the kidney was enlarged and a stone two and one-half inches long and one and one-half inches in diameter was extracted with some difficulty. It was found necessary to crush it with strong forceps and remove it piece by piece. It seemed to occupy the entire pelvis of the kidney and had no fassets behind it indicating the presence of other calculi. The cavity was explored with the finger but no other stones found. The ureter was somewhat dilated, but the thickness of the wall of the kidney seemed to suggest the presence of enough kidney substance to be useful in secreting urine. The edges of the pelvis were grasped with forceps and the pelvis itself packed with iodoform gauze inside of the Mickulicz handkerchief. A portion of the lumbar incision was closed with sutures and the abdominal opening completely closed and dressed. The patient was put to bed in good condition. Her pulse during the afternoon and evening ranged from 59 per minute directly after the operation with a temperature of 97 degrees F., to 80 per minute with a temperature of 98 degrees F., and respirations 28 per minute. There was a good deal of oozing from the wound but it was of a very pale and watery character and showed no tendency to the formation of clots. When burned in the flame it gave off a urinous odor. On the fifth day after the operation the discharge was almost entirely urinous and saturated the dressings with six ounces in twelve hours showing considerable activity in the kidney.

The accompanying temperature record (Figure 3) shows the uneventful progress of this case. The patient left the hospital on April 26 with the wound not yet entirely closed, but all urinous discharge had ceased for several days before. A few days afterward a fragment of stone was discovered in the wound and removed. Since this event and up to this writing (March 1897) the wound has completely closed, the patient is gaining in strength and the urine seems entirely free from pus and albumin.

This case illustrates the way large calculi are borne by the kidney. For many years the symptoms were so slight as to be hardly noticed. There were of course occasional attacks of pain but they did not last long. At last the ureter became partially obstructed and the symptoms were more pronounced. The case also illustrates the possibility of demonstrating the adequacy of the opposite kidney before operation. The scanty urine that was removed from the left ureter contained an excessive amount of urea and pointed at once to its health and the need of a larger amount of water to carry away the urea. Incidentally also this case shows the possibility of performing the most serious operations upon very old persons, even under such unfavorable conditions as attend the destruction of a kidney. Operations as serious as nephrotomy have been successfully performed on octogenarians.

Nephrectomy was thought of in this case, but the result shows that it is better to leave behind rather than remove remnants of a suppurating kidney provided there is no obstruction in the ureter. If necessary the kidney may be removed at a subsequent operation after the patient has recovered from the sepsis and the effects of the pain.

There are many cases of calculus which give rise to no symptoms and are only discovered postmortem. In many cases also small calculi pass into the bladder at intervals with dreadful pain. It is sometimes possible to follow such a stone along the ureter by the point of tenderness and at last with the cystoscope see it borne into the bladder as I have once done in a man, using for the purpose a Casper ureter-cystoscope. It is often possible to prove that the stone has been discharged into the bladder by using the cystoscope. This I have done and after making a drawing of the small stone with a bloody end my patient did me the kindness to urinate and demonstrate the accuracy of my observation by passing the calculus which had irritated his prostate for several days.

Many cases of calculus of the kidney are not surgical cases at all and become surgical only when they have gone on to suppuration or to such excessive pain as to interfere with health.

THE UTILITY OF NUCLEIN.

A Clinical Lecture delivered at Mercy Hospital.

BY N. S. DAVIS, JR., A.M.,M.D.

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At the clinic last week I showed you this patient when he exhibited most fully the physical signs and symptoms of croupous pneumonia. He had then been ill five days and was suffering from a moderately severe attack of the disease. The lesion was limited to the lower lobe of the right lung. At that time I hazarded the prophecy that unless an extension of inflammation occurred he would be likely to pass the crisis of his illness either on the night of the day that you saw him or within the two following days. I also pointed out to you the treatment that was usual in such cases and particularly called attention to the fact that in this case I was trying in addition to the ordinary routine treatment of pneumonia nucleinic acid. I made no comment at the last clinic upon the mode of action of nucleinic acid or the indications for its employment in the treatment of diseases. I call your attention now to this patient in order to point out the changes that have occurred since you last saw him, and also to speak somewhat more at length in regard to the usefulness of nuclein as a remedy, not in cases of croupous pneumonia only, but in other diseases as well.

