he had no experience with solanin, but he knew a physician in Chicago who has tried this remedy with remarkable results. Any addition to the materia medica should always be welcomed when presented by a reputable physician and it should not be belittled by any who have had no experience with it. If anything is found to be good, all right; if it is found to be not valuable, discard it. He would not give bromids. An optimistic view of epilepsy should be taken; the patient's hygiene, activity, diet, should be regulated, and an endeavor should be made to get him out of the epileptic habit. If there is any drug which will lessen the reflex irritability it should be tried. It would seem that solanin is a medicine which may take the place of the bromids with great advantage. The next case of epilepsy he has he will try solanin. From the physiologic action he anticipates some very good effects.

DR. M. CLAYTON THRUSH, Philadelphia, said he had been interested in this drug for a number of years. His attention was first called to the *Solanum carolinense* in West Virginia. He noticed that many colored people gathered berries of a certain plant and steeped them in whisky and took the decoction, receiving wonderful results in epilepsy. He investigated the drug and found it to be the *Solanum carolinense*, or horse nettle, and decided to make a complete investigation of the drug. As to its chemical composition, quantitative analyses were made of all the various parts of the plant in order to determine which part of the plant was most active therapeutically. It was found that the fruit contained the largest amount of solanin, the root was next in amount, then the leaves, and finally the stem. The alkaloids solanidin and solanin were combined in this drug by solanic acid. The solanidin was found to be present in about 7.6 per cent. the amount of the solanin, and the solanin was found to be converted by heating with a dilute acid into solanidin. Solanum contains solanidin, which is soluble in ether, and is readily detected by the proper chemical reagents. Solanin is extracted by chloroform from the alcoholic extract. It is very sparingly soluble in ether and water, freely soluble in chloroform and amyl alcohol, and also soluble in cold alcohol; more so in boiling alcohol. By heating in the presence of a diluted acid solanin is converted into solanidin and another substance capable of reducing Fehling's solution which is probably a form of glucose. Water will extract the solanin due to the presence of solanic acid. Solanin is present also in the berries of *Solanum nigrum*, in potato sprouts (*Solanum tuberosum*), in the common tomato leaves (*Solanum lycopersicum*), and in the formerly official *Solanum dulcamara*; the fluid and the solid extracts are made with a menstruum of two parts of alcohol and one part of water by the usual percolation method. This will apply to all parts except the fruit, which must be macerated. The remainder can be dried and made up as a fluid extract. The objection to the tincture is the large amount of alcohol present. As a result of pharmaceutical investigation it has been found that the fluid extract and solid extract are the best preparation of the drug. The alkaloid solanin itself can be used, with practically the same effect. Microscopic examination showed starch, tannin (calcium oxalate crystals), mucilaginous matter, resin and fixed oil in addition to the usual structural constituents. The medical properties had been well covered by Dr. Waugh. As solanin is a poison to the terminal motor plates, paralysis may be sensory and motor. By reason of this solanin is to be classed among the best analgesics. There is no danger of an accumulative action. It does not cause congestion of the brain, even in the aged. In all cases in which it is necessary to calm excitement, relieve pain or overcome spasms, it promises excellent results. It may be given with advantage in place of morphin. Dr. E. Q. Thornton has investigated the physiologic action of solanum on frogs by injecting the solid extract hypodermically into the posterior lymph spaces in doses of about 3 mg. to the gram weight of the frog. He found that the drug depresses the respiration, has little or no effect on the circulation, depresses the cerebrum and stimulates the cord. The reaction to acids is lost before tactile sense, and the same may be said of heat. In a series of investigations to ascertain its clinical value the drug has been employed in four Philadelphia hospitals, in about 25

