In the examination of these samples the greatest reliance was placed in every case on the microscopic appearance, though other tests were also used.

LABORATORY OF THE MINNESOTA STATE DAIRY AND FOOD COMMISSION.

[FROM THE DEPARTMENT OF PHYSIOLOGICAL CHEMISTRY, PATHOLOGICAL INSTITUTE OF THE N. Y. STATE HOSPITALS.]

ON THE PREPARATION OF NUCLEIC ACIDS.[1]

BY P. A. LEVENE.

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THE various modifications of Altman's and Kossel's methods of obtaining nucleic acid, which have appeared during the last year clearly demonstrate two facts: first, that the old methods were unsatisfactory; and secondly, that a thorough knowledge of the nucleo compounds is of ever-increasing importance to all investigators in the field of the chemistry of the cell.

All the new methods published in recent years are based on two properties of the nucleic acids; namely, their solubility in acetates and their resistance to dilute alkalies on heating. Both properties were observed only by the authors of the new methods. The improvement recently advocated by Schmiedeberg was based on the idea of removing (by means of copper salts) the proteid material which combines with the nucleic acids, to form the nucleo-compounds occurring in cells and tissues.

One of the properties of the nucleic acids described by the more recent investigators, namely their resistance to heating with alkalies, stands in contradiction to the observations of the older workers. Thus Miescher considered it requisite that the material which was being treated for nuclein should be kept at a very low temperature during every phase of its preparation. Kossel has succeeded in decomposing the ordinary nucleic acid of the thymus into thymic acid by heating it in water on the water-bath.

Neuman, advocating the heating method with alkalies, states that by this method more than one acid is generally obtained. From the fact that different proportions of the acids vary with the duration of heating, he draws the conclusion that the three acids are modifications of the one occurring in the tissue.

[1] Read before the New York Section of the American Chemical Society, April 6, 1900.

Hammarsten and Bang, who have applied the method of heating with alkalies for obtaining their guanilic acid, obtained a substance with properties differing greatly from those of all the other acids hitherto described.

Thus from the statements of the investigators advocating the "hot" method it may be admitted that the new methods, being an improvement over the old ones, they may be still further perfected, because they do change somewhat the original character of the substance.

In addition to this, I would like to add that to some nucleo-compounds the new method cannot be applied at all, as their decomposition on heating with very dilute alkalies takes place in so short a time that it is impossible to obtain any satisfactory yield by that method. I refer to the compounds known as para-nucleo-compounds.

A uniform method for obtaining all the nucleic acids is, however, most desirable. During the last two years I have been engaged in the study of different nucleo-compounds, and I have used, with satisfactory results, a method differing from those used by other authors. Fresh tissues, nucleo-proteid, as well as para-nucleo-proteids are treated with a strong solution of alkalies (5 per cent. sodium hydroxide or 8 per cent. ammonia), and allowed to stand in a cool place one to two hours. This solution or mixture is then gradually and slowly neutralized with acetic acid, care being taken not to add too much acid at a time, so that the temperature of the solution does not rise too high. It is advisable to keep the solution in a cooling mixture or to add ice to the alkaline mixture itself. When the mixture remains only slightly alkaline a saturated solution of picric acid is added until the mixture becomes neutral or nearly neutral (about 75 cc. of the picric acid to 1 liter of the mixture is generally sufficient); more acetic acid is added until the mixture is rendered strongly acid and then allowed to stand for some time, filtered, and to the filtrate is added 95 per cent. alcohol until the latter ceases to form a precipitate. This precipitate is nucleic acid. The picric acid is added in order to remove the proteid material. On neutralization with acetic acid a sufficient quantity of acetates is formed to enable the precipitation of all the nucleic acid by means of alcohol. (In the absence of acetates nucleic acid cannot be pre-

cipitated by alcohol.) By this method I have treated ovovitellin, ichtulin of cod-fish eggs, cod-fish sperm, pancreas and bacillus tuberculosis.

The very crude acid obtained from the ovovitellin contained 9.65 per cent. of phosphorus; three other samples purified contained, 10.02, 9.95, and 9.79; a copper salt contained, P, 8.57, and Cu, 12.36 per cent.; for the free acid, P = 9.78 per cent. The acid obtained from the same vitellin by Milroy in Kossel's laboratory varied in its contents of posphorus from 7.51 to 7.94 per cent. The acid obtained from ichtulin contained 8.46 per cent. of phosphorus. Walter, who studied the chemical nature of ichtulin in Kossel's laboratory, failed to obtain from it a substance similar to nucleic acid. The acid obtained from the cod-fish sperm was biuret free after the first precipitation and contained 8.65 per cent. of phosphorus. From the pancreas an acid was obtained with the same solubility as the other nucleic acids, while the substance described by Bang as guanilic acid differed in that respect from the other nucleic acids. From the bacillus tuberculosis the acid was also obtained biuret free after the first precipitation.

The study of the chemical properties of all the above-mentioned acids is now in progress.

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[CONTRIBUTIONS FROM THE HAVEMEYER LABORATORIES OF COLUMBIA UNIVERSITY, NO. 25.]

A CHROMIUM CELL FOR THE RECTIFICATION OF ALTERNATING CURRENTS.

BY J. LIVINGSTON R. MORGAN AND W. A. DUFF.

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MUCH attention has been given of late to aluminum rectifying cells. These consist of a platinum and an aluminum electrode in a solution of sulphuric acid or potash alum. When