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Studies in lichens and lichenicolous fungi: more notes on taxa from North America

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Abstract — The following taxa are reported for the first time from North America: *Arthonia anglica, A. cyrtodes,* and *Lichenostigma anatolicum. Sarcogyne bolleana* is made a synonym of *S. arenosa.*

1. *Arthonia anglica* Coppins, Lichenologist 21(3): 195. 1989.

Type: Anglia, "St. Leonard's, Jan. 1806", ad corticem *Fagi*, *?W. Borrer* s.n. (BM, holotype).

Arthonia "*dryadum*" R.C. Harris & Ladd ined., Preliminary Draft, Ozark Lichens, p. 59. 2005.

Harris & Ladd (2005) were the first to recognize the occurrence of this *Arthonia* species on the bark of hardwoods (especially *Acer* and *Carpinus*) in humid mesic woodlands along streams in the Ozarks. They noted that their material was similar to *A. anglica* but chose not to take up the name because they had not seen comparative material of that species and instead opted to use the manuscript name *A. "dryadum"*. While conducting fieldwork in the Ozark Ecoregion, the first author (JCL) became acquainted with this species and subsequently found populations in the middle to low elevations of the southern Appalachian Mountains (Lendemer & Tripp 2004) where it occurred in habitats comparable to those of the Ozark populations. Further fieldwork in southeastern North America revealed the species to be widespread in the coastal plain and piedmont (Hansen et al. 2008, Perlmutter & Lendemer 2008). In light of the Appalachian-Ozark distribution of this taxon in eastern North

America, a distribution that almost certainly indicates a wider distribution in the past, the first author was prompted to send a specimen of *A. "dryadum"* to Brian Coppins (E), who compared it to material of *A. anglica* and confirmed that they are conspecific. Thus, *A. anglica* is reported here for the first time from North America. *Arthonia anglica* can be distinguished from other North American species of *Arthonia* by its corticolous habit, irregularly shaped reddish-brown ascomata that contain gyrophoric acid in the margins, (3–)4-celled macrocephalic ascospores (15–22 × 5–7 μm), and *Trentepohlia* photobiont.

Selected specimens examined. – **U.S.A. Alabama.** Escambia Co.: Little River State Forest, W of SR 21, 12.iv.2007, *J.C. Lendemer et al. 9251* (NY). **Arkansas.** Benton Co.: Hobbs State Park-Conservation Area, 16.x.2005, *J.C. Lendemer et al. 5617* (NY). Crawford Co.: Ozark National Forest, along FSR 1725, 15.iv.2004, *R.C. Harris 49159* (NY). Newton Co.: Buffalo National River, along CR 84, 17.iv.2005, *R.C. Harris 51051-A* (NY). **Georgia.** Towns Co.: Southern Nantahala Wilderness, Hightower Gap to Rich Knob, 11.xi.2007, *J.C. Lendemer et al. 10914* (NY). **Missouri.** Butler Co.: Mark Twain National Forest, Mud Creek Natural Area, 16.x.2003, *W.R. Buck 45442* (NY). Carter Co.: Peck Ranch Conservation Area, 16.iv.1997, *W.R. Buck 31813* (NY). Greene Co.: Rocky Barrens Conservation Area, 16.iv.2005, *R.C. Harris 50929* (NY). Iron Co.: Mark Twain National Forest, along CR N, 13.x.1993, *R.C. Harris 31154-A* (NY). Jefferson Co.: E of Don Robinson Rd., 12.x.2003, *R.C. Harris 48156* (NY). Madison Co.: Mark Twain National Forest, Rock Pile Mountain Wilderness Area, 14.x.2003, *R.C. Harris 48281* (NY). Morgan Co.: Frank E. Carpenter Memorial Conservation Area, 15.iv.2005, *W.R. Buck 48579* (NY). Oregon Co.: Mark Twain National Forest, Greer Spring Trail, 18.x.2003, *R.C. Harris 48747-A* (NY). Ripley Co.: Mudpuppy Conservation Area, 17.x.2003, *R.C. Harris 48632* (NY). Taney Co.: Mark Twain National Forest, Hercules Glades Wilderness, 22.v.2003, *R.C. Harris 47746* (NY). Wayne Co.: Sam A. Baker State Park, 15.x.2003, *R.C. Harris 48374* (NY). **North Carolina.** Carteret Co.: Cape Lookout National Seashore, Shackleford Banks, 19.iii.2003, *W.R. Buck 43808* (NY). Haywood Co.: Great Smoky Mountains National Park, 3 mi SE Waterville, 28.x.2006, *J.C. Lendemer 8159 & E. Tripp* (NY). Jones Co.: Croatan National Forest, Catfish Lake South Wilderness, 17.iii.2003, *R.C. Harris 47085* (NY). Orange Co.: Mason Farm Biological Preserve, 13.iv.2007, *G.B. Perlmutter et al. 917* (NY). Transylvania Co.: Gorges State Park, E facing drainage of the Toxaway River, 10.viii.2005, *J.C. Lendemer 5641 & E. Tripp* (NY). Wake Co.: William B. Umstead State Park, 13.i.2007, *J.C. Lendemer et al. 8314* (NY). **Virginia.** Wythe Co.: Jefferson National Forest, Mt. Rogers National Recreation Area, Raven Cliff Horse Camp, 6.iv.2008, *G.B. Perlmutter 1350* (NY). **Wisconsin.** Columbia Co.: Columbia Power Plant, 11.ix.2003, *S. Will-Wolf s.n.* (NY).

