Articles

New and interesting records of lichens, lichenicolous fungi and other Ascomycota from northwestern USA III

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Abstract. **The lichenicolous fungi *Lichenochora aipoliae*, *Stigmidium leprariae* and *Taeniolella toruloides* are reported as new to North America, and *Monodictys epilepraria* as new to western North America. A record of *Lawalreea* cf. *lecanorae* from the region is discussed. The lichen *Biatora oligocarpa* is reported as new to the contiguous 48 states of the USA. Also reported new to northwestern North America are two Ascomycota microfungi, *Gloniopsis subrugosa* and *Nemania maritima*. In total, new state records are provided for Idaho (6), Michigan (1), Montana (1), Oregon (4) and Washington (12).**

Key words. **Idaho, *Lichenothelia*, microfungi, Oregon State University, Washington.**

The first two installments of this series reported range extensions for lichens and lichenicolous fungi from the northwestern USA, mostly Idaho and Washington (Haldeman 2018, 2019). Those papers treated roughly an equal number of lichens and of lichenicolous fungi. Here I continue to report species with few or no records from the region but the present paper leans more heavily on lichenicolous fungi, reporting 15, along with 5 lichens. With this paper I have also added three ascomycete microfungi that are not lichens, lichenicolous fungi or considered lichen allies. These are listed separately at the end of the paper as they should not be considered for inclusion on the North American lichen checklist (Esslinger 2019). However, in all cases the Ascomycota microfungi that I am reporting were found while I was searching the substrate for lichens and they are species which, I believe, lichenologists are as likely to find as traditional mycologists. Furthermore, much of the same equipment, reagents and terminology are used in the examination of lichens and lichenicolous fungi as in these microfungi. Perhaps the biggest obstacle to jumping into this group is the completely different literature set so I hope that by reporting these few species and the associated literature, some more lichen enthusiasts will take note of these often similar fungi.

Some records reported here fill a gap in their distribution between known locations in British Columbia or Alaska and central or southern California. Others are more significant range extensions and future investigations will tell if they are rare or overlooked. "#" denotes a lichenicolous fungus. * denotes a non-lichenized Ascomycota microfungus not covered by the North American Lichen Checklist (Esslinger 2019). The specimens with no herbarium given are in my personal herbarium.

Biatora oligocarpa **Printzen & Tønsberg**

This species is known from south and southeast Alaska, mainly on *Populus* but also *Alnus*, *Salix* and once on a beach-side *Picea sitchensis* (McCune 2017, Printzen and Tønsberg 2004, Spribille et al. 2010). Its occurrence in British Columbia is shown from a photo on the Ways of Enlichenment website (Björk 2020) from Emerald Forest, Whistler Municipality. This report is a southward range extension as well as a first record for the contiguous 48 states of the USA.

Specimen Examined. – **U.S.A. WASHINGTON. WHATCOM CO.:** Baker Lake Trail, *Pseudotsuga*, *Thuja*, *Tsuga heterophylla* and *Acer macrophyllum* forest, on bark of *Populus trichocarpa* bole, 239 m, 48.7489°N, 121.5495°W, 10 October 2019, *Haldeman 3334* (OSC).

#*Cercidospora xanthoriae* (Wedd.) R. Sant.

Knudsen and Lendemer (2006) reported this species first for North America based on a specimen verified by Javier Etayo. Their specimen was from southern California on *Xanthomendoza fallax*. They mentioned that *C. xanthoriae* "usually has four strongly heteropolar spores per ascus". The specimen reported here consistently has 4 spores/ascus which are strongly heteropolar with one cell tapering to a point. However, Navarro-Rosinés et al. (2004) stated that the spores of *C. xanthoriae* should only be slightly heteropolar. According to Khodosovtsev and Darmostuk (2017) this group needs a thorough revision. This species was also recently reported from Nevada on *Rusavskia elegans* (Carter et al. 2019). New to Idaho.

