

Megalaria beechingii (lichenized ascomycota), a New Species from Eastern North America

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ABSTRACT. – *Megalaria beechingii*, a new species from the southern Appalachian Mountains, USA is described.

INTRODUCTION

Recently, I received a number of interesting collections made by Sean Beeching from the southern Appalachian Mountains of North America. Among the specimens was a puzzling saxicolous crustose lichen that, upon further study, was recognized as an undescribed species of *Megalaria*. A trip to the locality allowed me to gather additional ecological data as well as ample material to allow detailed study and to serve as a type specimen. Subsequent examination of undetermined material in the herbarium of the New York Botanical Garden (NY) resulted in the discovery of several additional collections of the species. The material is here described as *Megalaria beechingii*.

MATERIALS & METHODS

Specimens were initially studied using a standard light dissecting microscope. Hand cut sections were prepared using a razor blade and by wetting the thallus/apothecia with water. Apothecial anatomy, pigments, and the characteristics of the asci and ascospores were examined following the methods of Ekman (1996). Photographs were prepared using a CoolPix 950 Digital Camera with the images assembled and edited (for grayscale and improved contrast) in Adobe Photoshop. TLC was performed using solvent C following the methods of Culberson and Kristinsson (1970). Selected specimens used for comparison are cited in Appendix I.

TAXONOMIC SECTION

Megalaria beechingii Lendemer sp. nov.

Ab *Megalario pulvereo* substrato rupicola, hypothecio brunneo (K+ violaceus), et acido fumarprotocetrarico nullo differt.

TYPE: USA. GEORGIA. RABUN CO.: Lake Burton Wildlife Management Area, vicinity of Popcorn Overlook, just south of US Route 76, north of Lake Burton, ~7.5 miles east of Clayton, Lake Burton Quad., elev. ca. 750 ft., humid overgrown dunite barren, on ridge-top, above tributary to Lake Burton, south-facing slope, pine (*Pinus*) – oak (*Quercus*) forest above, mixed hardwoods (*Acer*, *Nyssa*, *Quercus*) below, on large boulders, 17.IX.2006, J.C. Lendemer et al. 7700 (NY, holotype; CANL, PH-HBL, UCR, isotypes)

DESCRIPTION. – **Thallus** crustose, saxicolous, blue-gray to greenish-gray, areolate with areoles resting on a well developed white prothallus; prothallus white, fibrous in the available material; areoles

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arising from thalline warts near the growing edge of the thallus, initially \pm globose and convex, becoming flattened with age and aggregating as the thallus grows until forming a \pm continuous areolate crust; granules (granulose soredia) forming from the apical breakdown of areoles (plate 1, figure 3). **Apothecia** biatorine, epruinose, purple-black to jet black, initially plane and eventually becoming convex; margin concolorous with disc, persistent, becoming \pm excluded in convex apothecia; proper exciple laterally 80–100 μ m thick, occasionally with few large crystals, the interior dark brown-black (K–, HNO₃–) contrasting distinctly with the hyaline rim and the hypothecium, the outermost cells of the rim with variable amount of bluish-green pigment (blue-green, K \pm intense blue-green, HNO₃+ red, often faint in mature apothecia), composed of loose radiating hyphae, continuous under the hypothecium; hypothecium brown-red to dark brownish black (K+ purple-red, HNO₃+ intense brown), 50 μ m high; hymenium 100–110 μ m high, hyaline though often with streaks of pigment from hypothecium in the lower portions; epihymenium with variable blue-black pigmentation (K \pm purplish, HNO₃+ red), often with bluish excipular pigment extending from rim of proper exciple to adjacent portions; paraphyses unbranched to little branched above, \pm anastomosed below; asci *Bacidia*-type, cylindrical to \pm clavate, octosporous; ascospores broadly ellipsoid, often bent toward one side (kidney bean-shaped), hyaline, 1-septate, thick walled, not halonate, (12.7)–13.8–(14.8) x (4.6)–5.1–(5.4) μ m (n=15; \bar{x} \pm 0.25s); pycnidia not seen.