2. *Arthonia cyrtodes* Nyl., Annal. Sci. Nat. Bot., ser. 4, 19: 351. 1863.

Type: Cuba, *C. Wright s.n. = Lichenes Cubae no. 245* (FH-TUCK #3726! [HUH barcode 00259864, left-hand specimen marked "1"], **lectotype designated here**).

Arthothelium cyrtodes (Nyl.) Zahlbr., Cat. Lich. Univers. 2: 123. 1922.

Arthonia cyrtodes is a conspicuous member of the morphologically diverse and remarkably speciose genus *Arthonia* Ach. The species was described from Cuba, and the herbarium of The New York Botanical Garden (NY) holds additional

collections from Puerto Rico. This is the first report of the species from North America.

The history and typification of the name *Arthonia cyrtodes* require some discussion because it has been placed in the genus *Arthothelium* A. Massal. despite having transversely septate ascospores. When Nylander (1863) described *Arthonia cyrtodes* he based it on "*Lecidea cyrtodes* Tuck." a manuscript name supplied by Edward Tuckerman. In the description Nylander noted that the original material of Tuckerman's name actually consisted of two taxa, one with transversely septate ascospores which he named *A. cyrtodes* and another with muriform ascospores which he named *A. distendens* Nyl. Thus it is clear from the protologue of *A. cyrtodes* that the name applies to a taxon with transversely septate ascospores. In his revision of the genus *Arthonia*, Willey (1890) organized all of the known *Arthonia* species into groups based on ascospore color and septation. For some reason he placed *A. cyrtodes* in the group that was characterized by hyaline muriform ascospores (Willey 1890: 50) despite the fact that his own description did not report longitudinal septa. It was presumably on this basis that Zahlbruckner (1922) incorrectly transferred *A. cyrtodes* to *Arthothelium*. *Arthonia cyrtodes* has not been typified and as such, to prevent any confusion as to the application of the name, a lectotype is selected here from amongst the original material sent by Tuckerman to Nylander.

In the field this species could easily be confused with several others that have white continuous thalli and large flattened reddish-black ascomata, namely *Arthonia macrotheca* Fée or *A. mesoleuca* Nyl. *Arthonia cyrtodes* is almost identical to the former taxon in having an oil inspersed hymenium, large ascospores (>50 µm long), and K– pigments in the epihymenium; it differs in having transversely septate (10–13-celled) rather than muriform ascospores. The latter taxon is only superficially similar to *A. cyrtodes*, and differs by having a hymenium that is not inspersed with oil droplets, shorter ascospores (<50 µm long) that are muriform, and K+ red-violet pigments in the epihymenium.

Additional Specimens Examined. – **Puerto Rico:** vicinity of San Juan, 13.iii.1906, *N.L. Britton 302 & W.M. Wheeler* (NY); Santurce, 12.ii.1914, *E.G. Britton 1478* (NY); Dorado, 13.ii.1914, *N.L. Britton 1504 & J.F. Cowell* (NY); Naranjito, 25.xi.1915, *B. Fink 96* (NY). **U.S.A. Florida.** Glades Co.: Ortona Cemetery, 6.iii.2009, *J.C. Lendemer et al. 15722* (NY).

3. *Lichenostigma anatolicum* Halici & Kocakaya, Mycotaxon 108: 68. 2009.

Type: Turkey, Sivas, Gürün District, Gökpınar, 38°39.071'N, 37°18.309'E, alt. 1620 m, on thallus of a brown *Acarospora* sp. on gypsaceous rocks, 05.viii.2008, *M. Kocakaya* (hb. Erciyes University, Biology Department-0.5471, holotype).

