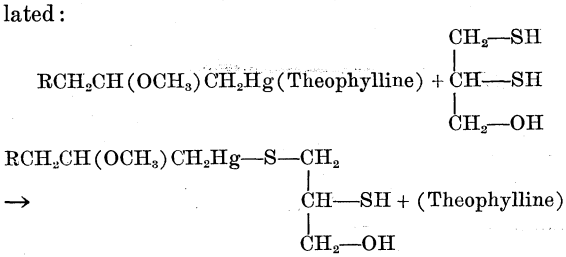
TABLE 4

PROGRESSIVE REACTIONS BETWEEN BAL AND MERCUZANTHIN

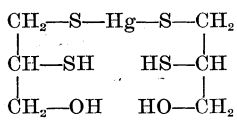
| Time after mixing (min) | Mols of – SH bound per atom of mercury |
|---|---|
| 5 | 1.17 |
| 15 | 1.31 |
| 30 | 1.73 |
| 45 | 2.01 |
| 60 | 2.27 |
| 75 | 2.55 |
| 90 | 2.67 |
| 120 | 2.67 |

ricyanide. One tenth ml of a 0.5% copper sulfate solution added to each titration flask was found to give a sharper end point. An aliquot removed after 85 min was titrated iodimetrically and showed no loss in total – SH. The drop in potassium ferricyanide titer is then assumed to be due to the formation of mercaptides. The results are given in Table 4.

The immediate reaction which occurs with the disappearance of 1 SH/atom of mercury may be formulated:



This reaction proceeds further with the disappearance of 2–3 mols of SH per atom of mercury. Presumably the C—Hg bond is ruptured with the formation of some such complex as that suggested by Gilman and co-workers (*11*).



(*C*)

It is also of interest that these reactions are progressively accelerated as the pH is reduced below 7.

In summary, it is felt that a mercurial diuretic, whether of the xanthine or mercaptide type, circulates in the blood as a mercaptide derived either from a simple monothiol or a protein. At the site of mercurial diuresis a reaction similar to (2) may occur between the mercurial and an enzyme bearing essential sulfhydryl groups. If there is more than one SH group present on the same molecule the mercury may be removed from the parent drug and temporarily bound. Rapid reactivation of the enzyme and excretion of the mercury undoubtedly occur, however, since no permanent damage is done to the kidney even on frequent administration over long periods. Removal of mercury from such an enzyme-mercury complex by BAL with suppression of diuresis would be anticipated and resumption of diuresis could occur from fresh mercurial presented to the kidney.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## Sedimentation Cylinder for Particle Size Analysis


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Among the simplest of the techniques for separation of fine-grained sediments into fractions based on particle dimensions is gravity settling followed by decantation, involving the settling of sediments in liquids in accordance with Stokes' law. In a recent analysis of a suite of samples it became necessary for the writer to isolate the 1/32–1/16 mm grade size for further study, and for this purpose a settling cylinder was devised, incorporating the best features of the Kühn settling tube (*1*) and the Atterberg sedimentation cylinder (*2*). A side opening was drilled into an ungraduated liter cylinder, far enough above the base of the cylinder so that the streamlines created by flow through the opening would not affect the sediment that had come to rest on the bottom of the cylinder or on the surface of the base of the stirring rod (in this case a rubber stopper attached to a glass rod). Flow through the side opening of the cylinder was regulated by means of a stopcock in a length of glass tubing, held in the opening by insertion of the tube through a hole in a rubber stopper (Fig. 1). Water was allowed to drain through the side outlet, and when drainage ceased, heights of 5 cm, 10 cm, and 20 cm above the level of the water remaining in the cylinder were marked on the cylinder walls, and these levels were etched into the glass of the cylinder. In Fig. 1 the etched lines are marked with wax pencil. and the levels just described are represented by the upper line of each pair of black lines.

