Mar. 2005, 2300 m., Maassoumi & Safavi

## RESULTS

### Taxa

Abbreviations and structure of information: L: Locality in bold Arabic Number (collector name with space then collection number, Herbarium acronym).

#### *Acarospora bornmuelleri* Steiner Fig. 2

On calcareous rocks; L: 4 (Ghiyasi 200, ICH); 8 (Ghiyasi 244, ICH); 10 (Sohrabi 31571, ICH). Recently, this species was reported from Kerman province by (Ghiyasi et al., 2019). Here some additional specimens were examined from different localities and the occurrence of species was formally confirmed. Widely distributed in the eastern Mediterranean regions, and possibly some lichen elements of the Irano-Turanian and Saharo-Arabian phytogeographical regions. See (Galun, 1970; Galun and Garty, 1972).

#### *Acarospora bullata* Anzi

On calcareous rocks; L: 3 (Ghiyasi 207, ICH). This species is very common in Iran and reported (Golubkova, 1988, 1981; Lotfian et al., 2016;

Magnusson, 1929; Müller, 1892; Seaward et al., 2008, 2004; Szatala, 1940). According to Knudsen et al., 2010, this species is very similar to *A. rugulosa* in North America and their separation requires further study.

***Acarospora cervina*** A. Massal.

On sun-exposed calcareous rocks; L: 6 (Ghiyasi 223, ICH). a widespread, probably holarctic species (Nimis, 2016) reported from different parts of Iran, see (Barkhalov, 1975; Calatayud et al., 2007; Magnusson, 1929; Moniry et al., 2005; Müller, 1892; Seaward et al., 2004; Sohrabi, 2005a, 2005b) Known from: East Azerbaijan, West Azerbaijan, Kordestan, Fars, Tehran, Golestan, Razavi Khorasan, Lorestan, Gom, Markazi, Zanjan, Yazd. This is a widespread species in Asia and Europe and North America with a Holarctic distribution in the southern part of the temperate zone (Nimis, 2016). According to Amrani et al., (2018), this species has a wide distribution in Iran and worldwide, so far known from Africa (incl Madagascar), Oceania – Australasia, Eurasia, Europe, North America and Arctic (GBIF, 2019).

***Acarospora impressula*** Th. Fr.

New to Iran; on sun-exposed calcareous rocks; 9 (Sohrabi 16777 sub *Lobothallia cernohorskyana*, ICH); 10 (Sohrabi 31573, 31579, ICH).

***Acarospora interrupta*** (Ehrenb.) Vain.

On calcareous rocks; L: 2 (Ghiyasi 220, ICH); 4 Ghiyasi 246, ICH). It is widely distributed in North Africa (Nurtai et al., 2017) and Iran, and originally known from Egypt, very common and distributed in northwest Iran and Azerbaijan.

***Acarospora stapfiana*** (Mull. Arg.) Hue Fig. 2

A lichenicolous lichen on saxicolous lichens, usually on *Caloplaca trachyphylla*. L: 10 (Sohrabi 16771); 1 (Ghiyasi 208, ICH); 3 (Ghiyasi 247, ICH); 8 (Ghiyasi, 252, ICH); 15 (Maassoumi & Safavi 3631, TARI). This species was previously known from few localities in East Azerbaijan, Golestan, Isfahan, Razavi Khorasan, Markazi and Tehran provinces (Magnusson, 1929; Müller, 1892; Seaward et al., 2008).

***Acarospora strigata*** (Nyl.) Jatta

On sun-exposed calcareous rocks; L: 10 (Sohrabi 31573, ICH). This species was recently reported from Kerman province by (Ghiyasi et al., 2019). This species was previously known from a few localities (Magnusson, 1929; Müller, 1892; Seaward et al., 2008).

***Anamylopsora pulcherrima*** (Vain.) Timdal

On sun-exposed calcareous rocks; L: 7 (Ghiyasi 227, ICH). This species was recently reported from Kerman province by Ghiyasi et al., (2019) and also previously reported from a few localities in West

Azerbaijan, Razavi Khorasan and North Khorasan provinces by Seaward et al. (2008).