CHEMISTRY. – Atranorin and zeorin by TLC. Spot tests, K+ yellow, KC+ yellowish, C-, PD-, UV-

ECOLOGY & DISTRIBUTION. – Initially *Megalaria beechingii* was known only from the type locality, a small ridge-top dunite barren in the southern Appalachian Mountains of eastern North America. The barren is bisected by a major highway and is somewhat overgrown. It is located on a south-facing slope above a small stream, and the topography and proximity to water have created a micro-habitat with high humidity; as was evidenced by the luxuriant growth of both corticolous and saxicolous macrolichens. It should be noted that, whereas many normally corticolous species were found on rocks at the locality, *M. beechingii* was exclusively saxicolous. The species is also remarkably abundant at the type locality, seemingly the dominant crustose lichen on many exposed rocks.

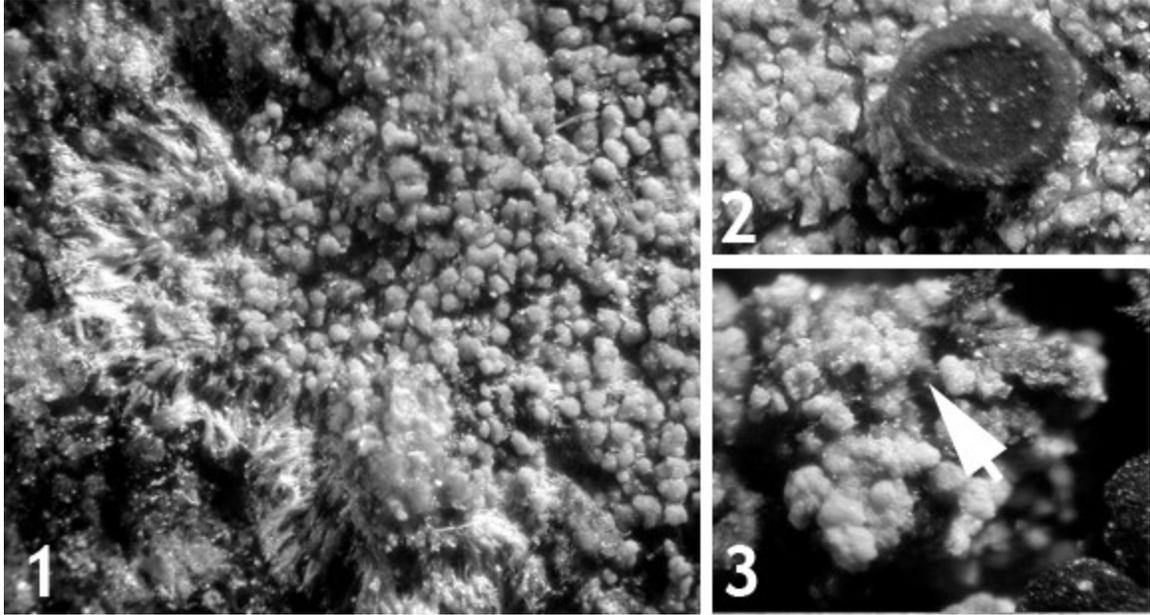
The dominance of *M. beechingii* at the type locality, coupled with the lack of previous collections (excepting a sterile collection made by R.C. Harris in the vicinity of the type locality) at first led me to assume the species was a narrow endemic. However, a search of undetermined material in the herbarium of the New York Botanical Garden revealed two additional collections from Clay Co., North Carolina.

Associated saxicolous species found with *M. beechingii* include *Acarospora dispersa* H. Magn., *Diploschistes actinostomus* (Pers.) Zahlbr., *D. scruposus* (Schreb.) Norman, *Fellhanera* sp., *Gomphillus americanus* Essl., *Hypotrachyna* spp., *Lasallia papulosa* (Ach.) Llano, *Parmotrema reticulatum* (Taylor) M. Choisy, *Pertusaria plittiana* Erichsen, and *Phlyctis petraea* ined.

DISCUSSION. – The genus *Megalaria* Hafellner was established by Hafellner (1984) to accommodate a single species, *M. grossa* (Pers. ex Nyl.) Hafellner, that had previously been placed in *Catillaria* A. Massal. or *Catinaria* Vain. The type species, *M. grossa*, differs significantly from the other sixteen species that have subsequently been placed in the genus by others (Ekman and Tønsberg 1996, Fryday 2004a, 2004b, Galloway 2004, Schreiner and Hafellner 1992), perhaps most notably in having a different ascus type and photobiont.

