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## Additions to Lichen Distribution in the Mississippi Valley

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milk no dissolving of the casein. On sterile bread no effect produced, indicating no spore forms were present in the yeast. Bread from a bakery where this yeast was used was the sample tested that did undergo a slimy decomposition when placed under warm conditions.

These results show that bacteria capable of producing a slimy decomposition are common in some of the brands of yeast most widely used, and it is probably the source of contamination in most cases.

#### METHODS OF PREVENTION.

The question of the prevention of this abnormal fermentation is one of considerable economic importance and probably will continue to be unless the yeast companies put a purer article on the market. The chief precautions that may be taken to prevent the trouble, are to place the bread in a cool place as soon as practical after baking. The bakings should also be made small so that the bread will be consumed before decomposition begins. If the trouble has occurred where potatoes or potato water are used in any form, it would be advisable to discontinue this use. So conducting the process of making that the bread will not be very moist, will help to prevent an occurrence of this trouble. No fear may be had regarding the effect on the health from eating bread containing this putrefaction, as the bacteria producing it are harmless saprophytes and the products formed by the decomposition are not known to be injurious. After the change has reached the later stages, the taste, odor, and physical condition are so marked that there is no difficulty in detecting it.

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## ADDITIONS TO LICHEN DISTRIBUTION IN THE MISSISSIPPI VALLEY.

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BRUCE FINK.

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During the last few years I have examined a large number of lichens from various parts of the Mississippi valley, and a few of these have never been recorded from the states in which they were collected, either in my own papers, or, so far as I know, in other publications. In a paper\* read before

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\* Fink, B. Notes on Lichen Distribution in the upper Mississippi valley. *Memoirs of the Torrey Bot. Club.* 6: No. 5. 385-307. 1 D 1899.

the botanical section of the A. A. A. S. at the Columbus meeting I made mention of some of these plants, but several are of special interest because rare or difficult to detect, and I have thought it worth while to record all for distribution. Aside from a single collection by myself in Illinois, the collectors are L. H. Pammel, E. Bartholomew, C. J. Herrick, C. H. Demetrio and R. Dunlevy. The collection made by Professor Pammel at La Crosse, Wis., is of special interest because it contains an unusually large number of interesting lichens for a small collection. With the exception of the single specimen from Illinois, the plants are all recorded from states whose lichen floras are little known; hence the record is the more needed.

## LIST OF SPECIES AND VARIETIES.

*Usnea barbata* (L.) Fr., var. *florida* Fr. On trees, Socorro county, New Mexico, March, 1895. Coll., C. J. Herrick. Plants well developed but sterile.

*Theloschistes parietinus* (L.) Norm.? On *Celtis occidentalis*. Rooks county Kan., December, 1893. Coll., E. Bartholomew. Sterile, but the thallus seems characteristic.

*Theloschistes lychneus* (Nyl.) Tuck. On *Celtis occidentalis*. Rooks county, Kan., December, 1893. Coll., E. Bartholomew. Specimens finely fruited and approaching *Theloschistes polycarpus* Ehrh., Tuck.

*Parmelia conspersa* (Ehrh.) Ach. On rocks, Socorro county, New Mexico, April, 1895. Coll., C. J. Herrick.

*Physcia stellaris* (L.) Tuck. On trees. La Crosse, Wis., January, 1895. Coll., L. H. Pammel. Socorro county, New Mexico, March, 1895. Coll., C. J. Herrick.

Eq *Physcia stellaris* (L.) Tuck., var. *apiola* Nyl. On rocks. Socorro county, New Mexico, April, 1895. Coll., C. J. Herrick. Thallus lobes poorly exhibited in specimen seen.

*Physcia obscura* (Ehrh.) Nyl. On old wood. Cole county, Mo., August, 1898. Coll., C. H. Demetrio.

*Peltigera pulverulenta* (Tayl.) Nyl.? On earth. La Crosse, Wis., January, 1895. Coll., L. H. Pammel. The sterile specimen may be *Peltigera horizontalis*, L. Hoffm., instead, as the spores are needed to render determination certain.