***Anaptychia bryorum*** Poelt Fig. 2

New to Iran; on decaying bryophytes and lichens over limestone; L: 10 (Sohrabi 16772, ICH). It was described by Poelt (1971) and so far known from Europe (Lisicka, 2005), Siberia (Zhurbenko, 1996) and North America (Fryday, 2004).

***Anaptychia mereschkowskii*** (Tomin) Kulakov,

Syn: *Anaptychia desertorum* (Rupr.) Poelt

On calcareous rocks; L: 1 (Ghiyasi 215, ICH); 2 (Ghiyasi 629, ICH); 6 (Ghiyasi 631, ICH); 7 (Ghiyasi 633). This species was recently reported from Kerman province by Ghiyasi et al., (2019 as *A. desertorum* (Rupr.) Poelt) and previously reported from different parts of Iran (Oxner, 1946; Seaward et al., 2008; Szatala, 1940).

***Aspicilia caesiascens*** Pišút

On calcareous rocks; L: 1 (Ghiyasi 627, ICH); 4 (Ghiyasi 216); 7 Ghiyasi 250). This species seems to be limited to the Irano–Touranian phytogeographical region, it was reported from Uzbekistan by Pišút (1978) and from Iran by Seaward et al., (2008) and Vězda (1979). *Aspicilia caesiascens* is a very unusual species because it is an umbilicate growth form, very different from crustose *Aspicilia* sensu (Nordin et al., 2010). Unpublished molecular data show that it belongs to the genus *Lobothallia*. This group was revised by Sohrabi et al. in an ongoing project and their result will be published soon.

***Aspicilia determinata*** (H. Magn.) N. S. Golubk.

The presence of this species in Iran needs confirmation. Unfortunately, the voucher specimen of this species was not available for this study. In an ongoing revision of the genus *Aspicilia* sensu lato in Iran, we were so far unable to confirm the presence of their species in Iran and we consider this record as a doubtful one.

***Calogaya biatorina*** (A. Massal.) Arup, Frödén & Söchting

On calcareous rocks; L: 6 (Ghiyasi 220 sub *Acarospora interrupta*, 221, ICH). This species was very recently reported from Kerman by Ghiyasi et al., (2019) and previously known from Iran by other researchers (Lotfian et al., 2016; Riedl, 1979; Seaward et al., 2008, 2004; Sohrabi et al., 2017; Steiner, 1910; Szatala, 1957, 1954).

***Calogaya persica*** (J. Steiner) Arup, Frödén & Söchting

Syn.: *Xanthoria polycarpoides* var. *persica* J. Steiner

The oldest known lichen record from Kerman province that was reported by Steiner (1916). The nearest known locality in Iran is Markazi and Golestan provinces. For further details, see the

following references: Seaward et al., 2008; Sohrabi and Sipman, 2007; Steiner, 1910; Steiner and Poelt, 1982; Szatala, 1957.

***Calogaya polycarpoides*** (J. Steiner) Arup, Frödén & Söchting

On bark of deciduous trees, L: 5 (Ghiyasi 203, ICH). This is probably the most common species of the genus in Iran reported by: Seaward et al., 2008; Sohrabi and Sipman, 2007; Steiner, 1910; Steiner and Poelt, 1982; Szatala, 1957.

***Caloplaca molariformis*** Frolov, Vondrák, Nadyeina & Khodos.

New to Kerman; on calcareous rocks; L: 10 (Sohrabi 31585, 31576, 31577, ICH). The identification of the Iranian specimens is based on the description provided by Vondrak et al., (2013).

***Caloplaca saxicola*** (Hoffm.) Nordin s.lat.

On calcareous rocks; L: 2 (Ghiyasi, 202, 228, ICH). It is certainly much more widespread in Iran and most of the earlier records were reported by Barkhalov, 1975; Müller, 1892; Oxner, 1946; Seaward et al., 2008; Szatala, 1957 and very recently from Kerman province by Ghiyasi et al., (2019). The identification of this species based on a description provided by Gaya (2009).

