from hops, juniper berries, pipsissewa, sarsaparilla, spikenard, etc. The fermented preparation, when ready for use, was found to have a strongly acid reaction, and an acrid and sweetish taste. Microscopic examination of the deposit in the bottle showed the following: Starch and vegetable cells, spores, a little oil and much amorphous matter; numerous needles, plates and prisms; numerous octahedral crystals resembling those of calcium oxalate. I made an effort to quantitate the oxalic acid in the beverage, but for some reason I was not successful, and this led me to suspect that the octahedral crystals were perhaps not calcium oxalate, but rather a crystalline glucoside from the sarsaparilla or some of the other vegetable constituents of the beer. I have not yet been able to satisfy myself of the nature of these crystals.

The fact remains that there was some relation between the ingestion of the root beer and the oxaluria, either through an excess of oxalic acid in the beverage, or through an abnormal degree of intestinal fermentation set up by the beer. In this connection Simon [8] mentions having seen an albuminuria follow free indulgence in root beer, but he makes no reference to a coexisting oxaluria. I have not succeeded in finding any mention of similar instances of the effect of the free use of this beverage.

The root beer had been used a number of years by Mr. F., and we naturally are confronted with the question of the amount and extent of the damage to the kidneys by the long continued use of the preparation. From the fact that the slight irritation of the kidneys cleared up in about four months, as was manifest by the disappearance of casts and the other formed renal elements, I feel quite certain that any damage that might have been produced by the use of this beverage had been fully repaired, for if such were not the case, with the amount of albumin found, we would be very certain to find casts at some time, and yet no casts could be detected during a number of thorough microscopic examinations which have been made since October, 1903. I therefore believe that we can eliminate the possibility of an incipient chronic disease of the kidneys in this case.

The prognosis in these cases is favorable in the great majority of instances. Broadbent states that he has never known postural albuminuria to resist treatment or to develop into actual renal disease. Pavy has watched cases for upward of fifteen years, and he is satisfied that functional albuminuria must be regarded as something besides an incipient stage of organic renal disease.

The treatment is simple, and the reverse of what is ordinarily considered suitable in renal disease. The treatment that is usually required is good, simple food, fresh air, and vigorous exercise. Tonics, such as iron, arsenic, quinine and strychnine, are useful in many of these cases. Dr. Broadbent has emphasized one important point, *i. e.*, that if there has been an error in diagnosis and the patient is treated for renal disease by giving a milk diet, protecting from cold and forbidding exercise, he will probably go from bad to worse; he has met with several instances of confirmed nervous valitudinarianism, apparently attributable to this error in diagnosis during the early life of the individual.

[8] Clinical Diagnosis, 4th edition, p. 407.

COAGULATION-TIME OF THE BLOOD.

A COMPARISON BETWEEN THE WRIGHT AND THE BRODIE-RUSSELL INSTRUMENTS, BASED UPON SIX HUNDRED OBSERVATIONS.

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THE coagulation-time of the blood is the interval which elapses between the moment of the withdrawal of the blood from the body and the moment when the blood coagulates. To determine this interval for clinical purposes, five methods are used: (1) The simplest procedure is still extensively employed, and requires merely that a drop of blood be placed upon a clean glass slide. The consistency of the blood is periodically tested by moving the drop with a needle. When the blood becomes gelatinous and fibrin shreds are thus demonstrable, coagulation has taken place. This is plainly crude technic. It cannot be relied upon to indicate a delayed coagulation, because of the rapid evaporation which occurs, upon subjecting the drop to the direct action of the air. (2) A decided improvement upon the old method just described is the microscopic examination of the blood. A fresh drop is placed upon a slide and covered with a cover glass. The blood is watched with the microscope until delicate fibrinous processes make their appearance. The recognition of the first shreds of fibrin is said to mark the end of the coagulation-time; but, since these shreds do not appear simultaneously in all parts of the drop, the method is inaccurate. (3) In the third method, described by Vierordt in 1878, a drop of blood is drawn into a capillary glass tube. A piece of horse hair, which has been properly cleaned, is inserted into the column of blood in the tube, and is moved up and down, at intervals. When the blood adheres to the hair, the moment of coagulation has come. The writers have had no success with this method and do not recommend its use.

In 1893 A. E. Wright constructed an apparatus, consisting of a number of similar, carefully calibrated, capillary tubes. A drop of blood drawn up into one of these tubes will adhere to the lumen when coagulation takes place. The exact moment when this adhesion occurs is determined by moving the blood column from time to time. This is done by blowing gently into the tube. When no response to this air pressure can be obtained the column of blood is coagulated. Several observations are made in this manner upon blood taken at regular intervals. No reliable results were obtained, by attempting to

judge of the degree of coagulation from the consistency of the column of blood when forcibly expressed from the end of the tube. It was at first thought necessary to protect the blood from changes in temperature by suspending the tubes against a water bath. This measure has been found to be superfluous, and now no particular effort is made to keep the blood at body temperature. The favorable results reported by Wright and others, in cases where this instrument was employed, led to its use by the writers. In this series of cases, an attempt has been made to find the simplest and most accurate instrument. For this purpose the Wright apparatus was compared with the (5) Brodie-Russell.

