In the group of cases where the smear was inconclusive or negative, the percentage of correct diagnosis was lower (about 60 per cent.). This might be interpreted as indicating that in some tumors the exfoliation is less pronounced, as has already been observed in tumors of the uterus.[4] When the number of exfoliated cells is small, their presence may more easily escape attention. In most instances the smear diagnosis was based on the examination of a single voided specimen of urine. It is likely that a greater accuracy would be obtained if the tests were repeated and more catheterized specimens were used.

The small number of cases examined thus far does not permit a thorough evaluation of this diagnostic method. However, we consider the results as very encouraging. It is particularly gratifying that twenty-one (88.88 per cent.) of the twenty-seven cases reported as positive were also positive from a clinical standpoint and that false positives were absent.

The cytology of the urine smear presents its own characteristics and these will require a thorough and systematic study. We intend to carry this work further and hope that at some future time we will be able to include our findings in a monograph, comparable to the one published on vaginal smears.[4] In the meantime, we feel that other investigators should have the opportunity of applying this new technique and of exploring its possibilities. This prompted us to give an account of our observations in this short preliminary report.

The great simplicity of this method, the ease of obtaining material without inconveniencing the patient and its inexpensiveness are great assets to its wider experimental or clinical application. It might prove particularly useful whenever repeated examinations are needed, either for clarifying an obscure diagnosis or following up the results of operations or treatments, as in hormonal therapy of prostatic carcinomas.[11] After further evaluation, it might seem advisable to include this test in periodic examinations such as those conducted in public health clinics for the purpose of detecting early or unsuspected neoplasms.

Despite the technical simplicity, the urine smear method of diagnosis, like the vaginal and endometrial smear methods, is rather difficult when it comes to the interpretation of the findings, and special training is required. At its present stage, it should not be considered as a final method of diagnosis. Clinical application must await further evaluation, and treatment should not be based entirely on the results of this test. A corroboration by biopsy, whenever possible, is strongly advised.

[11] It should be noted that estrogenic treatment causes a significant change in the cellular makeup of the urine sediment, corresponding to that caused in the vaginal secretion (G. N. Papanicolaou and E. Shorr, *Am. Jour. Obstet. and Gynec.*, 31: 5, 806–34, 1936). This consists in the appearance of cells showing marked acidophilia, pyknosis of the nucleus, cytoplasmic granules and increased glycogen content. The cancer cells, when present, stand out and make a striking contrast to the normal cells. Similar findings in the vaginal smear of cervical carcinomas following estrogenic therapy have been reported previously[4].

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NOTE ON THE ADSORPTION OF THROMBIN ON FIBRIN

EARLY studies on the action of thrombin and fibrinogen showed that there is a quantitative relationship between the concentration of thrombin and the amount of fibrin formed.[1,2] The data caused many to doubt Alexander Schmidt's view, which held that thrombin is an enzyme, because it was argued that if thrombin combines with fibrinogen to form fibrin, it is not an enzyme. Later the idea developed that such observations could have been explained on the basis of adsorption, and recently Wilson[3] has found that 5.1 units of thrombin disappear from solution with each mg of clotted fibrinogen. He regards this as an adsorption phenomenon.

Actually he studied only a very limited range of the variables, presumably because an adequate amount of thrombin was not available. We have extended the work and have found the relationship shown on Fig. 1.

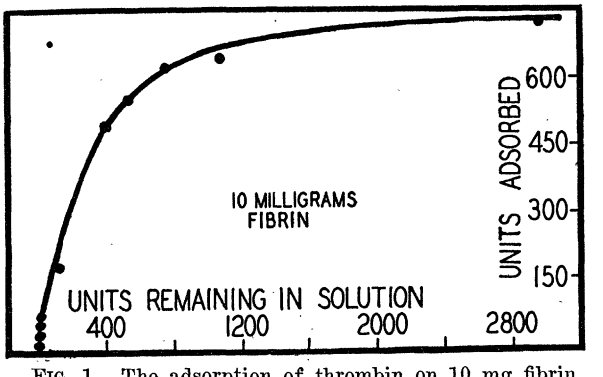

FIG. 1. The adsorption of thrombin on 10 mg fibrin, at room temperature, with a solution volume of 2 cc.

