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THE LICHENS OF "THE LEDGES," BOONE COUNTY,
IOWA.

BY KATY A. MILLER.

The study of the flora of "The Ledges" furnishes much opportunity for interesting research. Besides possessing some of the most beautiful scenery of Iowa these ledges, with their moisture and shade, make an inviting habitat for plants of many kinds. Of these plants the lichen flora is perhaps the most interesting, because heretofore little work has been done on the flora of perpendicular sandstone exposures, such as are here presented.

"The Ledges" are of ferruginous sandstone, rising in some places to a height of seventy-five feet. They present an almost perpendicularly exposed wall for about two miles along the Peese creek, a tributary of the Des Moines river. Disintegration seems to have gone on slowly, for many crustose thalli are well developed. In places where disintegration has gone on to any extent the refuse falls to the water below, so *Cladonias* are found only on the sandstone of the exposed faces and are comparatively rare. Such tree forms as *Parmelias*, *Physias* and *Ramalinas* were found on the sandstone, and such a typical tree form as *Usnea barbata* was collected only from the sandstone. These occurrences are explained by the nearness of trees from which these forms have migrated, and which afford abundant shade and moisture for them.

The study of these lichens has well repaid us, as several species new to Iowa were found, these being *Acarospora* (*Lecanora*) *cervina* var. *oligocarpa*, *Verrucaria viridula*, *Bil-*

imbia sp., *Cladonia pyxidata* var. *chlorophæa* and *Cladonia fimbriata* var. *coniocræa*, which has hitherto been reported in Iowa under *Cladonia fimbriata* var. *tubæformis*, and which likewise included *Cladonia fimbriata apolepta*, also found at "The Ledges." Most of the forms found here have good cellular cortices, and the thalli are larger and better developed than the thalli of the same species which grow in more exposed places.

The following list of lichens is the collection made at "The Ledges" last summer by Miss Charlotte King and Dr. Bruce Fink. In my determinations I am much indebted to Dr. Fink for help in some particularly difficult forms, and also for the use of his lichen herbarium for purposes of comparison and reference.

A set of the lichens herein listed is placed in the herbarium of the Iowa State college at Ames.

Ramalina calicaris (L.) Fr. var. *fraxinea* (L.) Fr. Lich. Eur. 30. 1831.

On sandstone and trees, rare.

Ramalina calicaris (L.) Fr. var. *fastigiata* (Pers.) Fr. Lich. Eur. 30. 1831.

On sandstone and trees, common.

Ramalina calicaris (L.) Fr. var. *farinacea*. (L.) Fr. Lich. Eur. 31. 1831.

On sandstone, rare.

Usnea barbata Fr. Sched. crit. Lich. Suec. 8:34. 1826.

On sandstone, infrequent.

Theloschistes polycarpus (Ehrh.) Tuck. Syn. 1:50. 1882.

On trees, rare.

Theloschistes lychneus (Ach.) Th. Fr. Lich. Scand. 1:146. 1871.

On trees, rare.

Theloschistes concolor (Dicks.) Th. Fr. Scand. 1:147. 1871.

On trees, rare.

Parmelia crinita Ach. Syn. Meth. Lich. 196. 1814.

On sandstone, common.

Parmelia tiliacea (Hoffm.) Ach. Meth. Lich. 215. 1803.

On trees, infrequent.

- Parmelia borreri* Turn. in Trans. Linn. Soc. 148. 1808.
On trees, frequent. (Young for m.)
- Parmelia borreri* Turn. var. *rudecta* (Ach.) Tuck. Syn. Lich. New Eng. 26. 1848.
On sandstone, common.
- Parmelia caperata* (L.) Ach Meth. Lich. 216. 1803.
On rocks, infrequent.
- Physcia hypoleuca* (Ach.) Tuck. Syn. Lich. New Eng. 33. 1848.
On trees, frequent.
- Physcia speciosa* (Wulf.) Nyl. in Act. Soc. Linn. Bord. (Ser. 3) 1:307. 1856.
On rocks, rare. (Cortex of hyphae.)
- Physcia pulverulenta* (Schreb.) Nyl. Act. Soc. Linn. Bord. (Ser. 3) 1:308. 1856.
On sandstone, frequent.
- Physcia stellaris* (L.) Tuck. Obs. North Amer. Lich. 395. 1860.
On trees, common.
- Physcia asteroidea* (Fr.) Nyl. Act. Soc. Linn. Bord. (Ser. 3) 1:308. 1856.
On trees, infrequent.
- Physcia caesia* (Hoffm.) Nyl. Act. Soc. Linn. Bord. (Ser. 3) 1:308. 1856.
On trees. (Species generally supposed to occur only on rocks. Iowa species have formerly been referred to *Physcia granulifera*, but upper cortex is cellular.)
- Physcia obscura* (Ehrh.) Nyl. Act. Soc. Linn. Bord. (Ser. 3) 1:309. 1856.
On granite, rare, but common on trees.
- Physcia adglutinata* (Flk.) Nyl. Syn. Lich. 428. 1860.
On trees, rare.
- Peltigera rufescens* (Neck.) Hoffm. Deutschl. Fl. 2:107. 1795.
On shaded earth, rare.
- Peltigera canina* (L.) Hoffm. Deutschl. Fl. 2:106. 1797.
On earth, rare.