Almost immediately after you saw our patient there occurred an extension of inflammation so that the entire lung on the right side was involved. During the week after this spread our patient became extremely ill. His fever continued high, in the neighborhood of 104 and 104½ at night time. He was delirious almost continuously. His breathing was very rapid, varying from 40 to 50 and sometimes 55 per minute; it was also shallow. He gradually grew cyanotic, his lips and finger-nails were bluish, and the skin over his body of an ashen gray. At one time he seemed so ill that recovery appeared impossible. On account of the very pronounced cyanosis and because of the constant delirium and unconsciousness of our patient, it was thought necessary to administer oxygen gas freely. It produced its usual effect; the cyanosis for the time was lessened, the mucous membranes became pink and the heart grew stronger and the pulse fuller. Our patient, however, under the influence of oxygen gas did not become entirely conscious or lose his delirium altogether, but his mental state improved. As good fortune would have it his temperature during the last three days has gradually lessened, and in all respects his condition has

slowly improved. You now see him conscious, with a temperature this morning of 99 and a temperature last night of only 100⅕. His pulse is medium in size, very regular, and from 80 to 85 per minute. The respirations, however, are still quick. You will observe that they number 35 to the minute, and are shallow. Percussion over the affected side of the chest demonstrates marked dulness over the entire right lung. It is filled with moist râles indicative of liquefaction of the fibrinous exudate.

So much for the present condition of our patient and for the history of his illness since you last saw him.

In regard to his treatment.—Aside from the employment of nucleinic acid there has been nothing unusual used. He has been given five grains of carbonate of ammonia every two hours; and during all the severe part of his illness strychnia was given in full doses. Oxygen was administered very freely by inhalation. Digitalis was given when the heart was most feeble and cyanosis was greatest. We are still administering strychnia and digitalis, but not frequently; the carbonate of ammonia has been discontinued. Of course the patient has been fed carefully and systematically, even during his delirium, but only liquid foods. His bowels have been kept regular, for the most part by the admistration of enemata. In this case I prescribed nuclein as I have frequently in others, because of the excellent experimental results obtained by Vaughan with the drug in animals infected by the pneumococcus. I was, moreover, led to employ it in this case particularly because a comparatively new preparation of nucleinic acid was put in my hands for trial—a stronger preparation than has usually been employed. Whether it has produced good effects or not in this individual case we will consider a little later, I will first refer to the mode of action of nucleinic acid and its mode of administration, and then consider its therapeutic value.

Nucleinic acid or, as it is commercially known, nuclein, was introduced to the profession by Professor Vaughan of Michigan University. Professor Vaughan has been most ably seconded in his experimental investigation of nuclein by Drs. McClintock and Novy of the same institution. It has been demonstrated by them, and the demonstration has been confirmed by various observers in other parts of the world, that nuclein possesses very pronounced germicidal power. Moreover, when it is administered to animals or to man it produces leucocytosis or phagocytosis, that is, a great increase in the number of white blood corpuscles. The amount of uric acid eliminated by the kidneys is augmented when it is taken. Nucleinic acid has also been shown to be absolutely innocuous. It can be given in doses of all sizes, and can be administered either by the stomach, hypodermatically, or injected directly into the veins of animals, without causing fatal results or illness. This is a rare combination of qualities. All of the germicides that we are accustomed to employ are poisonous to animals and to man, if used in sufficiently large doses. According to prevailing theories as to the cause of immunity to infectious diseases, phagocytosis is of prime importance, and a drug which will greatly increase the number of leucocytes in the blood we would expect to be of value to combat an infectious malady. Indeed, as you know, Metschnikoff assigns to phagocytosis wholly the power of combating microörganisms that gain access to the tissues or the blood of animals or man, and he has declared that if we can increase the number of phagocytes in the blood at will and sufficiently, we have almost a certain means of combating infectious maladies. Whether this statement is absolutely correct or not can only be demonstrated by extensive clinic trials of those drugs that provoke phagocytosis, and extensive experiments in the laboratory with the same class of remedial agents.