*Pannaria languinosa* (Ach.) Koerb. On shaded rocks. Winfield Kan., 1896. Coll., R. Dunlevy.

*Ephebe* sp. On rocks. Socorro county, New Mexico, April, 1895. Coll., C. J. Herrick. The plant is sterile and shorter, and more densely tufted than *Ephebe pubescens* Fr.

*Omphalaria pulvinata* (Nyl.) On limestone. Cole county, Mo., August, 1898. Coll., C. H. Demetrio. Sterile, but the habit thoroughly characteristic as well as presence of *Gloeocapsa* as the algal symbiont.

*Leptogium lacerum* (Sw.) Fr. On mosses along ledges. Cole county Mo., August, 1898. Coll., C. H. Demetrio.

*Leptogium chloromelum* (Sw.) Nyl.? On dead branches. Cole county Mo., August, 1898. Coll., C. H. Demetrio. Sterile, and upper surface densely granulate.

*Placodium elegans* (Link.) DC. On limestone. La Crosse, Wis., January, 1895. Coll., L. H. Pammel.

*Placodium cinnabarrinum* (Ach.) Anz. On rocks. Socorro county, New Mexico, March, 1895. Coll., C. J. Herrick.

*Placodium aurantiacum* (Lightf.) Næg. and Hepp. On rocks and trees. La Crosse, Wis., January, 1895. Coll., L. H. Pammel.

*Placodium cerinum* (Hedw.) Næg. and Hepp. On trees. La Crosse, Wis., January, 1894. Coll., L. H. Pammel. The peculiar waxy-yellow form with some *Pruinose apothecia*; common on *Ulmus*.

*Placodium ferrugineum* (Huds.) Hepp. On trees. La Crosse, Wis., January, 1895. Coll., L. H. Pammel.

*Placodium vitellinum* (Ehrh.) Næg. and Hepp. On sandstone. La Crosse, Wis., January, 1895. Coll., L. H. Pammel, and on some substratum from Winfield, Kan., 1896. Coll., R. Dunlevy.

*Lecanora subfusca* (L.) Ach. On trees. La Crosse, Wis., January, 1895. Coll., L. H. Pammel.

*Lecanora varia* (Ehrh.) Nyl. On trees. Emma, Mo., July, 1898. Coll., C. H. Demetrio.

*Lecanora calcarea* (L.) Sommerf., var. *contorta* Fr. On limestone. La Crosse, Wis., December, 1894. Coll., L. H. Pammel. A widely distributed, but rare lichen.

*Lecanora privigna* (Nyl.) var. *pruinosa* Auctt. On rocks. Cole county, Mo., August, 1898. Coll., C. H. Demetrio.

*Rinodina oreina* (Ach.) Mass. On rocks. Socorro county, New Mexico, March, 1895. Coll., C. J. Herrick.

*Pertusaria velata* (Turn.) Nyl. On trees. La Crosse, Wis., January, 1895. Coll., L. H. Pammel.

*Caldonia symphyocarpa* (Fr.) On earth. Cole county, Mo., August, 1898. Coll., C. H. Demetrio.

*Caldonia cristatella* (Tuck.) On old wood. Cole county, Mo., August, 1898. Coll., C. H. Demetrio.

*Biatora russellii* (Tuck.) On limestone. La Crosse, Wis., January, 1895. Coll., L. H. Pammel.

*Biatora rubella* (Ehrh.) Rabenh. On trees. Emma, Mo., October, 1898. Coll., C. H. Demetrio.

*Biatora fusciorubella* (Hoffm.) Tuck. On trees. La Crosse, Wis., December, 1894. Coll., L. H. Pammel.

*Biatora atrogrisea* (Delis.) Hepp. On *Ulmus americana*. Rooks county, Kan., December, 1893. Coll., E. Bartholomew. Exciple dark and hypothecium brownish-yellow. Spores twenty-five to forty-five by three to four mic. A lichen seldom collected in the territory.