The last method to be described is a device of T. G. Brodie and A. E. Russell. Although introduced in 1897, it has not been so widely used as it merits. The original apparatus was furnished with a water bath to keep the moist chamber at body temperature, and with a stage to regulate the size of the drop, two features which made the apparatus complex and costly. The modification devised by Prof. Guntzner and Dr. J. H. Pratt simplified the construction by omitting the water bath and stage without impairing the accuracy of the instrument. This modified apparatus was used by us.

The instrument is made by fastening a metal ring about 5 mm. in height and about 2 cm. in diameter to the surface of a glass slide. A hole in one side of the ring admits a small metal tube to which is attached a rubber tube and bulb, while, on the opposite side of the ring, is a second hole which provides for the escape of the air current. The end of the metal tube is bent slightly upward so that, by moving the cover glass, the air may be directed on the edge of the drop of blood. The upper edge of the ring is anointed with vaseline, and a drop of water placed in the chamber formed by the ring and the glass. A drop of blood is caught on a heavy cover glass and the latter placed upon the ring so that the blood drop projects into the moist chamber. The vaseline prevents the entrance of air around the edge of the ring and holds the cover glass in place. The drop is now watched with a low power microscope, while a current of air is forced through the metal tube. In this manner the corpuscles are set in motion. At first the motion may be irregular, but soon a ring of serum separates at the edge and the whole drop rotates. As the end of the coagulation-time approaches translucent masses appear throughout the drop of blood. These masses increase rapidly in size, and about them coagulation seems to take place. The moment when the edge of the drop of blood fails to rotate in response to the air current marks the end of the coagulation-time. This phenomenon may take place slowly or suddenly. As a control in all cases the cover glass was removed and the blood drop pricked with the point of a needle. Demonstration of fibrin shreds was regarded as final evidence that coagulation had occurred.

The technical difficulties of the Brodie-Russell are fewer than those to be encountered when using the Wright instrument. If the drop whirls at all in the moist chamber, a practically accurate coagulation-time can be obtained. Occasionally the drop cannot be made to rotate by the air current. This is usually due to uncleanly technic, but is sometimes caused by the exposure of the drop to a cold draught.

The Wright tubes are cumbersome, easily broken, and difficult to clean. It is not possible to tell at once whether or not the preparation will be a successful one, as can be done with the Brodie-Russell. In a certain number of cases the blood will not coagulate at all. The failure of the blood column to adhere to the lumen of the Wright tube cannot always be explained. Although sometimes if the blood is moved, just as coagulation takes place, the serum collects around the outside of the clot, and an adhesion between the clot and the tube will never take place. This failure to adhere is the greatest imperfection in the method, because there is no way of determining the coagulation-time without moving the blood. From this and other causes the Wright instrument failed to give results in 15% of the observations, while the Brodie-Russell failed in less than 5%.

It is probable, as stated by physiologists, that the contact of the blood with the tissues outside the vessels causes, in some way, the elaboration of a fibrin ferment. If the needle prick is a deep one, the rapid flow of the blood will wash away the ferment and prevent immediate coagulation. The reverse is true of a superficial prick. It is obvious from this that the needle prick should be deep enough to cause a free flow of blood, and that only the first few drops of blood should be used.

In this series of 59 cases, we have used the Wright tubes and the Brodie-Russell moist chamber side by side. The experiments were done in open wards and in small rooms, at the Massachusetts General Hospital, where the temperature varied between 51.8 and 85 degrees Fahrenheit. The coagulation-time was not found to be influenced by the temperature within these limits. Six observations were made with each instrument on 42 of the cases. In the remaining cases, the scheme of 12 observations on each patient could not be carried out.

The surface of the skin was cleansed with soap, water and alcohol, and the glass instruments with water, ether and alcohol. The blood was drawn from the surface of the body in three places, namely: from the lobe of each ear and from the ball of a thumb, a large triangular needle being used for the puncture, to insure the free flow of blood.

There have been no marked differences between the coagulation-times of the blood-drops taken from different points on the surface of the body, provided the flow has been equally free, although the contrary was observed by Pratt. The writers are convinced, from numerous tests, that if several drops of blood are taken simultaneously from different points on the surface

of their body, their coagulation-times will coincide, if the technic is perfect. Our results have not always shown the coagulation-times to be exactly the same when done with two instruments at the same time. The variations beyond a reasonable limit of error have been few, and might be explained by faults in technic. The average coagulation-time with the Brodie-Russell instrument in 300 observations was three minutes and twelve seconds; the average with the Wright was four minutes and eighteen seconds. This result is somewhat lower than that usually given.