Vaughan showed in some of his early experiments that nuclein administered hypodermatically to those animals that are very susceptible to infection by pneumonia will produce complete immunity toward the pneumococcus. It would therefore seem that nucleinic acid should prove an important remedial agent in the treatment of croupous pneumonia. His experiments also demonstrated that it readily killed staphylococci and streptococci. Some of his experiments showed that it produced at least an attenuation of the virulence of tubercular infection. Vaughan therefore urged that nucleinic acid be tried by physicians in pneumonia, in infection by staphylococci and streptococci, and in the early stages of tuberculosis.

Some very recent experiments by Hahn are of interest at this point. He has proven by the introduction of nucleinic acid into the blood of animals that the germicidal properties of the blood serum are very greatly increased. For example, by taking a given quantity of blood serum from a healthy animal and inoculating it with the staphylococcus, he found at the end of two hours that only 19½ per cent. of the microörganisms were alive; at the end of five hours, only 4 per cent. were alive. If nucleinic acid was introduced into the blood of the same animal, a marked leucocytosis was rapidly produced and the germicidal power of the blood serum was increased, so that when it was inoculated again with staphylococci, at the end of two hours only 2.9 per cent. were alive; and at the end of five hours only 1.7 per cent. The bactericidal properties of blood serum were shown to be increased more for the bacterium coli commune than for staphylococci. It is possible, as Hahn claims, to double the number of leucocytes in the blood in a few hours, and to double or even more than double the germicidal power of the blood serum by administering nucleinic acid. In order to produce a perceptible increase in the germicidal power of blood serum the number of white blood corpuscles must be increased to 13 or 14,000 per cubic centimeter.

The remedy has not been employed as extensively as it might have been, because at first it was recommended that it be used only hypodermatically, and few remedies that are employed hypodermatically gain very general use. Patients object to frequent puncture of the skin by a hypodermic needle if thereby they are not immediately relieved of pain. But it has been shown by the investigators at Michigan University that the drug can now be employed in solutions of 5 per cent. strength by the mouth, and quite as good results can be obtained in this way as by its hypodermic use. I doubt not, therefore, that we will soon see it more generally tested. We will then be better able to determine its exact degree of utility as a remedial agent.

There are several preparations upon the market which bear the name of nuclein. For the most part these are liquid preparations and are solutions of nucleinic acid. Personally I know nothing of the genuineness or value of these various preparations. Prof. Chittenden of Yale University, has made a care-

ful analysis of them, and in a recent publication has asserted that the only preparation which he has found to contain any considerable quantity of nucleinic acid (and it is the nucleinic acid which is the active principle of the preparation) is the solution which goes by the name of nuclein prepared by Parke, Davis & Co., of Detroit, Mich. My own experiments have been both with this and other preparations, but chiefly with this preparation of nucleinic acid. The clinical results which I have obtained by its employment have been conflicting. I have used it in a great variety and in a large number of cases, sometimes with encouraging results and sometimes with apparently no results at all; yet often enough with apparent good effect to make me willing to test the drug still further, particularly as we know that it is innocuous.

I have used it, I think, in ten or a dozen cases of pneumonia. I tried it at first hypodermatically, and stopped using it because it was so disagreeable to my patients; more recently I have tried it again, administering it by the mouth. In no case has the course of the disease been shortened. The difficulty of estimating the value of a drug by its trial in a given case is well illustrated in the one before us. It is quite impossible from any one or from a dozen cases to judge of the utility of a given drug. Its effects must be carefully watched in very numerous cases, in cases that occur in different years and in different epidemics, and cases of very different degrees of virulence. The patient before you has suffered from an intensely severe form of croupous pneumonia, and has been so seriously ill that at one time it seemed impossible for him to recover. The disease has been prolonged by the extension of the lesion from one part of the lung to another. In ninety-nine cases out of a hundred as severely ill as he was, recovery would not take place. Fortunately in this case recovery is taking place. That nucleinic acid has played a part in producing this recovery, we can not say with certainty. We expected, or hoped rather, that by its administration the bactericidal properties of his blood serum would be so increased as to prevent spread of the lesion in the lungs. The drug was employed in this case for about thirty-six hours before any extension of the disease occurred; but it did not, as you see, prevent the extension. It may, however, have played a part in making the patient better able to withstand the severe attack of illness that he has gone through.