Lichenostigma anatolicum is a newly described species collected on the thallus of a sterile brown *Acarospora* in Turkey (Halici et al. 2009). The species suppresses ascomata production in the host and is distinguished by the I+/KI+ blue

stain of the centrum and finely verruculose non-halonate brown ascospores (9.0–)9.2–*10.5*–11.8(–13) × (5.0–)5.5–*6.3*–7.0(–7.5) µm. Though halonate ascospores were not seen in the type specimen from Turkey, we observed that young ascospores were halonate, the halo up to 4 µm wide. It is a member of the subgenus *Lichenostigma*, a group that does not produce superficial black hyphae on the host. Our specimen was collected on sterile *Acarospora* cf. *veronensis* areoles on sandstone in both shade and full sun in Fremont Canyon in the Santa Ana Mountains in southern California. *Lichenostigma anatolicum* was rare, but the whole canyon had recently burned and only a remnant of the lichen and lichenicolous fungi biota survived. If not abundant on the host, *L. anatolicum* can be easily overlooked.

There are currently 23 described species of *Lichenostigma* worldwide (Mycobank 2009). Including this record, 11 species of *Lichenostigma* have been reported from North America (Esslinger 2009, Knudsen & Kocourková 2008, Kocourková & Knudsen 2008).

Specimens examined. – **U.S.A. California.** Orange Co.: Santa Ana Mountains, Fremont Canyon, south ridge, 33°47'24"N 117°40'19"W, 452 m, on *Acarospora* cf. *veronensis,* on sandstone slabs in shade above truck trail, 3.xii.2007, *K. Knudsen 9266* (UCR); south ridge 33°47'35"N, 117°41'33"W, 490 m, on sterile brown *Acarospora* on sandstone outcrops on spur of ridge in full sun, 3.xii.2007, *K. Knudsen 9272* (PRM).

4. *Sarcogyne arenosa* (Herre) K. Knudsen & S. Standley, Opuscula Philolichenum, 2: 36. 2005.

Acarospora arenosa Herre, Proc. Wash. Acad. Sci., 12: 129. 1910.

Type: U.S.A., California, Santa Cruz Mountains, hills west of Stanford University, on sandstone, 11.vi.1904, *A. Herre 540* (FH [HUH barcode 60874]!, lectotype; FH!, MIN!, US!, isolectotypes)

Syn. nov. *Sarcogyne bolleana* H. Magn., Ann. Crypt. Exot., 7: 143. 1935.
Type: U.S.A., western part, 1879, *J. Boll s.n.* (G!, holotype).

At the time of writing the treatment of *Sarcogyne* for the Lichen Flora of the Greater Sonoran Desert Region, Knudsen & Standley (2008) believed the type of *Sarcogyne bolleana* was lost and treated *S. bolleana* as a synonym of *S. regularis* Körb. Recently P. Clerc located the holotype of *S. bolleana* at G, which had not been annotated by Magnusson. The type definitely represents *S. arenosa* and so we correct the synonymy here. For descriptions of *S. arenosa*, see Magnusson (1935, as *S. bolleana*) and Knudsen & Standley (2008).

Magnusson did not see the Herre types of *S. arenosa* from the Santa Cruz Mountains in central California, which were apparently not deposited at FH when he wrote his monograph on *Acarospora.* He did examine two specimens determined as *Acarospora arenosa* from the Santa Monica Mountains in southern California, probably collected by H.E. Hasse, which he identified as

S. regularis and *Myriospora heppii* (Nägeli ex Körb.) Hue (Magnusson 1929), and he rejected *A. arenosa* as a species

When writing the Sonoran treatment of *Sarcogyne,* Knudsen & Standley (2008) only examined specimens of *S. arenosa* from California. There the species is frequent on consolidated soil, sandstone, and decaying granite (often occurring with *S. similis* H. Magn.) and on calcareous rock (there often occurring with *S. regularis*). We report *S. arenosa* as new to Colorado, Kansas, and Texas.

Sarcogyne arenosa is a member of the *Acarospora glaucocarpa–Sarcogyne regularis* group, which will eventually be segregated as a new genus.

Specimens examined. – **U.S.A. Colorado.** Larimer Co.: Owl Canyon, 9.7 miles N of Teds Place (junction of Hwy. 287 & 14), 1830 m, on limestone outcrops of Ingleside formation in *Pinus edulis* stand, 6.vi.1955, *S. Shushan & W.A. Weber S4742* (UPS). **Kansas.** Douglas Co.: Clinton Lake Wildlife Area above Coblenz Marsh, 38°54'12"N 95°29'43"W, 277 m, on limestone, 21.iii.2007, *C.A. Morse 14578 & N. Kuhn* (KANU, UCR). **Texas.** El Paso Co.: Frankin Mountains, 31°48'15"N 106°29'W, 1646 m, on calcareous rock, 14.viii.2006, *R.D. Worthington 34204* (UCR, UTEP).

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