The procedure in the analysis for which the apparatus was devised consists of the introduction of a sediment suspension (from which oversized material has been removed by wet sieving through a U. S. Standard No. 230 sieve) into the cylinder and the

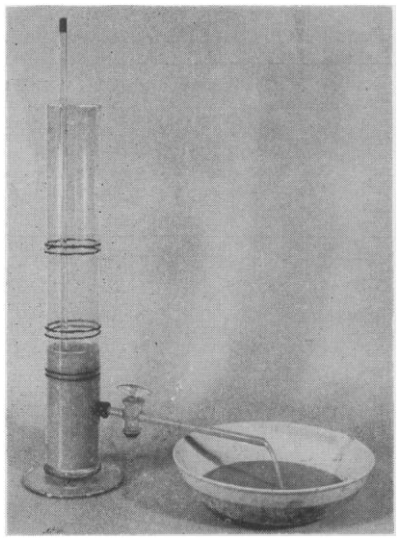

FIG. 1. Sedimentation cylinder with stopcock on side opening. Heights of 5 cm, 10 cm, and 20 cm above side opening are marked by upper lines of line pairs; distance between two lines of each pair represents 20-ml volume.

addition of water to bring the level of the suspension to the 10-cm line. The stirring rod remains in the cylinder throughout the process. After thorough mixing to obtain uniform distribution of particles, the sediment is allowed to stand for 1 min 56 sec, at which time the stopcock on the side outlet is opened and the supernatant liquid drained. The process is repeated until, at the end of the settling period, the liquid above the level of the side outlet is free of sediment, indicating that all particles finer than 1/32 mm have been removed; material coarser than 1/32 mm is recovered from the bottom of the cylinder by inverting the cylinder and flushing the sediment into an evaporating dish. The grain diameter at which the split is made depends on the settling time and the height of the liquid column above the outlet, and by proper choice of these factors, determined from Stokes' law, any diameter less than 1/16 mm may be used as the critical size.

A variation of the procedure, which perhaps lessens the number of decantations required for a single sample, consists of restoring the suspension to the 20-cm line instead of the 10-cm line after each decantation, and doubling the settling time after agitation.

Because it was not required by the study for which the apparatus was constructed, the volume of the liquid within the cylinder was not calibrated, but if, in planning the position of the side outlet on the cylinder wall, the height within the cylinder of the column of a measured volume of water (e.g., 1 liter) is used to determine the position of the topmost marking, then an outlet similar to that shown in Fig. 1 can be inserted 5 cm, 10 cm, or 20 cm below this level, and a second marking can be etched in the cylinder to represent a volume 20 ml less than the starting volume, shown in Fig. 1 as the lower line of each pair of lines. Using the appropriate pair of lines, the apparatus then may be used for size frequency analysis of fine-grained sediments according to the pipette method (*3, 4*), but without the use of a pipette. Careful manipulation of the stopcock on the side outlet will permit the withdrawal of exactly 20 ml of the suspension from a depth of 5 cm, 10 cm, or 20 cm below the surface of the suspension, in accordance with the times and heights of liquid column required by Stokes' law. After each withdrawal, the level of the suspension must be restored to the appropriate height above the side outlet, and, in addition, after the first withdrawal a correction for the decreased weight of dispersing agent in each succeeding aliquot must be made, as each withdrawal and restoration of liquid level will decrease the concentration of the dispersing agent remaining in the cylinder. The system must be reagitated thoroughly between sample withdrawals.

In the original apparatus the end of the stopcock tube and the rubber stopper through which it is inserted create a slight obstruction to the free fall of sediment particles along the cylinder wall in which the side outlet was made; as a result, some sediment is caught on this shoulder. A person experienced in the working of glass could fuse the tube to the cylinder with a smooth joint, and thereby overcome this difficulty.

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## Hormonal Influence upon the *in Vitro* Synthesis of Radioactive Fatty Acids[1]


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Within the past few years, substantial evidence has accumulated suggesting that experimental diabetes is associated with a major derangement of lipid metabolism. Stetten and Boxer (*1*) demonstrated that there is a marked impairment of fat synthesis in the diabetic animal when compared with the normal. Brady and Gurin (*2–4*) have shown that the conversion of radioactive acetate to long-chain fatty acids by rat liver slices is diminished in the case of alloxanized rats or depancreatized cats to less than 1/10 that of the normal. Attempts to reverse this failure of fatty acid synthesis by the addition of insulin, glucose, fructose-6-phosphate, oxalacetate, or α-keto glutarate to liver slices of diabetic animals have been unsuccessful (*4*). Although the addition of insulin to liver slices of normal rats stimulated, to a significant degree, the con-


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