Exhibition Subjects," which also called for considerable discussion. Mr. Wade championed the sort of exhibition that was thoroughly educational and which drew people by that fact only. He was fearful, he said, of the tendency of late to make exhibitions part of what was known popularly as "show-business." He believed an exhibition ought to draw without the employment of acrobats. He spoke of the Paris exposition as not only stimulating inventions, but of averting wars and saving France from demagogues. As was the Paris exposition to the world, so each small show should be to its community. In regard to the site for the fair of 1890, he said that Canada was disinterested. The success of the fair did not depend on where it was located, for the world was waiting to attend it, no matter where it was opened.

When Mr. Wade had concluded, Mr. H. J. Hill, the genial Secretary of the Association, was asked to give his views on the show part of exhibitions. He believed that people demanded amusements beyond the fair itself and had always been on the lookout for new attractions. Mr. Campbell said that while he agreed with Mr. Wade in the theory, he believed in being on the right side of the balance sheet. He did not believe any rule could be laid down for such matters, but it had to be left largely to the judgement of the manager of an exhibition. Mr. Becker said he thought it was largely the way a show started. If it began with offering special attractions, the people came to expect them.

The matter of advertising was discussed at length. Messrs. T. L. Newton and J. G. J. Campbell, of Milwaukee, were for newspaper advertising first, last and all the time. They believed in using the newspapers from the start and using them thoroughly.

In his report concerning the transportation of exhibits, Dr. D. McEarchan advocated a single rate going and coming. President Furnas said in this connection that west of the Missouri river, exhibits for fairs were carried free of charge by the railroads. Mr. Wade, of Canada, in his report on gates and tickets, endorsed the ticket plan of Mr. E. J. Becker and Secretary Hill, of Toronto. The turnstile, as used by fairs and expositions, was roundly denounced as a delusion, a snare and a mockery as far as economy was concerned.

Mrs. A. M. Noe, President of the Woman's State Fair Association, of Indiana, read a very interesting paper on " Women's Work in Connection with Fairs and Expositions." Mrs. Noe quoted instances in which the work of women had been largely instrumental in making fairs successful in all parts of the country.

After full discussion the following resolution was unanimously passed :—

Whereas, In consideration of the natural advantages of location and its ability to handle and accommodate a large concourse of people and the able and enthusiastic work done by the citizens of Chicago in agitating the holding of a World's Fair in 1892, and for the financial support such a movement has received at the hands of all its people, capitalists and citizens alike; it is

Resolved, That this convention give the city of Chicago its undivided support and endorsement for the World's Fair to be held in 1892.

At the close of the meeting the delegates were given a sumptous banquet by the Directors of the Milwaukee Exposition. We regret that there were no delegates present from any of our prairie provinces — good fairs are a necessity there.

Garden and Orchard.

Vegetable Pathology.

BY JAMES ELLIS HUMPHREY.

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(Continued from December issue.)

A question which very naturally suggests itself is : Why do fungi attack and cause diseases of other plants, instead of living independently? This question involves matters of the greatest interest and of fundamental importance and significance. It is well known that all *green* plants owe their characteristic color to the presence of a definite pigment known as leaf green or *chlorophyll*, which is so generally present among the higher plants, that to most minds the very word plant carries with it the idea of greenness. Now the possession of chlorophyll is the preeminent feature which gives to plants their all-important place in the economy of nature. No living thing can continue to live on inorganic substances, but all require as food some of those materials of comparatively complex chemical composition, known as organic substances. The materials furnished by the earth, the air and water are all of simple composition and unorganized, but in leaf-green we have the connecting link, the means of bridging the interval between the inorganic and the organic. We need not here discuss the process in detail. It is sufficient for our present purpose to say that in Nature's laboratory of the leaf, some of the simple constituents of air and water are combined, by the action of leaf-green in the sunlight, into the complex organic compounds which serve the plant as food. The chemistry of this remarkable process is not well understood, but the commonest permanent form in which these food materials appear is that of starch.