***Candelariella aurella*** (Hoffm.) Zahlbr.

On calcareous rocks; L: 3 (Ghiyasi 206, ICH); 3 (Ghiyasi, 248, ICH). This species is previously known from different parts of Iran (Barkhalov, 1975; Ghiyasi et al., 2019; Müller, 1892; Oxner, 1946; Seaward et al., 2004, 2008; Szatala, 1957; Westberg and Sohrabi, 2012). It is a very common lichen in East Azerbaijan, Fars, Golestan, Ilam, Khorasan, North, Khorasan, Razavi, Markazi, Semnan and Tehran provinces.

***Candelariella plumbea*** Poelt & Vězda

New to Kerman; on calcareous soil on limestone; L: 10 (Sohrabi 16766, ICH, sub *Placidium squamulosum*).

***Candelariella rosulans*** (Müll.Arg.) Zahlbr.

Known from calcareous rocks in different parts of Iran (Westberg and Sohrabi, 2012) This species is previously known from a few localities in Kerman by Ghiyasi et al., 2019; Lotfian et al., 2016.

***Catapyrenium cinereum*** (Pers.) Körb.

New to Kerman; on calcareous soil; L: 5 (Maassoumi & Safavi 3630, TARI).

***Circinaria elmorei*** (E.D. Rudolph) Owe-Larss., A. Nordin & Sohrabi

New to Kerman; on calcareous rocks; Locality: 1 (Ghiyasi 614, ICH); 7 (Ghiyasi 628, ICH); 8 (Ghiyasi 619, ICH).

***Circinaria excrescens*** (J. Steiner) Sohrabi **comb. nov. MB#833676**

Basionym: *Lecanora calcarea* var. *excrescens* J. Steiner, *Annales Mycologici* 8 (2): 223 (1910) [MB#457469]. *Aspicilia excrescens* (J. Steiner) Szatala, *Ann. Mus. Nat. Hungar. n.s. VIII* (1957), p. 126 [MB#364357].

Known only on calcareous rocks in arid regions of Iran; L: 5 (Ghiyasi 205, ICH). This was reported by (Steiner, 1910) as *Lecanora calcarea* var. *excrescens*. (Riedl, 1979; Seaward et al., 2008; Szatala, 1957). The morphological character of this taxon fits with the genus *Circinaria sensu* (Sohrabi, 2011). Therefore, a new combination of this is proposed to fix its nomenclature. However, the DNA and taxonomic position of this species should be further studied.

***Circinaria scabridula*** (H. Magn.) Sohrabi **comb. nov. MB#830069**

Basionym: *Lecanora scabridula* H. Magn., *Lichens Central Asia* 1: 105 (1940) [MB#367132]. Syn.: *Aspicilia scabridula* (H. Magn.) N.S. Golubk., *Novosti Sist. Nizsh. Rast.* 10: 219 (1973).

New to Kerman; on calcareous rocks; L: 10 (Sohrabi 16765, sub *Caloplaca aegyptica*, 31583, ICH).

***Circinaria sphaerothallina*** (J. Steiner) Sohrabi

On calcareous rocks; L: 9 (Sohrabi 16784, 16775, 16779, ICH), This species was reported from Kerman by (Ghiyasi et al., 2019).

***Circinaria straussii*** (J.Steiner) Sohrabi **comb. nov. MB#817956**

Basionym: *Lecanora fruticulosa* var. *straussii* J. Steiner, *Annales Mycologici* 8 (2): 228 (1910) [MB#543637] 1910. *Aspicilia straussii* (J. Steiner) Sohrabi, *Sauteria* 15: 467 (2008) [MB#512281].

on calcareous rocks; L: 7 (Ghiyasi 203, 204, ICH). So far, only known from Iran in very few localities in Markazi and Tehran provinces (Szatala, 1957). A new combination of this species in *Aspicilia* was published in Seaward et al. (2008: 467). However, the morphology of this species fits with the genus *Circinaria* as described before (Nordin et al., 2010; Sohrabi et al., 2013).

***Dermatocarpon miniatum*** (L.) W. Mann

On calcareous rocks; L: 6 (Ghiyasi 623, ICH); 10 (Sohrabi 31582, ICH); 12 (Eskandari IRAN 16358F, sub *Dermatocarpon moulinsii*). This species was previously reported from Kerman by Lotfian et al. (2016).

