spectrum of a solution with concentration, the above experiment has an obvious defect, viz., that the thickness of the layer of the strong and weak solutions being equal, the numbers of the salt molecules through which any ray of light passes are very different in the two cases. It should therefore be supplemented by showing also the color or the spectrum obtained when the light is passed through a wide trough of the dilute solution, the ratio of the widths of the troughs being the reciprocal of the ratio of the percentages of salt in the two solutions.

(3) Dr. W. W. J. Nichol's observation (Phil. Mag., Ser. 5, xix., 453) that anhydrous sodium sulphate will dissolve in a supersaturated solution of that salt may readily be shown as a lecture experiment by projection. For that purpose place a test tube containing the solution in a trough with glass sides full of water, and focus it on the screen. Then let the anhydrous salt in the form of a fine powder, fall upon the surface of the solution. By taking a pinch of the powder between the thumb and forefinger (both being quite dry), it may be made to fall as a shower of fine particles. These pass into the solution and are seen to move slowly across the screen through the solution, dissolving as they go, in some cases disappearing, and often changing the concentration of the part of the solution through which they have passed, so as to produce obvious refraction effects. Finally, to show that the solution was supersaturated, add a few crystals of the hydrated salt and crystallization at once occurs. The anhydrous salt must be added as a shower of fine powder, as larger pieces may — by taking up water and forming crystals of the hydrated salt before they can dissolve it — give rise to a general crystallization of the solution.

(4) The peculiarity of the solubility in water of such substances as aniline, carbolic acid, etc., observed by Alexejew (Wied. Ann. Bd. XXVIII., 305), may readily be shown on the screen, by using carbolic acid, whose critical temperature (the temperature above which it and water are mutually infinitely soluble) is about 69° C. For this purpose, pour some of the acid into a long test-tube, of about twelve or fifteen millimetres in diameter, and add water. The water will lie in a layer above the acid. Support the test-tube by a clip grasping at the top, and focus on the screen. The line of demarcation between the two liquids will be evident. Now mix the liquids by stirring, and the whole becomes cloudy. Let the tube stand, and the liquid separates again into two layers, having different depths from those they had before, both being now solutions. As this process requires considerable time, the stirring may have been done beforehand. Next surround the test-tube by a beaker of boiling water, passing it upwards from below, and stir the liquids with a hot glass rod. A slight cloudiness appears, but the liquid quickly clears and is seen to have become homogeneous throughout, the line of demarcation having disappeared. If now the beaker of hot water be removed, and one of cold water be substituted for it, the liquid becomes cloudy, a strong solution separating out everywhere, and the little spherical masses of strong solution sinking and coalescing as they sink, to form larger spheres. After a time the liquid is seen to have again become separated into two layers. If the necessary time is not available, the separation into layers may be obtained very quickly by removing the beaker of cold water and again applying the hot bath, which, raising the temperature, stops the separating out of the strong solution and re-dissolves it in the surrounding weaker solution, thus producing a comparatively strong solution in the lower part of the tube and a comparatively weak one in the upper part. The experiment requires but a few minutes and is both striking and instructive.

SOME DISEASES OF LETTUCE AND CUCUMBERS.

DURING the past winter and spring James Ellis Humphrey, professor of vegetable physiology at the Massachusetts Agricultural Experiment Station, has been engaged in the study of certain diseases of lettuce and of cucumbers, cultivated under glass. The investigation of some of these is sufficiently advanced to justify the following preliminary announcement, given in Bulletin No. 40 of the station mentioned.

The rotting of lettuce has been a source of much loss to gardeners who cultivate that plant as a winter crop, but its cause, and, therefore, proper preventive measures, have not been known. It usually appears first just above the surface of the soil at the attachment of the lower leaves to the stem, and then spreads to the centre of the head, causing the stem and the bases of the lower leaves, and later the whole of the tender inner leaves, to become decomposed into a slimy mass. The larger leaves being thus cut off from the stem by decay at their bases usually dry up; and there appears after a time, on the remains of the plant, if left undisturbed, the erect, spore-bearing threads of one of the imperfect fungus forms known by the name *Botrytis* or *Polyactis*. The vegetative threads of this fungus are to be found in the decaying tissues of the host in the early stages of the trouble, and no other fungus has ever been observed in connection with it. The professor's observations make it practically certain that the disease is due to the fungus-form mentioned, and this view is supported by the fact that similar forms are known to produce similar diseases in some other plants. This fungus appears to be able to develop also a saprophyte on old lettuce-leaves and other vegetable refuse, and may thus survive a long interval between two crops of lettuce, resuming its parasitic habits when the opportunity is afforded.

From what has been said, it is evident that careful and thorough treatment is essential to the control of the disease in question; and the nature of the crop limits this treatment to the removal of all sources of infection. All affected lettuce plants should be at once removed wholly from the house and destroyed by burning. For this purpose the boiler furnace is conveniently at hand. All dead leaves or other refuse should be often scrupulously cleaned up and burned, so that no breeding places may be left for the fungus. A house which has been very badly infested by the disease should be thoroughly cleaned, whitewashed, or painted, and supplied with fresh soil before a new season's operations are begun; and one may then expect, with the observance of the above described hygienic precautions, to be able to enjoy comparative freedom from loss from this cause.

The powdery mildew of the cucumber is due to the presence of a fungus which has been long known, but which has not been heretofore reported as occurring in America, so far as can be learned. It has been received during the past season, on leaves of greenhouse cucumbers, from Dr. Jabez Fisher of Fitchburg and from Professor L. H. Bailey of Cornell University. The fungus, as has been said, attacks the leaves, on whose upper surfaces it forms at first rounded spots, which appear like blotches of a white powder. These spots gradually enlarge and become confluent until the leaf is practically covered. Those parts of the leaf which are attacked soon turn yellow, and finally become dead and dry. Under favorable conditions the disease spreads quite rapidly and is very destructive.

The fungus which causes the trouble is known as *Oidium erysiphoides* Fries, var. *Cucurbitarum*, and is the *conidial* or summer spore stage of one of the fungi known as "powdery mildews." It is impossible to say certainly to which of the perfect or winter spore forms of the group it belongs.

It has been found by Professor Bailey and by Dr. Fisher that the fungus may be kept in check by frequent spraying with a solution of sulphide of potassium (liver of sulphur) in water. The proportion usually given is one ounce of the sulphide to two gallons of water, but both Dr. Fisher and Professor Humphrey have found this solution injurious to the foliage and the young cucumbers. A preparation containing an ounce to three gallons is certainly strong enough, and one with an ounce to four gallons is probably so.

As recommended for the lettuce disease, a house in which this fungus has been troublesome should be thoroughly cleaned and fumigated before the next season's crop is started.

THE AGRICULTURAL PRODUCTS OF MADAGASCAR.

M. D'ANTHOUARD, Chancellor of the French Residency at Antananarivo, has recently made to the French Government an interesting report upon the economic condition of Madagascar, a translation of which appears in the *Journal* of the Society of Arts