Specimen Examined. – **U.S.A. IDAHO. IDAHO COUNTY.:** Hells Canyon Recreation Area, W side of the N Fork of Klopton Creek, on upper surface of thallus of *Xanthomendoza fallax*. L. Geiser s.n., 45.6342°N, 116.4833°W, 17 August 2010, (OSC) OSC-M-292504a.

#*Geltingia associata* (Th. Fr.) Alstrup & D. Hawksw.

This species has been reported from Alaska and Washington (Diederich et al. 2010). It is reported here from a new host, *Pertusaria subambigens*. It was previously known from several *Ochrolechia* species, *Lepra dactylina* and from *Thamnolia* (Diederich et al. 2010, Diederich et al. 2018, Rambold and Triebel 1990).

Specimen Examined. – **U.S.A. WASHINGTON. WHATCOM CO.:** Excelsior Trail, north side of the Mt. Baker Highway, *Pseudotsuga*, *Thuja* and *Tsuga heterophylla* forest, on thallus and apothecia of *Pertusaria subambigens* on bark of down *Pseudotsuga menziesii* bole, 643 m, 48.9120°N, 121.7998°W, 11 February 2020, *Haldeman 3417*.

#*Lawalreea cf. lecanorae* Diederich

Diederich (1990) described *Lawalreea lecanorae* on *Lecanora* (*Myriolecis*) *persimilis* from Luxembourg. He described conidia 5.5-6.5 × 2-3µm with pycnidia green in the upper part and hyaline in the lower part. Zhurbenko and Notov (2015) reported *Lawalreea cf. lecanorae* from *Lecanora* (*Myriolecis*) *hagenii* from Russia. Their specimen differed in having larger conidia, 8.1-9.9 × 3.0-3.6 µm, with pycnidia pale brown below and medium brown above with a greenish gray hue around the ostiole. The specimen reported here, also from *Myriolecis*, has conidia similar in size to the Russian specimen and pycnidia like those of the Luxembourg specimen. I found 10 conidia ranged from 9.0-11.1 × 2.9-4.1 µm with a mean of 9.8 × 3.6 µm and median of 9.8 × 3.5 µm. The pycnidia are hyaline in the lower half and olive-green in the upper part. A key including this and similar coelomycete genera is presented by Diederich et al. (2012).

Specimen Examined. – **U.S.A. WASHINGTON. WHATCOM CO.:** south of Wildcat Cove, on nearly vertical sandstone above Bellingham Bay, on *Myriolecis dispersa*, 10 m, 48.651°N, 122.493°W, 9 January 2020, *Haldeman 3389*.

***Lecania madida* Reese Næsborg & Björk**

Reese Næsborg (2008) described this species and reported it from British Columbia and Montana. McCune (2017) mentioned British Columbia and Montana specifically but stated that it is likely to be found in other Pacific Northwest states. CNALH (2020) shows records from British Columbia, California and Idaho, all collected by the second author of the species, but it does not appear on the California list (Tucker 2014). New to Washington.

Specimen Examined. – **U.S.A. WASHINGTON. WHATCOM CO.:** South edge of Bellingham, North Chuckanut Trailhead, on bark of fallen *Populus trichocarpa* branch, 40 m, 48.701°N, 122.489°W, 28 September 2019, *Haldeman 3365*.

#*Lichenochora aipoliae* Etayo, Nav.-Ros. and Coppins

Etayo and Navarro-Rosinés (2008) described this species from Great Britain on *Physcia aipolia*. The specimen cited here matches the protologue well except in having 8 spores per ascus versus 4 spores per ascus in the protologue. Similar characteristics to their description include pycnidia immersed in gall-like infections, spores warty, hyaline and 1-septate, similar spore size and similar host. The specimen listed here was found on *Physcia alnophila* which was, until recently, considered conspecific with *P. aipolia* (Brodo et al. 2013, Lohtander et al. 2009). *Lichenochora galligena* was reported from Louisiana on *Physcia americana* (Diederich 2003), and that species has 8 spores per ascus, but the spores are shorter and wider (Etayo and Navarro-Rosinés 2008). They reported *L. galligena* spore sizes as 9-11 × 6-8µm and those of *L. aipoliae* as 12.5-14.5 × 6-7µm. Ten spores from the specimen reported here had a mean of 13.8 × 5.7µm. New to North America.