The best results which I have seen from the employment of nucleinic acid have been in cases of infection by pyogenic organisms, in cases where there was plainly infection but not actual suppuration. For instance, in quinsy where a tonsil was enlarged in the way characteristic of this form of sore throat, and when suppuration seemed imminent the drug has apparently prevented suppuration. Such good results have been obtained only when it was administered early and frequently. In the treatment of bubos, variously caused, similar results can often be obtained. After suppuration is established it does not seem to influence it. It is well known that all glands infected by pyogenic organisms do not suppurate. However, I have used the drug so often in such cases as to have acquired some confidence in its ability to prevent suppuration. I have used the drug in several cases of suppuration in deep-seated organs, from which drainage could not be perfectly established, but have never gotten positively good results

Some of you may remember a case in this hospital last winter, of abscess of the lung, a simple abscess, not a tubercular one. In that case nucleinic acid was administered hypodermatically just so soon as there was any suspicion of an abscess in the lung; and it was used persistently without appreciable effect. During the last summer I have employed it in two cases of intense pyelitis. The first occurred as a complication of disease of the spine which produced a paralysis of the sphincter muscles of the bladder, causing thereby retention of urine. The bladder was so greatly and so long distended with urine that the latter underwent decomposition and provoked inflammation of the bladder. The inflammation extended to the pelvis of the right kidney. When the patient first came under my observation he was extremely ill, suffering from a continuous fever, sweating at night, able to retain no nourishment, with a very feeble pulse and apparently not likely to live more than a week, if so long. The patient was removed from his home, where he was receiving very imperfect care, to the hospital; his bladder was frequently perfectly emptied and was carefully washed. At the same time nuclein was administered persistently. Teaspoonful doses of the 5 per cent. solution were given by the mouth once in two hours at first. The kidney, which had been greatly enlarged by the accumulation of pus and urine in the pelvis of it, rapidly diminished in size, the tenderness of the organ gradually disappeared, the fever disappeared with rapidity, vomiting ceased and nourishment was taken with avidity and ease. A somewhat rapid recovery took place; not a complete recovery, for that is probably impossible, but a comparative recovery. He now voids only a small amount of pus with his urine; he has once more gained control of the sphincter muscles of the bladder so that catheterization has no longer to be resorted to, and is feeling in every way comfortable. His lower limbs are of little use to him.

In this case, too, we are left in doubt as to how much the improvement has been effected by nucleinic acid and how much was due to the fortunate thorough drainage of the pelvis of the kidney through the bladder by regular removal of urine from the latter organ. Quite as good results have been observed where nuclein was not used.

In furunculosis it has repeatedly seemed to lessen the number and size of the successive boils and to make the disease of less than the usual duration.

I have tried nuclein in two cases of malignant endocarditis. In cases of this disease above all others we would expect a drug that is innocuous and that possesses such marked bactericidal properties to be beneficial, since the infection is in the blood channel. But in neither case has improvement been observed that seemed justly ascribable to nuclein. One of these patients you know, for he is now in this ward. You examined him when he first showed symptoms of malignant endocardial trouble, and you have seen embolism occur in his arm and leg, and finally gangrene of one foot develop. Nuclein was administered to him every two hours for several weeks. The patient, as you will remember, had daily a high temperature which lasted for an hour or two only. It first reached 106, and quite constantly ranged above 104. After the nucleinic acid had been used for some days the temperature gradually fell, its daily maximum being 102 or 102⅕. While the temperature ranged high there was both morning and evening a

period of elevation. Usually the morning temperature was highest. The highest rises of temperature coincided with the occurrence of embolism in new localities and followed it for one or two days.

The patient is steadily failing in strength. The noticeable diminution of fever is quite as probably due to the occurrence of no new embolism as to treatment. The failure of the treatment in this uniformly fatal disease is not unexpected.

As nucleinic acid increases the bactericidal power of the blood, it might be expected to be especially serviceable in those diseases in which the blood is the seat of infection. We have no clinical or experimental evidence bearing upon this point.

Vaughan reported good results from the employment of nuclein in cases of diphtheritic sore throat produced by streptococcus infection. He used it both locally upon the throat and administered it hypodermatically. I have also used it in these cases both locally and internally. I have never felt so great confidence in it, however, as to be willing to discard other germicides. I use invariably in addition to it the peroxid of hydrogen either with the atomizer or with a syringe. Recovery has occurred without complications in all cases of this kind that I have treated in this way.