Variations were found in health between one and seven minutes with both instruments. We attribute the extremes to technical errors. The limits are presumably three to six minutes. The proof of a delayed coagulation must be based on several observations, in order to minimize the influence of technical errors.

In this series are included 15 jaundice cases, the lesions of which embraced nearly every known cause of jaundice, *i. e.*, gallstones, catarrhal jaundice, cholecystitis, cirrhosis of the liver, cancer of the liver, cancer of the head of the pancreas, chronic pancreatitis, etc. It is of interest to note that in none of these cases did the coagulation-time vary from the normal.

The conclusions to be drawn from these observations are as follows:

The Brodie-Russell is more reliable than the Wright instrument.

The average coagulation-time is between three and six minutes.

The proof of a delayed coagulation must be based upon several observations.

The coagulation-time is not affected by the ordinary changes in room temperature.

Blood obtained simultaneously from different points on the surface of the body shows no marked variation in the coagulation-time.

A delayed coagulation is not constantly associated with jaundice due either to benign or to malignant obstruction. [The writers are greatly indebted to the visiting Staff of the Massachusetts General Hospital for their courtesy in providing material for these observations.]

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Clinical Department.

ADENO-CARCINOMA OF INTESTINES INVOLVING THE BLADDER.

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E. C. Single. Fifty-seven. Overworked and nervous. Poorly nourished, appetite good, bowels regular. Has been losing flesh pretty steadily. Patient was well, so she says, until one year ago, when she had two attacks of grip, since which time she complains of frequent micturition accompanied by burning and smarting, until six months ago when she had an acute illness of which the nature was not very well determined. Chills, rise of temperature, and abdominal tenderness. During the time of confinement to bed the bladder annoyances were diminished and urination less frequent. Five months ago the present condition of frequent urination during the day and the need to rise four or five times during the night has existed. Occasionally blood is seen in the urine and shreds of some foreign substance. At times a clot of blood is expelled with pain, and of late the urine is often tinged with blood. Menstrual history uneventful and menopause at fifty. Three years after this, on occasion of a slight bloody discharge from the vagina, she was sent by her physician, Dr. Reid, to Dr. Call, who relieved this symptom and who found at that time no other lesion. Urine examined with negative results. On the 13th of November, 1903, Dr. Call referred her to me, with the history as given above.

Patient thin and pale. Abdomen flat and somewhat resonant to percussion. Vulva in process of senile atrophy and vagina partly involuted. Uterus was found to be, apparently, of normal size and sharply anteflexed, a little drawn to the right. Bladder examined cystoscopically under cocaine. Urethra somewhat congested in contrast to the bladder wall which, thoroughly well ballooned, was healthy in appearance, except a grayish mass a little to the right of and anterior to the fundus, apparently about three cm. by two cm. in width, and from the mass finger-like, club-shaped filaments extended into the bladder, giving the appearance of a coronoid polyp described by Clado. A small piece scraped off and sent to Dr. W. F. Whitney for examination.

Microscopic examination showed the piece sent to be composed of vascularized soft, cellular, connective tissue, surface of which was papillary and covered with a single layer of long columnar epithelium.

Diagnosis: *Papilloma.* — Several subsequent examinations were made in the office, and on two occasions the bladder seemed perfectly healthy; the gray mass could not be brought into view through the contracted bladder wall. Examined under ether at the Charity Club Hospital Dec. 3. Cystoscopic appearance as described above. Uterus apparently in normal position, and what had been supposed to be the body gave the sensation of a fibroid. The small finger introduced into the bladder after dilating the urethra. Bladder wall perfectly smooth for two thirds of the distance, then the finger entered a crypt through the contracting bladder wall, giving the sensation of the ring of Blandl in hour-glass contraction of the uterus with the placenta above. And so, in this case, the finger could sweep about a perfectly smooth bladder and then enter a crypt or cul-de-sac and come in contact with a soft spongy mass. Large mass scraped off and sent to Dr. Whitney, and the following statement returned: "The specimen from the bladder of Miss E. C. consisted of some tissue in which there was considerable thick mucus. Microscopic examination showed a fibrous tissue structure in places and distinctly myxomatous degeneration. As far as this specimen goes, the diagnosis is a myxoma."

Examination of the urine by Prof. E. S. Wood, who reported: "I am unable to find in the sediment of any of these specimens any evidence of malignant growth of the bladder. I am unable to find any cells which are at all suggestive of morbid growth. I do find, however, in the sediment of all these urines, even in the specimen passed after the bladder was washed out, particles of food, such as vegetable cells and partly digested muscular fiber. It does not seem to me rea-