

muth 4 days (medians). The removal of edema fluid was estimated to be from 930 to 3300 cc. after digitalis, from 70 to 1750 cc. after theophylline, and from 200 to 3900 cc. after bismuth. Thus, the diuretic and antiedemic efficiencies of bismuth compared favorably with, or were superior to, those of the other drugs. Bismuth was more efficient when compared with digitalis and theophylline used individually, but less efficient when compared with the latter two drugs used together.

Bismuth and theophylline (digitalis not being as extensively investigated) caused concurrent, definite, and sometimes marked, increases in blood- and urinary-chlorides and an increase in urine-urea with a simultaneous decrease in blood-urea, when increases in diuresis resulted. These correlations failed of demonstration in 2 moribund patients who did not respond to bismuth and theophylline. Accordingly, the results as a whole fit in with modern conceptions of the mechanism of action of purine and certain metallic diuretics, namely, that the diuretic action is mediated through the tissues as a whole. The well-sustained diuretic and antiedemic actions of bismuth are more consistent with a tissue than with a purely renal action.

Final conclusions are reserved, however, until other possibilities are explored, and the diuretic and antiedemic efficiencies of various diuretics are tested in different clinical edemas.

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A Receiver Unit for the Determination of Lactic Acid.

JOHN FIELD 2D. (Introduced by E. G. Martin.)

From the Laboratories of Physiology, Stanford University, California.

The analytical methods for determination of lactic acid have been greatly improved in the last few years, notably by Clausen¹; Friedmann, Cotonio and Shaffer²; Davenport and Davenport³; and Friedemann and Kendall.⁴

The receiver unit here described was designed for use with the

¹ Clausen, S. W., *J. Biol. Chem.*, 1922, lii, 263.

² Friedemann, T. E., Cotonio, M., and Shaffer, P. A., *J. Biol. Chem.*, 1927, lxxiii, 335.

³ Davenport, H. A., and Davenport, H. K., *J. Biol. Chem.*, 1928, lxxvi, 651.

⁴ Friedemann, T. E., and Kendall, A. I., *J. Biol. Chem.*, 1929, lxxxii, 23.

Friedemann, Cotonio and Shaffer² apparatus and procedure. When small amounts of lactic acid are to be determined, better checks have been obtained by this method than by the use of other types of receivers. A marked advantage lies in the fact that its use involves a minimum of dilution of the receiver contents, through simplification of washing. This is important, because the end point of the iodine titration is sharper the lower the volume of liquid titrated.

The receiver consists essentially of a 5/16" x 6" test tube, carrying a 2-hole rubber stopper. Through one of these holes there runs a glass tube, drawn into a capillary as soon as it passes the stopper, and extending to the bottom of the tube. The other hole carries a trap, which leads to the source of suction.

In an analysis each such receiver contains 10 ml. of 1.0% sodium bisulphite. Accordingly the incoming gases are drawn through a column of bisulphite at least 10 cm. high, in the form of a stream of small bubbles. The fineness of these bubbles insures a large ratio of surface area to volume, which favors absorption. If the suction be properly regulated, no liquid will be drawn up into the trap, yet a steady stream of bubbles can be maintained.

At the end of a run the tubes are emptied into 125 ml. pyrex Erlenmeyer flasks, the receiver is washed out twice with 2 ml. of wash water, and the titration is carried out in the usual way. As the addition compound has not been decomposed at this point, the oxidation of some of the bisulphite consequent upon this pouring is not a serious matter.

Seventeen runs on aliquots of zinc lactate containing 0.64 mgm. lactate ion resulted in an average recovery of 92.0% and a median of 93.9%. Nine of the runs were above 90%, these averaged 97.3%, and 14 were above 85%, averaging 94.7.

The trial runs clearly showed that it is more accurate to use the higher value of a pair of results than it is to average the two, since only one value of the 17 exceeded 100.0%.