Specimen Examined. – **U.S.A. WASHINGTON. WHATCOM CO.:** South side of Bellingham, North Chuckanut Trailhead, *Thuja plicata*, *Alnus rubra* and *Tsuga heterophylla* forest, on bark of recently fallen *Populus trichocarpa* branch on upper surface of *Physcia alnophila* thallus, 40 m, 48.701°N, 122.489°W, 28 September 2019, *Haldeman 3364* (OSC).

#*Lichenodiplis lichenicola* Dyko & D. Hawksw

This species was first reported from North America by Zhurbenko et al. (1995) from northern Alaska on *Rinodina turfacea*. There is also a well-documented observational record with photos on CNALH (2020) from eastern Washington on *R. pyrina*, *Hollinger 13978a*. Although there are few records from North America it appears to be fairly common in the inland northwest. New to Idaho.

Specimens Examined. – **U.S.A. IDAHO. BENEWAH CO.:** ranch on Emerald Creek Road on the Shoshone County border, flat pastureland with patches of *Abies grandis* and *Populus trichocarpa*, on *Crataegus douglasii* on *Rinodina freyi*, 855 m, 47.04°N, 116.35°W, 25 September 2016, *Haldeman 1787* sub *Calicium adaequatum*; **CLEARWATER CO.:** North Fork of the Clearwater River between Washington and Weitas Creeks, on HCl- rocks along river edge above flood level, on *Rinodina milvina*, 703 m, 46.6367°N, 115.4481°W, 31 July 2016, *Haldeman 1467* (herb. Diederich, herb. Haldeman); Orofino, along the Clearwater River, in hymenium of unidentified, K-, *Rinodina* on *Crataegus douglasii* bark, 314 m, 46.478°N, 116.257°W, *Haldeman 2149* (OSC); **SHOSHONE CO.:** South-facing slope above East Fork of Gold Creek near Gold Pass, in hymenia of *Rinodina freyi* on *Amelanchier alnifolia* twig, 1367 m, 47.17°N, 115.34°W, *Haldeman 926* sub *Lecanora pulicaris*. **WASHINGTON. FERRY CO.:** Southwest of Inchelium, *Pinus ponderosa* and *Pseudotsuga menziesii* forest, in hymenia of K- *Rinodina* sp. on bark of *Holodiscus discolor*, 1074 m, 48.17°N, 118.31°W, *Haldeman 3306*.

#*Lichenothelia dimelaenae* (Calat. & Hafellner) Kocourk., K. Knudsen & Muggia

This species was described by Calatayud et al. (2004) as *Lichenostigma dimelaenae* on *Dimelaena oreina* from Arizona. Ametrano et al. (2019) reported it from Arizona, California, Colorado and Idaho, also on *Dimelaena oreina*. New to Oregon.

Specimen Examined. – **U.S.A. OREGON. LAKE CO.:** Along Hwy. 31 on the east side of the south end of Silver Lake in the high desert, on large boulders used as woodchuck lookouts, 29 March 1969, *L. H. Pike L-664A*, (OSC, the rock chip with the most infected lichen thallus was split from *L. H. Pike L-664, Dimelaena oreina*).

#*Lichenothelia rugosa* (G. Thor) Ertz & Diederich

Thor (1985) described this species and reported it from Colorado and Utah. Kocourková et al. (2012) summarized records from southern and central California and Alstrup and Cole (1998) reported it from two locations in British Columbia. All the previous records were reported as

Lichenostigma rugosa or *Lichenostigma rugosum* and all were on *Diploschistes*. The following records fill a broad gap in the distribution. New to Idaho and Washington.