cases of epilepsy in its various forms. In order to show the efficacy of this drug he related one instance. This girl is entirely cured, there being no symptoms since four years ago. She had the disease since 7 years of age and had been using bromids, and every time developed a profuse acne. As a result of his own experience he had reached the following conclusions: 1. That *Solanum carolinense* is of the greatest value in *grand mal* of idiopathic type without hereditary taint, when the disease has begun beyond the age of childhood. 2. It is perhaps next of greatest value in hystero-epilepsy with marked convulsive seizures. In cases of *petit mal* the drug does not seem to do the great good that has been noted in the major type of the disease. 3. In cases of well advanced epilepsy of any type in which there is degeneration of the cerebral neuron, the drug will act specifically for a time even better than the bromids, but it will finally be determined that the bromid salts will ultimately control the attacks better in these cases. 4. The foregoing clinical study has brought out sufficient evidence to warrant the statement that the inherent advantage of vegetable depresso-motors is great as compared with any mineral salt given with the same intent, since destruction of the blood corpuscles by the latter is a most detrimental feature toward lessening the resistance of the individual in a disease, in which, above all, the constitutional tonic should be favored as ideal treatment. 5. A thorough impregnation of the nerve cells can alone be had and, therefore, cure hoped for in epilepsy in proportion as solanum is pushed to the fullest physiologic dosage and maintained through periods of months, a year not being too short a time to warrant its discontinuance. 6. The fluid extract of the drug made freshly is the ideal form of pharmaceutical preparation given in ascending doses commencing with one fluid dram and increasing to the full constitutional effect. 7. It is to be decidedly preferred to the bromids in those cases in which it can be used advantageously, because no toxic symptoms follow its free administration, and the mental faculties are not impaired by its use.

DR. WILLIAM F. WAUGH, Chicago, said that 30 years ago one of his brother officers in the navy said he thought it was a great mistake that steam had displaced the sail, that the American clipper ship was the highest type of the ship builder's art, that the world should have been contented with it and not gone further. It is perfectly natural for conservatism to hold back, but the world never stands still, and is constantly asking for something better. It is his firm conviction that if the faith of the world in drugs, which it seems to have lost so completely, is to be renewed, something better must be given than it has had. With this feeling he presented his paper on solanin, which gives certain advantages that justify the physician in giving it a trial, at least.

Clinical Notes

DIRECT TRANSFUSION OF BLOOD IN THE TREATMENT OF HEMORRHAGE.

PRELIMINARY CLINICAL NOTE.

GEORGE CRILE, M.D.

CLEVELAND, OHIO.

During the past year a series of seventy-four carefully conducted experiments on the direct transfusion of blood in the treatment of hemorrhage in animals was made by Dr. Dolley and myself, and from these experiments the following conclusions were drawn:

Arteries and veins of varying sizes may be readily anastomosed by Carrel's method so as to be impervious to blood and free from clotting; the transference of blood from one animal to another is most definitely accomplished by anastomosing the proximal end of an artery of the donor into the proximal end of the vein of the donee; convenience need be the only consideration in the selection of the vessels to be anastomosed; the

blood of one animal may be rapidly transfused to another; the blood of one dog is isotonic with that of another dog; if a dog be bled to the last drop of blood that will flow, and then an equal amount of blood be transferred from another, the transfused blood suffers no impairment by the blood or tissue of its new host, and, in turn, it causes no impairment; no hemolysins are produced; and, finally, the transfused blood becomes a perfect substitute for the lost blood, and the factor of hemorrhage may be eliminated.

After having covered by experiments every conceivable phase that would have a clinical bearing, I concluded to make a clinical test in the first case that baffled all other forms of treatment, and in which the patient apparently must otherwise inevitably die. The opportunity was presented in a case of secondary hemorrhage following nephrolithiasis, the history of which is as follows:

CASE 1.—Male, 23 years old. Diagnosis, nephrolithiasis.

Operation.—Four large stones were removed from the pelvis of the kidney, where they had caused local infection and the formation of a vascular membrane about them. The wound formed in bisecting the kidney was packed with gauze. On opening the kidney there was considerable hemorrhage, but it was readily controlled then and after the operation.

Subsequent History.—On the fourth day oozing began to appear on the dressings, and there was also hematuria. This continued until the morning of the fifth day in spite of all the measures that could be employed against it, including packing, pressure, etc. By evening the condition of the patient had become alarming. The hemoglobin was reduced to 25, the red cells to 1,800,000, the pulse was 160 beats per minute and barely perceptible, the respirations 48 per minute and gasping, and the patient was unconscious. Treatment by posture, bandaging, saline infusions, stimulants, repacking, adrenalin chlorid solution, etc., was of no avail. It was clear that the terminal stage was at hand with all the resources at command exhausted. It seemed, therefore, a suitable case for transfusion, and one which would afford a crucial test of its value. A willing donor in the person of the patient's brother was at hand.