- Peltigera canina* (L.) Hoffm. var. *sorediata* (Schaer.) Tuck.
Syn. North Amer. Lich. 1:109. 1882.
On shaded rock and sandstone, rare.
- Peltigera canina* (L.) Hoffm. var. *spuria* (Ach.) Tuck. Syn.
North Amer. Lich. 1:109. 1882.
On earth, rare.
- Pannaria nigra* (Huds.) Nyl. Lich. Scand. 126. 1861.
On sandstone, abundant.
- Amphiloma* (*Pannaria*) *laguinosa* (Ach.) Nyl. Prod. Lich.
Gall. et. Alg. 69. 1857.
On sandstone, abundant.
- Collema pulposum* (Bernh.) Ach. Syn. Lich. 311. 1814.
On sandstone, rare.
- Senechoblastus* (*Collema*) *nigrescens* (Ach.) Stitzenb. Beit.
zur Flechtensyst 144. 1862.
On trees and sandstone, rare.
- Leptogium lacerum* (Sw.) Nyl. Syn. Lich. 1:122. 1858.
On mossy sandstone, rare.
- Leptogium pulchellum* (Ach.) Nyl. Syn. Lich. 1:123.
1858.
On trees, rare.
- Leptogium chloromelum* (Sw.) Nyl. Syn. Lich. 1:128.
1858.
On mossy rocks, rare.
- Placodium cirinum* (Hoffm.) Leight. Lich. Fl. Great
Brit. 177. 1871.
On sandstone, rare, (Thallus and fruit larger and
darker than usual.)
- Placodium aurantiacum* (Lightf.) Naeg. and Hepp.
Spor. der Flecht. Eur. 1853.
On sandstone, common.
- Placodium cerinum* (Ehrh.) Naeg. and Hepp. Spor. der
Flecht. Eur. 1853.
On trees, common.
- Placodium cerinum* (Ehrh.) Naeg. and Hepp. var. *sider-
itis* Tuck. Syn. North Amer. Lich. 1:175. 1882.
On granite, rare.

- Placodium cerinum* (Ehrh.) Naeg. and Hepp. var. *ulmorum* Fink in herb. var. nov.
On elms, rare.
- Placodium vitellinum* (Ehrh.) Naeg. and Hepp. Spor. der Flecht. Eur. 1853.
On sandstone, common.
- Placodium vitellinum* (Ehrh.) Naeg. and Hepp. var. *aurellum* (Hoffm.) Tuck. Syn. North Amer. Lich. 1:180. 1882.
On trees, infrequent.
- Lecanora muralis* (Schreb.) Schaer. Lich. Helv. Enum. 66. 1822.
On sandstone, rare.
- Lecanora subfusca* (L.) Ach. Lich. Univ. 393. 1810.
On trees, infrequent.
- Lecanora subfusca* (L.) Ach. var. *argentata* Ach. Lich. Univ. 393. 1810.
On trees, common.
- Lecanora varia* (Ehrh.) Ach. Lich. Univ. 377. 1810.
On cedar, frequent.
- Acarospora* (*Lecanora*) *cervina* (Pres.) Kbr. var. *oligocarpa* (Nyl.) Fink.
On sandstone, rare. *Lecanora fuscata* (Schrad.) Th. Fr. of the former reports. (Spores 14-16 in ascus. $\frac{11-16}{7-10}$ mic.)
New to Iowa.
- Rinodina sophodes* (Ach.) Kbr. Syst. Lich. 122. 1855.
On trees, rare.
- Rinodina sophodes* (Ach.) Kbr. var. *exigua* (Ach.) Tuck. Syn. North Amer. Lich. 1:208. 1882.
On wood, rare (*Hypotheций* frequently becoming dark).
- Pertusaria velata* (Turn.) Nyl. Lich. Scand. 179. 1861.
On trees, rare.
- Pertusaria multipuncta* (Turn.) Nyl. Lich. Scand. 179. 1861.
On trees, rare.