*Lecidea enteroleuca* (Fr.) On trees. La Crosse, Wis., December, 1894. Coll., L. H. Pammel.

*Buellia spuria* (Schær.) Arn. On rocks. Socorro county, New Mexico, March, 1895. Coll., C. J. Herrick.

*Buellia myriocarpa* DC., (Mudd.) var. *polyspora* Willey. On trees. La Crosse, Wis., December, 1894. Coll., L. H. Pammel. A lichen seldom detected.

*Graphis scripta* (L.) Ach. On trees. La Crosse, Wis., December, 1894. Coll., L. H. Pammel. And Emma, Mo., October, 1898. Coll., C. H. Demetrio.

*Arthonia lecideella* (Nyl.) On trees. La Crosse, Wis., December, 1894. Coll., L. H. Pammel. A lichen common in the territory, but little known till recently.

*Arthonia dispersa* (Schrad.) Nyl. On *Fraxinus viridis*. Rooks county, Kan., December, 1893. Coll., E. Bartholomew.

*Endocarpon miniatum* (L.) Schær. On rocks. La Crosse, Wis., December, 1894. Coll., L. H. Pammel. And Magdalena mountains, New Mexico, April, 1895. Coll., C. J. Herrick.

*Endocarpon pusillum* (Hed.) On limestone. La Crosse, Wis., January, 1895. Coll., L. H. Pammel.

*Endocarpon pusillum* (Hedw.) var. *Garovaglii* Kph. On earth. Kane county, Ill., July, 1895. Coll., B. Fink.

*Endocarpon hepaticum* (Ach.) On earth. Cole county, Mo., August, 1898. Coll., C. H. Demetrio.

*Staurothele umbrina* (Wahl.) Tuck. On rocks. La Crosse, Wis., December, 1894. Coll., L. H. Pammel. A lichen not commonly collected.

*Verrucaria fuscella* (Fr.) On limestone. La Crosse, Wis., January, 1895. Coll., L. H. Pammel. Quite as rarely collected as the last.

*Verrucaria muralis* (Ach.) On limestone. Rooks county, Kan., March, 1893. Coll., E. Bartholomew. And La Crosse, Wis., January, 1895. Coll., L. H. Pammel.

*Pyrenula punctiformis* (Ach.) Naeg., var. *Fallax* Nyl. On trees. Emma, Mo., July, 1898. Coll., C. H. Demetrio.

*Pyrenula thelena* (Ach.) On trees. Emma, Mo., July, 1898. Coll., C. H. Demetrio.

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## POWDERY MILDEW OF THE APPLE.

BY L. H. PAMMEL.

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There has been much discussion on the subject of powdery mildew of the apple. It has been referred to several genera but Sorauer\* in his book on "Plant Diseases" and Tubeuf† in his work on "Plant Diseases" reports the *Podospheera oxyacanthæ* DC., as destructive to the apple, and makes the statement that it is abundant upon the apple and pear in America. Frank‡ in the second edition of his work on "Plant Diseases" makes a statement somewhat similar to that of Tubeuf. These statements are undoubtedly based upon the work of Galloway,§ who paid some attention to the subject of a powdery mildew upon the apple. Several American writers have briefly referred to the occurrence of a mildew upon apples, among them, Fairchild and Galloway, who made some experiments in treating this disease. Professor Galloway,|| in a paper on the common mildew of the cherry, records the occurrence of this fungus upon the apple, and it is also recorded here upon the quince and wild crab. In a circular issued by Galloway,¶ mention is made of this fungus under the name of *Podospheera oxyacanthæ* and in a later paper\*\* the fungus is again referred to under the

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\* Pflanzen Krankheiten 330.

† Pflanzen Krankheiten 193.

‡ Die Pilzp. Frank. d Pflanzen 250.

§ Circ. U. S. Dept. of Agrl., Div. of Vegetable Pathology 8.

|| Rep. Dept. Agrl. 1888: 353.

¶ U. S. Dept. Agrl., Div. Veg. Path. 8. See also Zeitsch f. Pflanzen 1:97.

\*\* Jour. Myc. 6:14.