Specimens Examined. – **U.S.A. IDAHO. IDAHO CO.:** along Hwy 95 near Slate Creek, open woodland of *Cercocarpus ledifolius* and *Pinus ponderosa*, on thallus of *Diploschistes scruposus* on thin soil over rock, 493 m, 45.627°N, 116.296°W, 5 October 2016, *Haldeman 1817* (OSC). **WASHINGTON. FERRY CO.:** southwest of Keller, open, south-facing *Pinus ponderosa* forest, on *Diploschistes scruposus* thallus on exposed boulder, 767 m, 48.03°N, 118.75°W, 22 September 2019, *Haldeman 3322*; **OKANOGAN CO.:** south end of Omak Lake, *Ericameria nauseosa* and *Purshia tridentata* scrub with outcrops, on *Diploschistes scruposus* thallus on rock, 278 m, 48.245°N, 119.370°W, 24 June 2019, *Haldeman 3163*.

***Miriquidica garovaglioi* (Schaerer) Hertel & Rambold**

Hertel (2001) gave the North American range of this species as Arctic Canada, Colorado and Wyoming. There are also records from Arizona (Nash et al. 2004) and California (Tucker 2014) as *M. garovaglii*. Reports from Montana (DeBolt and McCune 1993) and Idaho (McCune 1998), also as *M. garovaglii*, were amended to *Lambiella impavida* by McCune (2017). The specimen reported here has a hyaline hypothecium, medulla IKI-, P+O, K+brownish Y, and C- and 7 spores averaged 12.7 × 5.4 µm. New to Washington.

Specimen Examined. – **U.S.A. WASHINGTON. WHATCOM CO.:** Mt. Baker, Chowder Ridge, alpine ridgetop just above krummholz, on rock, 1991 m, 48.842°N, 121.858°W, 31 August 2017, *Haldeman 2556*.

#*Monodictys epilepraria* Kukwa & Diederich

This species was first reported from North America by Seaward et al. (2017) from the USA, Maine. They also mention that it is probably widespread in eastern North America based on unpublished herbarium records. For photos and the species description see Kukwa and Diederich (2005). All records from the above references are from *Lepraria*. The *Lepraria* host reported here had spot tests of P+O, K- and KC-. New to western North America.

Specimen Examined. – **U.S.A. WASHINGTON. WHATCOM CO.:** Wildcat Cove south of Bellingham, *Pseudotsuga menziesii* and *Arbutus menziesii* forest above Bellingham Bay, on *Lepraria* sp. over moss on a shaded boulder, 10 m, 48.6508°N, 122.4929°W, 9 January 2020, *Haldeman 3392* (OSC).

***Myriospora smaragdula* (Wahlenb. ex Ach.) Nägeli ex Uloth**

See Haldeman (2019) for discussion of northwestern records of this species. New to Washington.

Specimen Examined. – **U.S.A. WASHINGTON. WHATCOM CO.:** Wildcat Cove south of Bellingham, outcrops within *Pseudotsuga menziesii* and *Arbutus menziesii* forest above Bellingham Bay, on nearly vertical sandstone, 10 m, 48.6508°N, 122.4929°W, 9 January 2020, *Haldeman 3381*.

#*Opegrapha thelotrematis* Coppins

Tønsberg (1997) first reported this species for North America from *Thelotrema lepadinum*. He found it on the outer coasts of Vancouver Island, British Columbia and the Olympic Peninsula, Washington. New to Oregon.

Specimen Examined. – **U.S.A. OREGON. LANE CO.:** Siuslaw National Forest, 800 ft, 01 March 2001, *J. Sperling 00-JLS-567* (OSC 92446 sub *T. lepadinum* and with *Taeniolella toruloides*).

#*Rhagadostoma lichenicola* (De Not.) Keissl.

This widespread species (Navarro-Rosinés and Hladun 1994, Zhurbenko 2007a) has been reported from northwestern North America in southeast Alaska (Spribille et al. 2010) and British Columbia (Alstrup and Cole 1998) on *Solorina crocea*. MyCoPortal (2020) also shows two Colorado records from Longs Peak on *Solorina crocea*, *Kiener 6850* and *8915*. I searched through the *Solorina crocea* collections at OSC and found this species to be the most common lichenicolous fungus in those collections. Here it is reported new to Idaho, Oregon and Montana. In all cases mentioned below the fungus occurs on the upper surface of *Solorina crocea*.

