solution, with the exception of sodium, the halogens and sulfur.

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THE NEPHELOMETER IN MYCOLOGY

THE use of the nephelometer in the biological sciences is not new. It has been used to measure the growth of bacteria in nutrient solutions and has been adapted to the determination of protein, using sulfosalicylic acid as a precipitating agent. A method of determining nitrogen as ammonia, using a modified Nessler's reagent, has been worked out for extremely dilute solutions of ammonia or ammonium salts.

It occurred to the writer that a water culture of a fungus such as oidium could be determined by this method, provided the hyphae were broken up sufficiently. A culture of oidium in a dilute nutrient solution was shaken up in a shaking machine for various lengths of time and with the addition of different acids and bases. Attempts to use glass beads and clean sand as aids in the breaking up process failed because of the colloidal silica formed by the rubbing together of the particles.

Best results were obtained by using a glass-stoppered, wide-mouthed bottle approximately four times as high as the diameter and fitted inside with a cone-shaped roll of nichrome gauze. This cone should be tall enough to have the tip pressed upon by the glass stopper and thus prevent its shaking about. The bottle should be not over one third or one fourth full of the culture and should be shaken rapidly for at least twenty minutes. The culture being dashed back and forth through the wire gauze at an angle is torn to pieces small enough to stay in suspension for a considerable time. The culture should be neutral as even a slightly acid solution attacks the wire under these conditions and a colored solution results which is useless for a nephelometric determination. It may be found desirable to remove the gauze cone and add sufficient concentrated sulfuric acid to make a 10 per cent. solution and again shake for five minutes. The increased specific gravity of such a solution will help to keep the particles from settling out. Every effort must be made to keep any turbidity other than that due to the fungus from developing. If any calcium was used in the nutrient solution the addition of sulfuric acid will cause a very objectionable precipitate. In any case a part of the sample should be filtered and the filtrate run as a blank.

If it is merely desired to compare various solutions, one of them may be used as a standard, or a suitable standard can be made by adding one drop of saturated silver sulfate solution to 200 cc of distilled water and adding just enough dilute HCl to completely precipitate the silver. This solution darkens after a time but is good for several readings.

By observing the precaution necessary to successful determinations with a nephelometer the writer has found that the readings are proportional to the amount of growth present in the solution.

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AN ACCURATE METHOD OF TAKING READINGS ON EXCEEDINGLY LOW ROCK DIPS

IN regions of nearly horizontal bedded rocks it is practically impossible to make accurate dip readings with a Brunton compass where the dip is less than fifty feet per mile. It is however often essential in deciphering low structures to get dependable results quickly in the field. The procedure described below was found to meet this requirement very satisfactorily.

Tie a long nail on one end of 100 feet of fish-line. Drive this nail into the bed of rock of which the dip is to be read. Stretch the fish-line across the rock face. Usually a 50-foot exposure or a 25-foot exposure can be had. Such lengths facilitate calculation. Mark the fish-line at 25, 50 and 75-foot intervals by tying on pieces of red yarn or silk thread. Have a small line-level such as is commonly used by carpenters placed over the center of the line and raise the line until the bubble reads level. Then with a carpenter's 6-foot folding rule, note the dip and make the calculation.

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SPECIAL ARTICLES

THE ACTION OF GLUTATHIONE AND HEMOGLOBIN ON THE GROWTH OF FIBROBLASTS IN VITRO

FOR some time it has been known that fibroblasts and epithelial cells proliferate indefinitely in vitro in a medium composed of equal parts of plasma and embryo juice.[1] If the factors responsible for the unlimited growth of tissues in such a medium could be

[1] A. Carrel, "Artificial Activation of the Growth in Vitro of Connective Tissue," *J. Exp. Med.*, 17: 14, 1913; "Tissue Culture and Cell Physiology," *Physiological Review*, 4: 1, 1924; "Les Milieux Nutritifs et leur Mode d'Emploi dans la Culture des Tissues," *C. R. de la Soc. de Biol.*, 96: 603, 1927; Fisher, A., "A Three Months Old Strain of Epithelium," *J. Exp. Med.*, 35: 367, 1922; A. Carrel and A. H. Ebeling, "The Multiplication of Fibroblasts in Vitro," *J. Exp. Med.*, 34: 317, 1921; "Survival and Growth of Fibroblasts in Vitro," *J. Exp. Med.*, 38: 487, 1923.