- Urceolaria scruposa, Ach. Meth. Lich. 147. 1803.
 On sandstone, frequent.
- Cladonia symphycharpa Fr. Lich, Suec. 1826.
 On earth, rare. (Not recognized as a distinct species by Wainio, but placed under *Cladonia cariosa*. We can not put our Iowa forms there. Ours are somewhat like *Cladonia turgida*.)
- Cladonia mitrula Tuck. in Darl. Fl. Cestr. 444. 1853.
 On sandstone, frequent.
- Cladonia pyxidata (L.) Hoffm. var. chlorophaea (Spréng.) Flk. Clad. Comm. 70. 1828.
 On sandstone and earth, common. New to Iowa.
- Cladonia fimbriata (L.) Fr. var. coniocraea (Flk.) Wainio Mon. Clad. Univ. 2:308. 1894.
 On old wood, infrequent. (Hitherto reported in Iowa under name of *Cladonia fimbriata* var. *tubaeformis* Fr., which has also included *Cladonia fimbriata* var. *apolepta*.)
- Cladonia fimbriata (L.) Fr. var. apolepta (Ach.) Wainio. Mon. Clad. Univ. 2:307. 1894.
 On earth, rare.
- Cladonia delicata (Ehrh.) Flk. Clad. Comm. 7. 1828.
 On old logs, rare.
- Cladonia caespiticia (Pers.) Flk. Clad. Comm. 8. 1828.
 On sandstone, rare. (Running into *Cladonia mitrula*.)
- Cladonia furcata (Huds.) Schrad. Spicil. Fl. Germ. 107. 1794.
 On earth, frequent.
- Cladonia sylvatica (L.) Hoffm. Deutschl. Fl. 114. 1796.
 On earth, rare.
- Cladonia cristatella Tuck. Syn. Lich. New Eng. 55. 1848.
 On stumps. (Specimen lost.)
- Bacidia (Biatora) inundata (Fr.) Kbr. Lich. Fl. Germ. 187. 1855.
 On lime rock.
- Bilimbia (Biatora) sp. Fink in herb. (Near *Bacidia sphaeroides* and *B. operxanthroides*.)
 On wood. New to Iowa.

- Buellia spuria* (Schaer.) Arn. Flora. 291. 1872.
On rocks. (Tending toward *Buellia lepidastra*, as margins of apothecia are more or less evanescent and thallus is quite as near that of the latter.)
- Buellia parasema* (Ach) Kbr. Syst. Lich. 228. 1855.
On trees, rare.
- Buellia myriocarpa* (D. C.) Mudd. Man. Brit. Lich. 250. 1861.
On old wood, frequent.
- Opegrapha varia* Ach, Lich. Univ. 259. 1810.
On trees, infrequent.
- Graphis scripta* (L.) Ach. Lich. Univ. 265. 1810.
On trees, common.
- Arthonia lecidella* Nyl. Enum. Cener. Lich 337. 1858.
On trees and sandstone, frequent.
- Arthonia radiata* (Pers.) Th. Fr. Lich. Arc. 240. 1860.
On trees, common.
- Arthothelium spectabile* (Flk.) Stiz. Beitr. Flechtensyst. 152. 1862.
On trees, infrequent.
- Calicium quercinum* Pers. Tentam. dispos. Fung. suppl. 59. 1797.
On trees, rare.
- Calicium quercinum*, tending toward var. *subcinium*.
Nyl. Syn. Meth. Lich. 8:156. 1858.
On trees, rare.
- Calicium parietum* Ach. in Veg. Acad. Handl. 260. 1816.
On red cedar, rare.
- Dermatocarpon* (Endocarpon) *pusillum* (Hedw.) Schneider. Text. Licht. 189. 1897.
On sandstone, rare.
- Verrucaria nigriscens* Pers. in Uls. Ann. de Bot. 14:36. 1795.
On sandstone, frequent.
- Verrucaria viridula* Ach. Lich. Univ. 675. 1810.
On granite, rare. (Thallus of the characteristic color but too scanty to be certain that it is not *V. nigriscens*.)
New to Iowa.

Verrucaria fuscella (Turn.) Ach. Lich. Univ. 289. 1810.

On sandstone, rare.

Pyrenula gemmata (Ach.) Naeg. in Hepp. Flecht, Eur.
51. 1867.

On trees, frequent.

Pyrenula nitida (Schrad.) Ach. Mong. in Berl. Magaz.
21. 1812.

On oaks, rare.

Pyrenula quinqueseptata (Nyl.) Tuck. Genera Lich.
173. 1872.

On trees, frequent.