***Dermatocarpon moulinsii*** (Mont.) Zahlbr.

New to Kerman; on calcareous rocks; L: 2 (Eskandari, IRAN 16358F).

***Dermatocarpon vellereum*** Zschacke

New to Kerman; on calcareous rocks; L: 12

(Eskandari & Torabi, IRAN 16342, F).

**Diploschistes diacapsis** (Ach.) Lumbsch

On calcareous rocks; L: 2 (Ghiyasi 232, ICH); 12 (Eskandari, IRAN 16357F). Previously reported from Iran (Lamb, 1963; Reichert, 1940; Riedl, 1979; Seaward et al., 2008; Sohrabi and Sipman, 2007; Steiner, 1916; Szatala, 1957; Vězda, 1978) and recently also from Kerman province by Ghiyasi et al., (2019).

**Enchylium tenax** (Sw.) Gray

New to Kerman; on calcareous soil; L: 5 (Ghiyasi 237, ICH); 8 (Ghiyasi 606, ICH); 10 (Sohrabi 16773, 16769, 16767 sub *Peccania terricola*, ICH). Previously reported from Iran (Barkhalov, 1975; Kakeh et al., 2018; Rabenhorst, 1871; Riedl, 1979; Seaward et al., 2008, 2004; Sohrabi and Sipman, 2007; Szatala, 1940; Weber, 1964).

**Glypholecia scabra** (Pers.) Müll. Arg. Fig. 2

on calcareous rocks; L: 1 (Ghiyasi 630, 618, ICH); 2 (Ghiyasi 616, ICH); 3 (Ghiyasi, 251); 4 (Ghiyasi 253); 6 (Ghiyasi, 209); 15 (Maassoumi & Safavi 3628, TARI). Previously reported from Iran by following reports: (Ghiyasi et al., 2019; Lotfian et al., 2016; Müller, 1892; Oxner, 1946; Seaward et al., 2008; Sohrabi and Sipman, 2007; Steiner, 1916; Szatala, 1940, 1957).

**Golubkovia trachyphylla** (Tuck.) S.Y. Kondr. et al.

New to locality in Kerman; on calcareous rocks; L: 3 (Ghiyasi 612, ICH), 15 (Maassoumi & Safavi 3631, TARI). Reported from Iran by Lotfian et al., 2016; Seaward et al., 2008.

**Heteroplacidium compactum** (A. Massal.) Gueidan & Cl. Roux

New to Kerman, on calcareous rocks; L: 4 (Ghiyasi 255, ICH). Reported from Iran by Riedl, 1979 and Seaward et al., 2008, 2004.

**Kiliasia granulosa** (Szatala) Timdal

New to Kerman; on calcareous rocks; L: 11 (Valadbeigi 6094 (B)). Previously known as *Toninia weberi* Timdal (Seaward et al., 2008, 2004).

**Lecidella carpathica** Körb.

New to Kerman; on calcareous rocks; L: 2 (Ghiyasi 622, ICH); 10 (Sohrabi 31572, 31580, 31581, ICH).

**Lobothallia cernohorskyana** (Clauzade et Vězda) A. Nordin, Cl. Roux & Sohrabi

On calcareous rocks; L: 9 (Sohrabi 16774, 16777, 16781, ICH); 2 (Ghiyasi 632, ICH); 6 (Ghiyasi 615, ICH). Reported from Kerman province by Ghiyasi et al., (2019) also from Iran by Seaward et al. (2008: 466 as *Aspicilia cernohorskyana*).

**Lobothallia radiosa** (Hoffm.) Hafellner

On calcareous rocks; Reported from Iran (Barkhalov, 1975; Müller, 1892; Riedl, 1979; Seaward et al., 2008; Steiner, 1910; Szatala, 1957).

**Myriolecis crenulata** (Hook.) Šliwa, Zhao Xin & Lumbsch

On calcareous rocks; L: 3 (Ghiyasi 210, ICH); 15 (Maassoumi & Safavi 3623, TARI). Reported from Kerman by Ghiyasi et al., (2019) and from other parts of Iran (Müller, 1892; Seaward et al., 2008, 2004; Sohrabi and Sipman, 2007; Steiner, 1910; Szatala, 1940).