When Ekman and Tønsberg (1996) described the corticolous species *M. brodoana* from the Pacific Northwest of North America, they took the opportunity to discuss the problems associated with the circumscription of *Megalaria*, particularly the seemingly isolated position of the type species. Ekman and Tønsberg (1996) concluded that whereas differences exist among the taxa referred to *Megalaria* there are also substantial similarities. The authors thus proposed two alternative circumscriptions of *Megalaria*, one restricting the genus to the type species *M. grossa*, and the other adopting a “broad” concept of the genus reflecting the similarities in apothecial anatomy and tendencies in ascus type. Ekman and Tønsberg (1996) adopted the latter circumscription of the genus, which was subsequently confirmed with molecular data (Ekman 2001).

The new species differs most obviously from *M. pulvereana* by its saxicolous habit and dark pigmented hypothecium, the two species are otherwise quite similar and, *M. pulvereana* (Borrer) Hafellner & E. Schreiner has been reported from North America (Esslinger 2006). Interestingly, while the species are also chemically similar in the production of atranorin and zeorin, *M. beechingii* seems to constantly lack fumarprotocetraric acid, which is sometimes present in *M. pulvereana* (fumarprotocetraric acid is present in a collection of *M. pulvereana* from Rabun Co., Georgia (NY!)).



Figures 1-3. *Megalaria beechingii* (holotype). Figure 1. Thallus with distinct prothallus and formation of areoles along growing edge. Figure 2. Apothecium. Figure 3. Formation of granulose soredia from the apical breakdown of areoles.

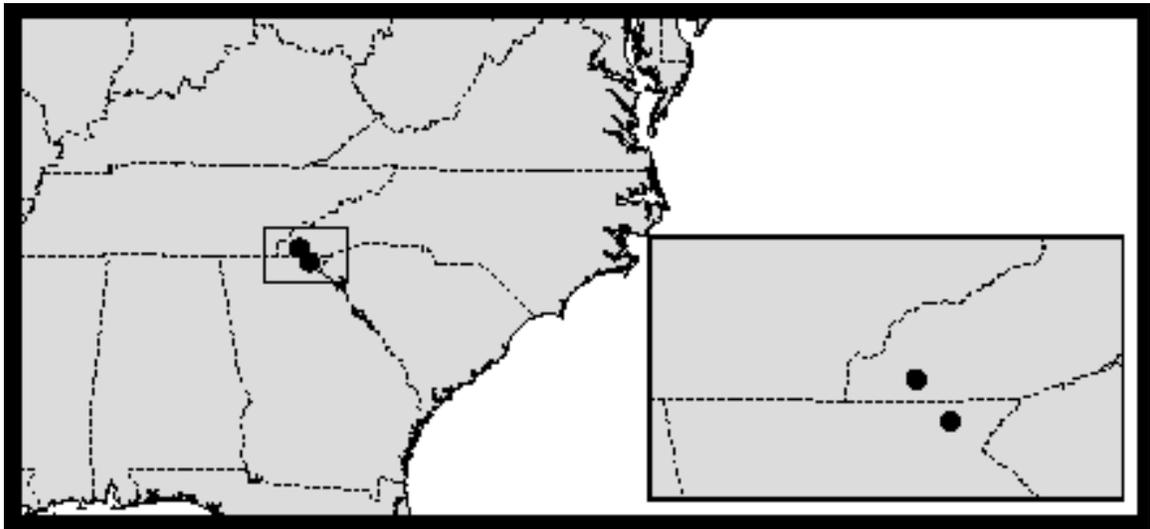


Figure 4. Known distribution of *Megalaria beechingii*, in eastern North America.

