of the inoculation. This latter was sometimes performed with a knife, sometimes with a needle, always with careful precautions and close subsequent examination. Such experimental limbs as permitted it were cut and preserved like herbarium specimens, and are exhibited with the paper."

The organism found answers fairly to the description of Pasteur's butyric *vibrion*. They are usually oblong, rounded at the ends, mostly connected, two together. Their motions are not rapid, consisting of turning in every direction, and sliding irregularly forward. They are found within closed cells, in the open spaces, and in immense numbers in the viscid exudations from the diseased bark and leaves. The most conspicuous alteration observed in the tissues is the disappearance of the starch grains from the cells. The cell walls are left intact, and the protoplasmic portions remain until after the starch is mostly absorbed and appears to suffer little change until death ensues. The disease is, *par excellence*, one of the bark. The leaves die in consequence of this, or are themselves invaded, either primarily or secondarily, by the destroyer. The progress of the disease is always slow, but the leaves of an affected limb often turn black quite suddenly, perhaps according to meteorologic conditions. In diseased bark, before change has taken place visible from without, and while the leaves are still green and fresh, an active fermentation occurs. This continues until desiccation or the exhaustion of the fermentable substances puts an end to the process. The products of this fermentation are Carbon dioxide and Butyric acid, or a closely similar substance. From the fact that virus from the Pear affects the Apple tree, and vice versa, the speaker argued that the disease was similar in each. The experiments tended to show that the virus is harmless upon the epidermis of healthy plants, nor does it penetrate through the breathing pores. The speaker exhibited drawings of the cells of a healthy plant and a diseased one, showing that the starch in the latter was gradually absorbed. He obtained the virus from diseased trees, where it is exuded, and placed it in distilled water. Upon the dead leaves and branches the virus dried and looked like varnish. When redissolved it retains its vitality. The simple puncture of a bark of a tree with a needle which had been dipped in the virus would be sufficient to cause its death. Prof. Burrill exhibited a small vial containing about a teaspoonful of the virus in solution, which he said was sufficient to destroy a whole orchard.

### The Griffith Award.

The committee appointed to examine the specimens of adulterations of commercial articles, and to award the prize, a fine objective, offered by Mr. E. H. Griffith, for the best mounted specimens, reported that C. M. Vorce was the only contestant and that his exhibits of coffee and butter were fine ones. He was therefore entitled to the prize.

President Smith presented it to him in a brief speech, and he accepted, regretting that there had been no other contestants.

A resolution offered by Prof. Burrill, that the president and vice-presidents elect of the society be appointed a committee to report upon some plan for uniformity in size and naming of eye-pieces and tubes, was adopted.

The report of the treasurer Mr. George E. Fell, showed $266.06 on hand, and $450.75 due the society, of which the treasurer regarded $114.69 as being very certain of being paid, making total assets $380.81. The report was adopted.

Prof. Griffith renewed his offer of a ½ inch objective or its equivalent for the best mounted slides showing adulterations in commercial articles, accompanied with the best Thesis upon the specimens submitted. His offer was accepted with thanks.

The Society then adjourned to meet at such time and place as the Executive Committee may determine upon.

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The Soiree, which was given in the evening at Merrill Hall, by the members of the American Society and the local microscopists, was in every way successful, and gave great satisfaction.

## PRESERVATION OF FOSSIL INSECTS AND PLANTS ON MAZON CREEK.

By J. W. Pike, Vineland, N. J.

Mazon Creek is a branch of the Illinois River, which it joins at Morris, Grundy Co., Ill. It has carved its channel down into the blue shale, which lies above the Morris coal seam, and exposed the ironstone nodules which contain the fossil plants and insects.

Scientific interpretation rests upon comparison. We compare this coalbed with other deposits of carbon, and with those now forming, and ascribe it to an ancient swamp or wet land surface. The shale above is compared with other clay-beds and with the mud of bays and lakes, and we conclude that it is the product of a subsidence and of deeper water. The fringing swamp had advanced upon higher ground, and from it floated the fern leaves and insects that were buried in the accumulating clay of the deeper basins. Leaves that sink upon the mud of a lake will rest flat upon the upper layer, and are buried under the layers that follow. So, too, the leaves in the Mazon shale are conformable to its lines of stratification. Over the shale are beds of sandrock. Compare them with beds of sand and clay now being formed over the peat and clay of the sinking Atlantic coast. It becomes clear that the beds of coal, shale, and sandstone on the Mazon are the product and record of a subsidence in the carboniferous period.

*Metamorphism.*—The shale immediately around the fossils was transformed into clay-ironstone nodules by the deposition of ferrous carbonate. The concreting force has emanated from the fossils, because the nodules take their general shape. The iron deposit has not merely filled the spaces between the particles of clay, but has crowded them apart and thickened the strata, making them concavo-convex above and below the fossils. Specimens exhibited show the continuity of the strata from the soft outlying shale through the nodules, their thickening and resulting convexity, the conformability of the leaves, etc.

These biological records, like primitive human inscrpitions, were written in nature's picture-language, only they are incomparably more perfect. Like the cuneiform of the Assyrian tablets it was done upon soft clay, but the clay was hardened automatically by the writing itself, and not by baking. Like the castings of the founder who surrounds his models with moist sand, these are casts; but they are casts of the delicate structure of ferns and insects, moulded in fine clay by the gentle touch of moving water. These inscriptions were not carved on the exposed and crumbling surface of monuments, but were sealed up in the concretions, and lay buried in the clay, beyond the reach of wear and decay, during the incalculable periods of the Permian, Triassic, Jurassic, Cretaceous and Teritiary. After the ages of ice and prairie lakes, the waters of the Mazon dug their channel through lake deposits, ice drift, carboniferous sandstone, and into the blue shale. The fossil bearing nodules were washed out of the softer shale, mingled with granitic gravel and strewn in the river bed. Exposure to the air changed the blue ferrous compound to ferric or red oxide. These nodules spontaneously divided into halves, disclosing these exquisite pictures of the ferns, insects and creeping things of the carboniferous lowlands. Per-oxidation continues till the iron separates from the clay. Thus the half of a nodule, with a fern pictured on its surface, may become a geode—a hard red brown shell of iron enclosing the clay in an ochery form in its interior; or it may, in the process, crack and crumble into flakes and fragments. The collector, therefore, must now anticipate the denuding forces, and dig the concretions out of the shale of the river's banks and bottom, and crack them for himself.

## CAVES IN JAPAN.

By Prof. Edw. S. Morse.

Mr. Morse described a number of artificially-constructed caves which he had examined in various parts of Japan, giving sketches of them upon the black board.

These caves varied considerably in their design, but agreed in their general proportions, and were evidently intended as receptacles for the dead. They were excavated