When thrombin clots fibrinogen large amounts of the former are removed from solution, and the quantity removed depends upon the original concentration of the thrombin solution. The curve showing the equilibrium relationships has the appearance of an adsorption isotherm. The new data thus support the view that thrombin is removed from solution by ad-

[1] W. H. Howell, *Am. Jour. Physiol.*, 26: 453, 1910.
[2] L. A. Rettger, *Am. Jour. Physiol.*, 24: 406, 1909.
[3] S. J. Wilson, *Arch. Int. Med.*, 69: 647, 1942.

sorption. An impressive feature of the results is the surprisingly large amount of thrombin which can be removed from solution. For instance, 10 mg of fibrin removed 750 units from a solution originally containing 3,750 units. We may assume 1,400 units per mg dry weight for the specific activity of thrombin[4] and calculate in terms of weight that 10 mg of fibrin removed about 0.53 mg of thrombin.

The results were obtained by using thrombin prepared from bovine plasma as described by Seegers,[5] and fibrinogen prepared by cold alcohol precipitation. The protein in the fibrinogen solution was 98 per cent. clottable with thrombin. The thrombin and fibrinogen preparations were found by test to be free of antithrombin. A solution of fibrinogen in 0.9 per cent. NaCl was adjusted to contain 10 mg fibrinogen per cc. One cc of this solution was added to 1 cc of thrombin solution (various concentrations) in such a way as to produce virtually instantaneous mixing. After 10 minutes the fibrin was removed with a glass rod and the remaining thrombin was measured quantitatively.[6]

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

AN EASILY ASSEMBLED MACHINE FOR MAKING COTTON PLUGS FOR CULTURE TUBES

A NUMBER of years ago Dr. H. W. Batcheler, of the Wooster Experiment Station, Wooster, Ohio, demonstrated to the Ohio Academy of Science a machine for the rolling of cotton plugs for culture tubes. Apparently this has not been published, and the writer has not seen the apparatus. As manpower shortages and cotton shortages have developed, the need for such a machine has become increasingly evident. As a result of this, a machine has been developed which is so efficient it is thought others might be interested.

The essential unit of our machine is a Waco Power Stirrer[1] which has two shafts, one running at 300 r.p.m., the other at 600 r.p.m. The faster of the two is the more satisfactory. The only additional requirement is a foot-controlled rheostat for starting, stopping and controlling the speed of the motor. We use an old foot control from an electric sewing machine. This is wired in series with the motor and provides positive control. The actual spindle on which plugs are rolled is a three and one-fourth inch applicator stick which has enough one-inch gummed paper tape rolled on one end to make it fit the quarter-inch chuck available with the stirrer motor. As the applicator stick gradually wears smooth it is necessary to roughen it slightly from time to time with the edge of a sharp knife blade.

We use University Plugging Cotton from the Rock River Cotton Company, Janesville, Wisconsin. This is spread out and strips, as wide as the length of the plug to be made, are cut lengthwise of the roll. This method of cutting assures the fibers running lengthwise of the strip. For test-tube plugs it is desirable to decrease the thickness of the strip by separating it into two layers of approximately equal thickness to assure ease in manipulation. The end of such a strip is brought in contact with the rotating applicator stick and a little pressure starts the roll. The motor is run slowly until the plug has accumulated sufficient cotton. The cotton strip is then pulled loose from the plug and the plug is tightened by applying very light pressure with the thumb and three first fingers held parallel to the rotating plug. A test-tube is then pushed on the rotating plug and the exposed end of the plug is shaped with the thumb and finger to make the fibers compact so the plug will not be pulled apart in use. The motor is then stopped and the plug is removed from the applicator stick while still in the test-tube by pulling both away from the motor.

With a little practice it is possible to make about 150 plugs per hour. The plugs are of any desired firmness and can be used time after time, thus effecting a great saving in cotton. The labor cost per plug is very low and considering the long service which such a plug will give, the final cost is less than for conventional methods of plugging.

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[4] W. H. Seegers and D. A. McGinty, *Jour. Biol. Chem.*, 146: 511, 1942.

[5] W. H. Seegers, *Jour. Biol. Chem.*, 136: 103, 1940.

[1] Wilkins-Anderson Company, 111 North Canal Street, Chicago, Illinois.

MICROVISCOMETER

USUAL methods for viscosity determination require specimens of considerable volume. In dealing with small samples, *e.g.*, biological fluids, the simple device described permits rapid, accurate determinations on volumes of less than 0.1 ml.

Measurements are made in terms of resistance to the torque developed by a small synchronous, self-starting

[6] W. H. Seegers and H. P. Smith, *Am. Jour. Physiol.*, 137: 348, 1942.