Now, as was noticed above, the threads of the fungi are white, uncolored ; that is, they contain no leaf-green. Consequently, the fungi cannot elaborate their own food material, but must obtain it ready elaborated, from some other source. Evidently the available sources of organic food supply fall under two heads, *living organism*, and *dead organic matter*, commonly decaying. And, on this basis, we may divide the fungi into two classes, those which derive their nourishment from other *living* things, and those which live on the remains of *dead* organisms. The latter, known as corpse-plants or *saprophytes*, includes the moulds, toad-stools and many other fungi. But the first named group is that which at present interests us, since it contains the various groups mentioned at the beginning of this sketch, which live on or in the bodies of other living plants at their expense, and cause extreme weakening or even the death of the affected plants. Such fungi are known as *parasites*, and the plants they attack are called their *hosts*. This distinction between saprophytic and parasitic fungi is a very useful one, but no sharp line can be drawn between the two groups, since some fungi seem to be able to live either as parasites or as saprophytes, while it is probable that very many *pleomorphic* fungi are parasites in some of their forms, and saprophytes in other stages of their life-cycle.

Finally, we may notice the interesting fact that any given parasitic fungus is usually restricted in its capacity for harm to a single host-plant or to a few closely related ones ; though, on the other hand, closely related fungi may attack plants of widely different relationships. Thus, the mildew of the lettuce and that of the onion are very closely related fungi, yet neither mildew can attack the host-plant of the other, since the structural resemblances are few and the relationship remote between the lettuce and the onion.

From the above facts we may derive a few important principles for our guidance in attempts to avoid or check the ravages of fungi among plants cultivated for use or beauty. Since the mycelium of a parasitic fungus grows usually within the tissues of its host-plant, it is too late to try remedies after a plant is once infected. It is true that a few fungi are superficial in growth, and a treatment may perhaps be found which shall destroy such parasites without harm to the host. But in most cases our aim must be to fortify exposed plants against infection by the timely application of productive solutions or mixtures, which shall prevent the germination of the spores which fall upon the plant so treated. Some progress has been made in this direction and some results have been reached which justify hopes of ultimate general success in largely avoiding the present enormous annual losses resulting from fungous diseases.

The treatment which now gives promise of most general applicability and efficiency is the spraying of the plants with a solution of sulphate of copper (blue stone) or with one of the preparations in which it is the important ingredient, known as Eau celeste, Bordeaux mixture, etc. It seems very possible, too, that plants may he fortified against the attacks of parasitic fungi, or their susceptibility to such attacks be largely diminished, by special fertilization, for the purpose of introducing into the plant substances which, while not interfering with its growth, shall make it a less congenial soil for the growth of fungi. The line of investigation here suggested has not yet been followed out, although it offers an opportunity for chemico-physiological work which may yield important results. It is obvious, also, that a vigorously healthy plant will resist the fatal influence of parasites far better than a poorly-nourished one.

Much may be done, after a plant is too far gone to be saved, to prevent further spread of the disease by removing and destroying the diseased parts. It is not sufficient, however, to throw the portions removed into the rubbish heap; the spores must be actually destroyed and this can be effectually done only by burning. A considerable number of fungi produce, in the plants on which they live, *resting-spores* which ordinarily remain on or near the ground in dead leaves or stubble, survive the winter, and, germinating in the spring, infect the new growth. In these cases the danger of a severe attack in the following year can be greatly lessened by clearing up and burning all such sources of infection.

Numerous instances can be cited of more or less common weeds or wild plants so closely related to certain cultivated plants that they are liable to the attacks of the same fungi, and so serve to perpetuate those fungi and to infect the related cultivated plants when growing near. Evidently, then, such plants should be carefully and thoroughly exterminated wherever they may prove a source of danger.

We may pass, now, to the application of the foregoing facts and principles in the consideration of a few particular fungous diseases.

[TO BE CONTINUED.]