

Benincasa cerifera or *Cyclanthera explodens*. This *Plasmopara* has previously been reported upon five of the above named hosts, and upon *Cucumis Anguria* and *Cucumis moschata*; ¹ its appearance upon so large a number of new hosts has added interest to this part of the study. In every case the cucumbers and muskmelons were first attacked, then the other cucurbits. No plant outside the order has as yet been attacked by this *Plasmopara* and no oospores have been discovered here either for *Plasmopara Cubensis* or *Plasmopara australis* (Speg.), which was found in abundance on *Sicyos angulatus* and sparingly upon adjoining plants of *Micrampelis lobata* adjacent to a diseased pickle field. It may be further observed, that *Plasmopara Cubensis* (B. & C.) is clearly distinct from *Plasmopara australis* (Speg.) whether examined upon the same hosts (*Micrampelis* and *Sicyos*) or upon the different hosts of the former.

I shall be pleased to supply, as far as possible, to any mycologists who may desire them, specimens of these fungi upon the various hosts.—A. D. SELBY, *Ohio Agricultural Experiment Station, Wooster, Ohio.*

COPPER IN PLANTS.

COPPER is an element of very wide distribution in the bodies of plants, a matter which appears to be determined by the presence of the metal in the soil rather than by the exercise of any selective power. Specimens grown in ordinary soils may contain as much as 30^{mg} of this substance to each kilogram of dry matter, while those in rich soils may yield 560^{mg} from the same quantity of dry matter according to Lehman.² The wood of a tree, *Quercus macrocarpa* Michx., recently submitted to Professor Frankforter of this university for chemical analysis, was found to contain slightly less than 500^{mg} of copper to each kilo of dry matter. When the matter was called to the attention of the writer, the entire trunk and crown of the tree had been carried away, with the exception of a short stump from which the bark had been stripped. This rendered impossible any attempt to determine the distribution of the substance throughout the plant. It was evident, however, that it was dead before it had been cut down. The examination of the material at hand showed the copper in the form of finely divided,

¹ Stewart, Bull. N. Y. Expt. Station.

² Der Kupfergehalt von Pflanzen und Thieren in kupferreichen Gegenden. Archiv fur Hygiene 27: 1. 1896.

reddish-brown particles in the tracheides, vessels, and medullary parenchyma. It is presumed that it gained entrance to these tissues before the death of the tree and had therefore passed through the conducting elements and been absorbed by the living cells of the medullary rays. This tissue also contained starch both in the cells containing copper and those free from it. It is not easy to predicate in what form the copper was taken up by the plant, but probably as a carbonate, which would be reduced to the metallic state in the tissues. The large amount of the substance present rather supports Lehman's conclusions that it does not exert a marked injurious influence upon plants. Its occurrence throughout the annual rings indicates that it had been freely absorbed during nearly a decade. However, the death of the tree may have been finally caused by the influence of this substance.



Medullary cell of *Quercus macrocarpa*, containing particles of metallic copper.

Mr. J. B. Skertchly has found that *Polycarpaea spirostylis* F. von Mueller occurs in such close connection with the copper deposits of North Queensland in such an invariable manner that it may be used as indication of copper deposits in the soil or in solution in the streams near by. On this account he has named it the "copper plant," and notes also that in regions rich in copper it is the predominant member of the herbaceous flora.³ It is of interest in this connection to note that Lehman found that the tissues of fowls feeding in regions rich in copper yielded 15.5–115^{mg} of this substance per kilo of dry matter. An investigation of the plants growing in the copper regions around Lake Superior, and near the dumping grounds of cities, would doubtless bring some interesting results as to the absorption of metals.—D. T. MACDOUGAL, *University of Minnesota*.

FROST FORMATIONS.

THE purpose of this note is to collect the records of observations of frost formations on plants not included in my résumé in this journal.⁴

A letter from Professor Trelease dated April 7, 1894 states that he had observed the formation of crystals of ice on *Verbesina Virginica*

³ Tin Mines of Watsonville, Rep. by J. B. Skertchly, Assistant Geologist, Queensland. 1897.

⁴ 19: 120. 1894.



MacDougal, Daniel Trembly. 1899. "Copper in Plants." *Botanical gazette* 27(1), 68–69. <https://doi.org/10.1086/327788>.

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