Vaughan's experiments with nuclein in the laboratory on animals affected by tuberculosis were sufficiently flattering, although he could not produce absolute cures or perfect immunity by the drug, to make it appear of probable utility, at least in cases of incipient phthisis. He urged the profession to try it. I have endeavored to watch its effects in a large number of cases. If it does good it probably does so in part by lessening the virulence of the tubercle bacilli and in part by preventing superimposed infection by pyogenic organisms, to which there is always so strong a tendency. I have often thought that when given in the first stage it delayed suppuration and excavation.

Since nuclein produces experimentally such marked phagocytosis and increases the bactericidal power of blood serum, it is a drug well worth a thorough clinical test. From clinical trials it seems most certain to do good in furunculosis and similar pyogenic infections of mild type. It is especially useful as a prophylactic or attenuant when such infection has just occurred. It deserves more extensive trial in pneumonia and beginning tuberculosis. I know of no contraindication for its employment except its augmentation of uric acid and consequent possible aggravation of the uric acid diathesis.

CONCERNING THE PRESENT CONDITION OF STATE MEDICINE IN THE UNITED STATES.

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State medicine as now understood belongs entirely to modern times. It began in England just before the middle of the present century, when Edwin Chadwick, a barrister, made what has been called his "Epoch-making report" to parliament on the health of towns. By his investigations and report he secured the attention of the government and the interest of the people; laws were passed, and English sanitary work and control were inaugurated. More than fifty years have passed, and England's system of sanitary control, both inland and marine, is a strong feature of her government. The statistics in the Register General's office show that the annual death rate for England and Wales for the ten years 1871-1880, averaged 21.27 per 1,000; while for the period 1881-1890 it was 19.8, a decrease of more than 11 per cent. The former death rate in England was given at 32 per 1,000. The present annual death rate in the United States varies slightly in different States and cities from 16 to 18 per 1000. In some favored cities and towns it is less.

The beginning of State medicine in the United States was in this wise: In 1849 the Governor of Massachusetts, by authority of an act of the Legislature, appointed a commission consisting of three citizens to prepare a plan for a sanitary survey of the State. Lemuel Shattuck, Nathaniel P. Banks and Jehiel Abbott were made to constitute this commission. The work of investigation began, but delays were inevitable, and the Massachusetts State Board of Health was not formed until the year 1869. Dr. Henry I. Bowditch was properly placed at its head. The names of Shattuck, Banks, Abbott and Bowditch of the old Bay State are well remembered.

Because of the frequent invasions of yellow fever in New Orleans the Legislature of Louisiana established a State Board of Health in 1885, whose duty was to maintain a quarantine and have some control of the sanitation of that city. This, then, was the first named as a State Board of Health in the country. The powers of this Board were enlarged in 1867. Its service was valuable for the purpose at the time, but it had not at first the means and general power of control that have since been given to State boards of health.

A little more in the line of history is best given in an account of the work of Dr. Bowditch. In the centennial year of 1876, an International Medical Congress was held in Philadelphia. The president of the Massachusetts State Board made the address on "Hygiene and Preventive Medicine." The discourse was historical, showing much of the condition of things at the time, and the work of pioneer sanitarians. He said: "I have been requested to speak to you on public Hygiene and its great resultant, State preventive medicine, as it appears to an observer looking back upon the centennial period now just closing."

"As a matter of vital importance to the well-being of any community, and, as such, worthy to be cheerfully and amply sustained by great cities and States, public hygiene, as we now understand that term, has, till within a short time, been wofully neglected, save when, under the stimulus of some great and terrible epidemic, frantic but temporary efforts have been made to stay the plague by hygiene or by other means. Of late, however, a new and better era seems opening to our view, and State preventive medicine affords us higher hopes for all coming time."

Farther on in this address Dr. Bowditch spoke of the work immediately preceding, viz., from 1869 to 1876, as that "which is destined to continue and progress while the nation itself lives, the noblest and most beneficient of all, viz., that in which the profession, joining heartily with the laity and aided by the material and intellectual resources of great States, will study to unravel the primal causes of all disease with the object of preventing it. It is the epoch of State preventive medicine.[1] As it now seems, this

[1] Address.—Transactions International Medical Congress, Philadelphia, 1876.