Specimens Examined. – **U.S.A. MONTANA. POWELL CO.:** above Dry Fk., Blackfoot River, 20 km north of Ovando, 1680 m, 23 July 1976, *McCune 6674a* (OSC). **IDAHO. IDAHO CO.:** Selway-Bitterroot Wilderness, just below Triple Lakes, 2195 m, 45.952ºN, 114.437ºW, 16 August 2012, *Haldeman 120*. **OREGON. CLACKAMAS CO.:** Mt. Hood National Forest, High Rock, 13 mi. south-southeast of Zigzag, 4950 ft., 12 September 2000, *Christy 9547* (OSC, sub *Solorina crocea*); **LANE CO.:** 400 meters east of Sister Springs, west of the North Sister, 2075 m, *Sundberg 12* (OSC, sub *Solorina crocea*); **UMATILLA CO.:** Umatilla National Forest, steep north-facing slope in *Pinus contorta*, *Abies lasiocarpa* and *Larix occidentalis* forest, 1677 m, 45º 05' 05.7", -118º 37' 05.7", 9 September 2009, *Billy Ellyson 9/09/2009-1a* (OSC).

***Segestria leptalea* (Durieu & Mont.) R. C. Harris**

McCune (2017) reported this species from southeast Alaska to coastal and inland British Columbia and Tucker (2014) listed several California records. This specimen was found on a unique substrate for this species – a *Pseudotsuga menziesii* cone lodged in soil and litter in dense shade below a large *Pseudotsuga*. New to Washington.

Specimen Examined. – **U.S.A. WASHINGTON. WHATCOM CO.:** Larrabee State Park, Ridge Trail, *Pseudotsuga*, *Tsuga heterophylla* and *Alnus rubra* forest, on *Pseudotsuga menziesii* cone lodged in soil and litter, 518 m, 48.6588°N, 122.4626°W, 11 November 2019, *Haldeman 3366* (OSC).

#*Stigmidium lepraria*e Zhurb.

Zhurbenko (2007b) described this species from Norway on *Lepraria neglecta*. Since then it has been reported from various locations in Europe and Russia, on the *L. neglecta* group or *L.* sp. (Himelbrant et al. 2014; Kukwa and Flakus 2009; Malíček et al. 2009; Urbanavichus and Urbanavichene 2017; Zhurbenko 2009). New to North America.

Specimen Examined. – **U.S.A. IDAHO. SHOSHONE CO.:** Pole Mountain summit east of Table Camp, open, mostly flat subalpine summit surrounded by clumps of *Abies bifolia* and *Tsuga mertensiana*, on *Lepraria neglecta* on exposed soil, 2012 m, 46.9803°N, 115.4311°W, 11 July 2017, *Haldeman 2329* (OSC).

#*Taeniolella toruloides* Heuchert & Diederich

The known range of this species according to recent work on this genus (Ertz et al. 2016, Heuchert et al. 2018) is limited to Europe on *Thelotrema antoninii* and *T. lepadinum*. Heuchert et al. (2018) described two other species of *Taeniolella* from *Thelotrema*, neither of which has yet to be found in North America. Both records shown here consist of dense tufts on the thallus of *T. lepadinum* and have conidia in long chains with distinct constrictions. Spribille et al. (2010) reported *Taeniolella* sp. from *Thelotrema lepadinum* but it is not known to which species this refers. New to North America.

Specimens Examined. – **U.S.A. OREGON. LANE CO.:** Siuslaw National Forest, 800 ft, 01 March 2001, *J. Sperling 00-JLS-567* (OSC 92446 sub *T. lepadinum* and with *Opegrapha thelotrematis*). **WASHINGTON. WHATCOM CO.:** Baker Lake Trail, *Pseudotsuga*, *Thuja* and *Tsuga heterophylla* forest, on bark of bole of dead *Abies*, 239 m, 48.7489°N, 121.5495°W, 10 October 2019, *Haldeman 3366* (OSC).