**Myriolecis dispersa** (Pers.) Šliwa, Zhao Xin & Lumbsch

On calcareous rocks; L: 7 (Ghiyasi 213, ICH). Reported from Iran by: Barkhalov, 1975; Ghiyasi et al., 2019; Oxner, 1946; Seaward et al., 2008, 2004; Sohrabi and Sipman, 2007; Steiner, 1910; Szatala, 1957; Weber, 1964.

**Peccania arabica** (Müll. Arg.) Henssen

This species recently was reported from Kerman province by Lotfian et al. (2016).

**Peccania arizonica** Tuck. ex Herre

New to Kerman; on calcareous rocks; L: 9 (Sohrabi 16776, 16780, 16782, 16783 ICH).

**Peccania coralloides** (A. Massal.) A. Massal.

On sun-exposed calcareous rocks; L: 1 (Ghiyasi 238, ICH); 4 (Ghiyasi 243, ICH). This species has been recorded from Iran by Müller, 1892; Riedl, 1979; Seaward et al., 2008; Szatala, 1957.

**Peccania terricola** H. Magn.

On calcareous rocks; L: 2 (Ghiyasi 611); 3 (Ghiyasi 610); 7 (Ghiyasi 40, 42, 43, 44, ICH); 10 (Sohrabi 16767, 31569, 31566, ICH). Reported from Kerman by Ghiyasi et al., (2019) and from other parts of Iran by Seaward et al. 2008; M. Sohrabi 2005b; Sohrabi and Sipman 2007.

**Physconia grisea** (Lam.) Poelt

This species recently was reported by (Lotfian et al. 2016). The voucher for this species was out of access for this study.

**Placidium squamulosum** (Ach.) Breuss Fig. 2

On calcareous soil over limestone, L: 6 (Ghiyasi 218, ICH); 2 (Ghiyasi 23a, 24, ICH); 8 (Ghiyasi 608, ICH); 10 (Sohrabi 16764, 16766, 16786, 31567, ICH). This species is widespread in Iran; it was reported from Golestan, Khorasan and Esfahan provinces, see (Barkhalov, 1975; Breuss, 1990; Müller, 1892; Seaward et al., 2008, 2004; Sohrabi and Sipman, 2007).

**Protoparmeliopsis muralis** (Schreb.) M. Choisy incl. var. *versicolor* (Pers.) M. Choisy

On calcareous rocks; L: 2 (Ghiyasi 620, ICH). This species was recently reported from Kerman by Ghiyasi et al., (2019) and is known as widespread species in Iran (Buhse et al., 1860; Dyanat-Nejad, H. Karamedini, 1993; Lotfian et al., 2016; Mehrabian and Mirzai, 1996; Müller, 1892; Riedl, 1979; Seaward et al., 2008, 2004; Sohrabi and Sipman, 2007; Steiner, 1910; Szatala, 1957, 1940). Known from Kordestan, West Azerbaijan, Tehran, Razavi Khorasan.

***Protoparmeliopsis peltata*** (Ramond) Arup, Zhao Xin & Lumbsch

This species recently was reported from Kerman province by (Lotfian et al., 2016) as *Rhizoplaca peltata*.

***Psora globifera*** (Ach.) A. Massal s. lat.

on calcareous rocks; L: 2 (Ghiyasi 218). Recently reported from Kerman by Ghiyasi et al., (2019). However, no specimen was available to us and the occurrence of this species in Kerman province needs

confirmation.

***Pyrenodesmia egyptiaca*** (Müll. Arg.) M. Choisy & Werner

New to Kerman; on calcareous rocks; L: 10 (Sohrabi, 16768, ICH).

***Pyrenodesmia variabilis*** (Pers.) A. Massal.

New to Kerman; on calcareous rocks; L: 15 (Maassoumi & Safavi 3623, TARI).

