and to the action of cobra venom will play a rôle in the final solution, but my own experiments have not hitherto thrown any light on the subject.

As regards the method, the blood is to be drawn into 2 per cent. sodium citrate, thoroughly washed, and made up into a 4 per cent. suspension in 0.9 per cent. common salt. The suspensions may be tested at once, or may be kept in the ice box until the following day and then tested. Equal quantities of a 1 : 8,000, and of a 1 : 15,000 dilution of cobra venom are then added, and after one hour incubation the results may be read. If still higher dilutions, as from 10,000 to 60,000 are used, the cells must be incubated for one hour and observed the next morning, but nothing is gained by this except more delicate gradations. Syphilitic cells should resist a solution twice as strong (1 : 8,000) as that which is sufficient to destroy all the control (1 : 15,000). If intermediate solutions are also used, it is possible to trace the gradual loss of the reaction in treated cases. It is probable that each specimen of cobra venom would have to be independently standardized, but one gram would then suffice for about 5,000 tests.

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The distribution of sulphur compounds in brain tissue.

By **W. KOCH** and **F. W. UPSON.**

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The distribution of sulphur expressed in per cent. of total among the various chemical groups of the whole brain is approximately as follows: (1) Proteins, 60 per cent.; (2) lipoids, 26 per cent.; (3) water, soluble extractions or neutral sulphur compounds, 9 per cent.; (4) sulphates, 5 per cent. (Total sulphur in per cent. of dry matter is from 0.45 to 0.5.)

Sulphur occurs in the following five stages of oxydation: (1) Cystein R—S—H, (2) cystin R—S—S—R, (3) sulphonate or taurin-like R—SO_2—OH, (4) ethereal $(RO)_2SO_2$, (5) sulphates.

Taking the various groups of chemical constituents, the following stages of oxydation of sulphur have been found in each: Protein — (1) cystein, (2) cystin, (3) ethereal; lipoids — (4) ethereal. Water soluble extractives (1 or 2 or both) most likely cystein, (3) sulphonate or taurin-like.

The present investigation has concerned itself mainly with the water soluble extractive form of sulphur, which besides containing a compound which is either taurin or an immediate precursor of taurin, contains another group of compounds which appear to bear a close resemblance to the group of neutral sulphur compounds found in the urine. In view of the fact that Folin considers the neutral sulphur of the urine as a measure of tissue metabolism, this observation becomes of special significance. The possibility of comparing the metabolic activity of different tissues with one another, and of the same tissue under different conditions, is at once apparent.

No very close resemblance can be demonstrated until we know the chemical structure of these compounds.

The resemblances so far found are as follows: The neutral sulphur compounds of the tissues and of the urine are both soluble in water, soluble in dilute alcohol, not precipitated by phosphotungstic or tannic acids, precipitated by mercuric acetate. They do not precipitate with barium chloride direct or after boiling with hydrochloric acid. They contain lead blackening sulphur.

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The study of autolysis by physico-chemical methods.

By **ROBERT L. BENSON** and **H. GIDEON WELLS.**

Further studies of autolytic changes in animal tissues by means of the depression of the freezing point and rise in conductivity show the great value of these methods of estimating the rate and progress of autolysis. The results obtained in this way give a much more accurate and valuable indication of autolytic changes in any given tissue than the commonly used determination of the percentage of nitrogen in coagulable form. Autolysis comprises the disintegration of the cell components and involves a great many substances, some of which are coagulable proteins and many of which are not. If we determine the proportion of nitrogen that is made non-coagulable by heat, we get a figure which is the same whether the coagulable nitrogen that has been made incoagulable is in the form of proteoses and peptones, or has been carried to the ultimate amino-acids or even further. The several steps that take place in the autolysis of nucleins also have no effect on this figure after the