OTHER ASCOMYCOTA MICROFUNGI NOT ASSOCIATED WITH THE STUDY OF LICHENS

***Gloniopsis subrugosa* (Cooke & Ellis) E. W. A. Boehm & C. L. Schoch**

This species was reported for the USA from Arizona, Kansas and Massachusetts by Barr (1990) and from New Jersey by Ellis and Everhart (1892, p. 702), both as *Hysterographium subrugosum*. There is also a CNALH (2020) record from southern California, *Knudsen 2356*, and a MyCoPortal (2020) record from Ohio, *Grootmyers MUOB 364183*. Boehm et al. (2009) moved this species to *Gloniopsis*. They included photos, a key to this group and a description and discussion of this species. The two collections mentioned here had spores that were brown in the ascus which differs from *G. praelonga* (Boehm et al. 2009). They were consistently with 7 transverse septa and 1 longitudinal septum in the middle 2-3 rows. New to Idaho and the Pacific Northwest region, also apparently new to Michigan.

Specimens Examined. – **U.S.A. IDAHO. IDAHO CO.:** Salmon River near Slate Creek, bark of *Cercocarpus ledifolius*, 493 m, 45.6269°N, 116.2958°W, 5 October 2016, *Haldeman 1820*. **MICHIGAN. BARRY CO.:** disturbed area of old fields and scattered woods near Gun Lake, 22 June 1957, *H. A. Imshaug 19787a* (OSC). The latter specimen was split from a large collection (*19787*) of *Candelariella xanthostigma*.

***Nemania maritima* Y. M. Ju & J. D. Rogers**

Ju and Rogers (2002) described this species from wood in mangrove forests in Taiwan. Læssøe (2003) reported it first for Denmark and Norden et al (2015) reported it first for Norway. The website Pyrenomycetes from southwestern France http://pyrenomycetes.free.fr/nemania/html/N_maritima.htm (Fournier and Magni 2020) reports it from that region and has photos and a description. There are additional Pacific records found in MyCoPortal (2020) from the USA (southern California and Hawaii) and New Zealand. New to northwestern North America.

Specimen Examined. – **U.S.A. WASHINGTON. SAN JUAN CO.:** Lopez Island, Watmough Bay, on driftwood log on upper edge of the beach, 48.4311°N, 122.8144°W, 18 January 2017, *Haldeman 1926* (OSC).

***Pseudographis elatina* (Ach.) Nyl.**

An Oregon record on *Pseudotsuga menziesii* bark was mentioned by Karakehian et al. (2019), who also provided micro and macro photos of this species. MyCoPortal (2020) lists a California and several Oregon records from the 1970's, but there are so few reports from the region, especially recently, that it seemed prudent to include this record here. It should also be noted that MyCoPortal (2020) shows this as a synonym of *Loxospora elatina* but this must be wrong. *Loxospora elatina* is a crustose, sorediate lichen, usually sterile but when fertile the spores are transversely 3-5 septate and often curved (McCune 2017). *Pseudographis elatina* is not lichenized and has muriform, hyaline spores that turn deep blue in IKI (Karakehian et al. 2019) among many other differences. I have commonly seen empty ascoma shells on *Pseudotsuga* bark throughout northern Idaho and Washington that recall a dried version of this species but have not been able to find asci or spores. Further studies are required to know if those belong to this species. When wet in the field the ascomata of the collection reported here were nearly circular, but upon drying became nearly linear and closed. New to Washington.

Specimen Examined. – **U.S.A. WASHINGTON. WHATCOM CO.:** Church Mt. Road above Mt. Baker Highway, *Pseudotsuga*, *Thuja*, *Tsuga heterophylla* and *Alnus rubra* forest, on bark of *Pseudotsuga menziesii* bole, 612 m, 48.9116°N, 121.8476°W, 11 February 2020, *Haldeman 3424* (OSC).

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