***Rhizocarpon geographicum*** (L.) DC.

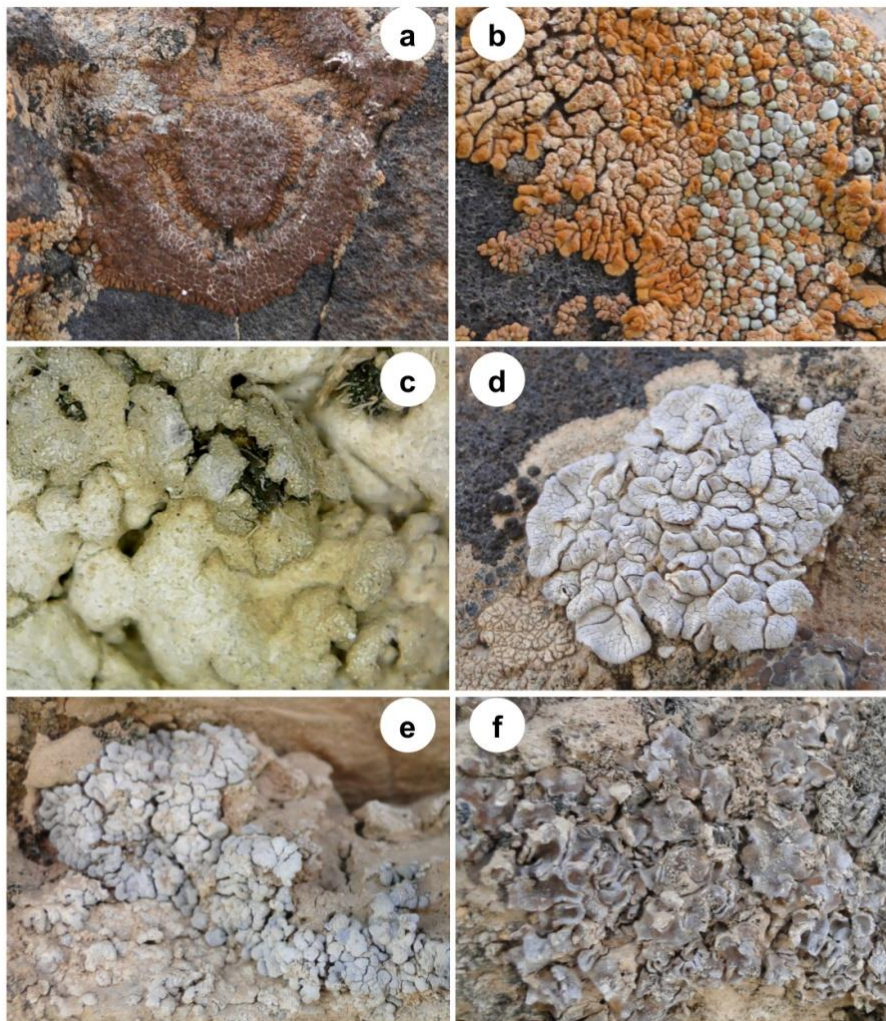
This species is widespread in Iran and was reported from Kerman province recently by Lotfian et al., (2016).

***Rhizocarpon lecanorinum*** Anders

This species recently was reported from Kerman province by Lotfian et al., (2016).

***Rhizoplaca melanophthalma*** (DC.) Leuckert

This species recently was reported from Kerman province by Lotfian et al., (2016).



**Fig. 2.** Selected lichens from Kerman (Location 10): a. *Acarospora bornmuelleri*; b. *Acarospora stapfiana*; c. *Anaptychia bryorum*; d. *Glypholecia scabra*; e. *Thalloidima diffractum*; f. *Placidium squamulosum*.

***Rinodina dubyana*** (Hepp) J. Steiner

On calcareous rocks; L: 7 (Ghiyasi 224, ICH). This species recently was reported from Kerman province by Ghiyasi et al., (2019) and from Iran by Müller, 1892; Seaward et al., 2008; Szatala, 1957, 1940.

***Rinodina subnigra*** H. Magn.

On calcareous rocks; L: 11 (Valadbeigi 6073, B). This species previously also known from Kerman (Valadbeigi et al., 2009).

***Rusavskia elegans*** (Link) S.Y. Kondr. & Kärnefelt

Very common species in Iran and recently also reported from Kerman province (Lotfian et al., 2016).

***Sarcogyne similis*** H. Magn.

New to IRAN; on calcareous rocks mainly limestone; L: 9 (Sohrabi 16785, ICH); 10 (Sohrabi 16778, ICH).

