my reflector can be readily acquired with a little practice, and I am confident that it will be found of much utility in many cases. It is very serviceable for class demonstration.

ON THE USE OF SALICYL-SULPHONIC ACID AS A TEST FOR ALBUMOSES AND PEPTONES (SALIPHONIC TEST).

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IN a former paper in the *BRITISH MEDICAL JOURNAL* of April 18th, 1891, I described the results which I had obtained by the use of salicyl-sulphonic acid as a test for proteids, dealing particularly with the extreme delicacy, reliability, and simplicity of the test as applied to albumin and globulin, and pointing out its value as affording a ready means of discriminating between (A) the proteids coagulable by heat (albumin, globulin, etc.) or precipitated by neutralisation (acid-albumin and alkali-albumin) on the one hand, and (B) albumoses and peptones on the other. I showed that with the former class of proteids (A) the precipitate formed by the addition of salicyl-sulphonic acid is not redissolved by heating, but, on the other hand, becomes coagulated; while with the second class of proteids (B) the precipitate readily redissolves on heating, to reappear when the fluid cools.

Roch had previously (unknown to me) suggested the application of salicyl-sulphonic acid as a test for albumin. He was unaware that it also precipitates globulins (for example, myosin, serum globulin, etc.), albumoses, etc., and is really a test for proteids, not simply for albumin. His method consisted in the addition of a little of the acid to a portion of the fluid to be examined; the occurrence of a precipitate was taken as indicating the presence of albumin. This was defective, inasmuch as my experiments have shown that the precipitate so formed may be any member of the proteid series, and the subsequent employment of heat is an essential proceeding.

Moreover, the delicacy of Roch's results with albumin itself was greatly lower than what my experiments yielded, and not so high indeed as that afforded by several of the well-known tests already in use. The different results as regards the delicacy of the test for albumin arrived at by Roch and myself probably depend—in part, at least—upon the difference in the methods which we followed. Roch used a comparatively dilute solution or crystals of the acid. I employed a saturated watery solution of the reagent and a smaller amount of the fluid to be tested, and found such a mode of procedure to be much more effective and precise.

My further investigation of the subject has been devoted largely to the uses of salicyl-sulphonic acid in regard to albumoses and peptones.

Albumose.—Primary albumoses are precipitated by the reagent, and heat causes a disappearance of the precipitate, to reappear when the fluid cools. This is a characteristic albumose reaction, and it forms a ready and effective test for the substance. The precipitate is not dissolved by dilution with water and is not soluble in excess of the reagent. This test I have found to be more delicate than the biuret reaction (pink colour with CuSO_4 and KHO), while at the same time the biuret test is not distinctive of albumose, but common to it and peptone. Salicyl-sulphonic acid also constitutes an excellent test for deuto-albumose (secondary albumose) if the fluid to be examined is first mixed with two or three times its bulk of a saturated solution of ammonium sulphate. It is only in presence of such a salt that deuto-albumose is precipitated by the reagent.

Peptone.—Peptone (both peptic and pancreatic) is readily precipitated, as I have already described, by salicyl-sulphonic acid in saturated ammonium sulphate solutions. The precipitate clears up on heating and reappears on cooling. (There can be no confusing this with an albumose precipitate, for, as is well known, albumoses cannot exist in a saturated ammonium sulphate solution, all the albumoses being insoluble in saturated solutions of that salt.) The peptone precipitate is immediately redissolved by the addition of a little water or nitric acid, for as soon as the solution is diluted and the

saturation with ammonium sulphate rendered incomplete, the precipitate dissolves. The presence of any considerable amount of glycerine prevents the appearance of this precipitate.

Again, the precipitate is readily redissolved by adding a further amount of salicyl-sulphonic acid, in marked distinction from the precipitates of the other proteids, which are not soluble in excess of the reagent. It is advisable, then, when testing for peptone in ammonium sulphate solutions to take a very small amount of salicyl-sulphonic acid, and gradually pour in a considerable quantity of the fluid to be examined. This constitutes an easy and accurate test for peptone in saturated ammonium sulphate solutions, a more delicate test than is afforded by the biuret reaction. It is to be noted that the peptone precipitate, like other proteid precipitates formed by salicyl-sulphonic acid, presents the appearance of a uniform opalescence or turbidity throughout the fluid, when the reagent is well mixed with it. Scattered crystalline flakes floating in a clear fluid may appear in strong solutions of ammonium sulphate and other salts, apart from the presence of proteids, but this cannot lead to any error, as it does not in the least resemble the general turbidity at once present with the occurrence of a proteid precipitate.

Further, in addition to showing the presence of peptone in the way described, salicyl-sulphonic acid may be used to separate peptone from the ammonium sulphate solution. The peptone is precipitated, filtered off, washed with a dilute solution of the reagent, and redissolved in a weak solution of an alkali; it is thus virtually freed from ammonium sulphate, and readily gives the biuret and other tests uncomplicated by the presence of saturated ammonium salt.

The fact that peptone is not precipitated by salicyl-sulphonic acid, except when the solution is saturated with ammonium sulphate, is a fact of much importance. For, while fluids saturated with ammonium sulphate (or sodio-magnesium sulphate) can only contain one proteid (peptone), fluids not so saturated may, in addition to other proteids, contain two (peptone and albumose), the reactions of which are for the most part identical, especially peptone and deuto-albumose, both giving the biuret action and many others in common. They are, indeed, at present distinguished from one another only by the fact that the one (albumose) is precipitated by ammonium sulphate, while the other (peptone) is not; this involves the comparatively slow process of saturation with ammonium sulphate. But by means of the saliphonic test it is easy to determine quickly which is present; for albumose gives a precipitate, at least when two-thirds saturated with ammonium sulphate, while peptone does not.

To conclude, salicyl-sulphonic acid serves as an extremely precise, reliable, and quick test for all proteids. And in addition to detecting the presence of proteid matter, the reagent enables one to assign the proteid present to one or other of three classes:

A. *Heat-coagulable proteids (albumin, globulin, myosin, etc.) and derived albumins (acid-albumin and alkali-albumin).* Precipitate does not dissolve on heating, but becomes coagulated.

B. *Albumoses.* Precipitate redissolves on heating, and reappears on cooling. To precipitate deuto-albumose effectively the fluid should first be mixed with twice its bulk of saturated ammonium sulphate solution.

C. *Peptones.* No precipitate, except in solutions already saturated with ammonium sulphate. If other tests (biuret, etc.) show presence of proteid, and no precipitate is given by salicyl-sulphonic acid, the proteid present must be peptone. A precipitate in ammonium sulphate solutions indicates the presence of peptone; it is readily redissolved on the addition of a little water or glycerine.

NOTES OF A CASE OF ACCIDENTAL COW-POX.¹

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As accidental, or, as Ceely calls it, casual cow-pox, is not common, and as with the spread of vaccination and revaccination, more and more perfectly performed—protective not

¹ Read at a meeting of the Midland Branch of the British Medical Association at Gainsborough, Lincolnshire.