Within the larger, broad context of *Megalaria* the new species is distinguished by the unique combination of thalline and apothecial characters, saxicolous habit, and chemistry. *Megalaria beechingii* is one of only three currently recognized, species of *Megalaria* that are not corticolous. The three other saxicolous and terricolous species of *Megalaria* being only recently recognized (Fryday 2004a, 2004b). None of these taxa have been reported from eastern North America, and all three differ in apothecial or thalline characters. Coppins (1992) reported several saxicolous specimens of *M. grossa* from Europe but that species has ascospores and apothecia much larger than those of *M. beechingii* and is not known to produce lichen substances (Ekman and Tønsberg 1996).

ADDITIONAL SPECIMENS EXAMINED. – USA. GEORGIA. RABUN CO.: 12.2. mi. W of Clayton, 11.vi.1991, R.C. Harris 13796 (NY, sterile); vicinity of Popcorn Overlook, 27.vii.2006, S.Q. Beeching s.n. (PH-HBL) NORTH CAROLINA. CLAY CO.: Nantahala National Forest, along Buck Creek Road, 1.2 mi. NNW of US 64, 9.x.1998, R.C. Harris 42695 (NY), R.C. Harris 42729 (NY).

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APPENDIX I

SELECTED SPECIMENS EXAMINED OF ADDITIONAL MEGALARIA SPECIES. – M. BRODOANA. – CANADA. BRITISH COLUMBIA.: Queen Charlotte Islands, Moresby Island, Tasu, 52°46'N, 132°02'W, in *Picea-Thuja* forest on Gowing Island, on *Alnus* [sic] *rubra* above beach, 29.vii.1967, I.M. Brodo et al. 12844 (CANL, PARATYPE); Queen Charlotte Islands, Moresby Island, Jedway, 52°18'N, 131°13'W, along road to foot of Harriet Harbour and near stream inlet, *Picea-Tsuga-Alnus* stand at shore, on *Tsuga* at edge of forest, 26.vii.1967, I.M. Brodo et al. 12552 (CANL, PARATYPE), I.M. Brodo et al. 12569 (CANL, PARATYPE). M. COLUMBIANA. – CANADA. BRITISH COLUMBIA.: Didney, on alder trunks, 12.xii.1912, J. Macoun 59 (CANL, ISOLECTOTYPE). M. GROSSA. – SPAIN. CANARY ISLANDS.: Tenerife, Fayal-brezal with scattered pines, between Agua Garcia and Monte de La

Esperanza, 1100 m., 26.ii.1964, central mountain range, *H.A. Imshaug et al. 35856* (MSC); Fayal-brezal zone, ridge from Piedra Chinobre to Pico de Limante, 800 m., 21.ii.1964, Sierra de Anaga, *H.A. Imshaug et al. 35673A* (MSC). **M. IMSHAUGHII.** – **NEW ZEALAND.:** Campbell Island, Rock outcrops and tussock grass-land on summit ridge of Beeman Hill, 600-650 ft., 24.xii.1969, *R.C. Harris 4535* (MSC, PARATYPE), *R.C. Harris 4537* (MSC, PARATYPE). **M. JEMTLANDICA.** – **USA. ALASKA. BARROW.:** Dry bank north of North Meadow Lake, 70°18'40"N, 156°39'15"W, 0 m., 18.vii.2001, *A. Fryday 8370* (MSC). **M. LAURERI.** – **CANADA. ONTARIO.:** Nipissing District, Lookout Trail, Algonquin Provincial Park, ix.1960, on *Acer*, *H.A. Imshaug 26876* (MSC). **USA. MICHIGAN. CHEBOYGAN CO.:** Moist hardwoods in gorge of Carp Creek, University of Michigan Biological Station, 10.vii.1967, on *Fagus*, *R.C. Harris 3655* (MSC). **M. MELANOTROPA.** – **NEW ZEALAND.:** Campbell Island, *Dracophyllum* scrub on north side of Preserverance Harbour, about half-mile north of Beeman Station, 22.i.1970, *R.C. Harris 5694* (MSC). **M. PULVEREA.** – **BRITISH ISLES.:** England, V.C. 3 South Devon, Dartmoor, Okehampton, Throwleigh, Blackaton Brook, Grid Ref. 20/65-91, on bole of *Quercus* in sheltered, rather moist woodland, 14.xii.1975, *P.W. James s.n.* (CANL, FERTILE).