***Squamarina cartilaginea*** (With.) P. James

This species recently was reported by Lotfian et al., (2016). The voucher for this species was out of access to this study and additional specimens are needed for confirmation.

***Thalloidima candidum*** (Weber) A. Massal.

New to Kerman, on calcareous rocks; L: 10 (Sohrabi 16770, ICH).

***Thalloidima diffractum*** (A. Massal.) A. Massal Fig. 2

This species recently was reported for Kerman (Ghiyasi et al., 2019 as *Toninia diffracta*).

**DISCUSSION**

These new findings not only contribute to the knowledge of lichens in Kerman province in SE Iran, but also widen the knowledge on the world distribution of some poorly known lichens. Some of the species reported here including *Anamylopsora pulcherrima*, *Candelariella plumbea* and *Circinaria straussii* are very rare and known from very few localities in Iran. Our observation on lichens of Kerman confirms that despite ca. 190 years from the first report on Iranian lichens by Göbel (1830), it is still poorly investigated. In Iran and particularly in Kerman province, there are two reasons for this weakness. First, there is no resident lichenologist, who could collect and study lichens in Kerman intensively. Second, the topography, phytogeography, geology, and climate of the country including Kerman Province is extremely variable. For example, the climatic diversity of Kerman varies from hot to cold, extremely dry to very dry, and a countryside where nears steppe, semi-arid, to desert climates, which is rare and unique in this respect. Kerman province has several high mountains, where their peaks rising are following: Mt. Bahraseman, 3886 m; Mt. Pelvar,

4233 m; Mt. Jupar, 4135 m; Mt. Lalehzar, 4351 m. Around these mountains, many large steppe-mountain regions with a rocky topography and covered by rather natural endemic vegetation; the presence of montane and alpine areas with intrusive (igneous) rock substrates is especially important for the total lichen diversity.

In the present study, the number of 59 lichenized fungi belonging to 14 families are reported: Teloschistaceae (9 taxa), Acarosporaceae (9 taxa), Megasporaceae (7 taxa), Verrucariaceae (6 taxa), Lecanoraceae (6 taxa), Physciaceae (5 taxa), Lichinaceae (4 taxa), Candelariaceae (3 taxa), Ramalinaceae (4 taxa), Rhizocarpaceae (2 taxa), Graphidaceae (1 taxon), Baecomycetaceae (1 taxon), Collemataceae (1 taxon) and Squamarinaceae (1 taxon). As to substrate diversity, 49 species are epilithic or saxicolous, 5 epigeic or terricolous and 3 epiphytic growing on bark or mosses. Our result certainly emphasizes the great importance of Kerman province within the Iranian lichen flora and thereby, justifies the high level of attention to this poorly known area. Further field studies updating and supplementing the presented list should be performed. Remarkable point is the low number of epiphytic and terrestrial lichens. This issue probably reflects the very dry climate, even though the visited localities were laying at elevations between 1500-2500 m.

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## فهرست قارچ های گلسنگی استان کرمان، جنوب شرق ایران

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**چکیده:** میکوتای گلسنگی نیمه جنوبی، شامل استان کرمان نسبت به استان های نیمه شمالی ایران مانند آذربایجان، گلستان، مازندران خیلی کمتر مطالعه شده است. ما در اینجا اولین بار فهرست گلسنگ های استان کرمان را ارائه می کنیم که شامل ۵۷ آرایه از متعلق به ۳۰ جنس و ۱۴ خانواده می باشند. برای این هدف، ما متون علمی قدیمی و جدید به همراه نمونه های هرباریومی مطالعه شده و نتایج عملیات میدانی سال های ۲۰۰۹، ۲۰۱۰ و ۲۰۱۱ در کرمان را بررسی کردیم. نتایج این مطالعه، شامل گزارش ۱۵ تاکسون جدید به میکوتای گلسنگی کرمان می باشد. از این میان سه آرایه *Acarospora impressula* Th. Fr., *Anaptychia* جدید نیز پیشنهاد می گردد.

**کلمات کلیدی:** سیرسیناریا، قارچ های گلسنگی، میکوتا، ترکیب نام علمی جدید، گزارش جدید