First Transfusion.—Under local anesthesia an anastomosis between the proximal end of the radial artery of the donor and the proximal end of the basilic vein of the donee was made, and the blood was allowed to flow steadily for 30 minutes. As a result the patient promptly came out of his unconscious state, the pulse and respiration fell, the blood pressure rose from 63 to 94 millimeters of mercury, the hemoglobin from 28 to 50 per cent., and the red cells from 1,800,000 to 2,900,000. In the donor the hemoglobin fell from 100 to 70 per cent. and the red cells from 5,500,000 to 4,600,000 per cubic millimeter.

The patient was then in such good condition that the original plan of doing a nephrectomy was followed, using ether as the anesthetic. The operation was well borne in spite of difficulties in removing the kidney, which will not be here mentioned.

The following morning the condition of the patient was unsatisfactory on account of decomposing blood clots filling the bladder. Under cocaine I then made a suprapubic cystotomy, washing out a large quantity of foul smelling urine, and removing quantities of infected blood clots. During the day following this there was total suppression of urine and marked uremia. This was overcome during the following night, and the next day he was better. Improvement continued for two weeks, when the larger part of the lumbar wound was healed. A severe cystitis continued. Then, without warning, a profuse hemorrhage set in from the bladder and continued for two days in spite of all treatment. The red cells again fell to 1,900,000 and the hemoglobin to 25 per cent. The pulse rose to 130, and his condition was critical.

Second Transfusion.—This time another brother served as

donor. The patient's condition immediately improved again, the red count reaching 3,000,000, and the hemoglobin 54 per cent. The granulations in the remainder of the lumbar wound had been pale and inactive, but the next day they were red and healthy. No further hemorrhage occurred, and from this time on the red count rose until it reached 4,800,000. He was discharged from the hospital as cured on the twenty-fifth day after the second transfusion. He has now resumed his work and shows 6,400,000 red cells.

Two patients with typhoid hemorrhages received transfusion, one was in extremis and the other one very low. Both were wonderfully revived by the transfusion. One was dying at the time, but became entirely conscious and rational and held his improvement until further hemorrhage proved fatal on the following day. The other patient survived further hemorrhages, but died later with a double parotitis and typhoid. Under similar circumstances I should suture the typhoid ulcers, as the patients after the transfusion were good surgical typhoid risks.

The fifth transfusion was for a secondary renal hemorrhage following nephrolithotomy. The patient was very poorly nourished and a poor risk. The hematuria continued for thirteen days, and finally his red count was reduced to 1,800,000, hemoglobin to 28 per cent., and he had been delirious for two days. We then performed transfusion in a similar manner to the preceding. As the fresh blood flowed into his vessels his delirium gradually lessened, and while on the table and during the transfusion entirely disappeared. The lumbar wounds healed, but an abdominal wound made for exploratory purposes, although resutured twice, never showed a sign of repair, finally ending in peritonitis and death. The blood count, without any further treatment, however, was maintained to the end.

The last case was that of a woman who had been bleeding from the bowels for four months, and during that time had been under medical treatment. Her secondary anemia was extreme; the hemoglobin was approximately 12 per cent., red cells 1,200,000. She was in such a low state that it was not safe even to anesthetize, and was brought in for the purpose of making a transfusion. The transformation in this case was extraordinary. The lemon-yellow color was replaced by white, then by pink, the lips became red, the blood count was more than doubled and the hemoglobin trebled. She felt invigorated and stimulated. All other treatment was withdrawn and her hemorrhage ceased. Three weeks later a little blood was noticed at stool. She was then anesthetized and thoroughly examined, when it was found there was marked varicosity in the rectum with some small ulcers. These were sutured over and the patient left the hospital at the end of six weeks with a red blood count of 4,000,000 and hemoglobin of 70. Before the transfusion she had no appetite and could scarcely be made to take nourishment. Directly after the transfusion she had a very vigorous appetite and gained rapidly in health and strength. Her red cells rose to 2,500,000 (more than doubled) and hemoglobin to 40.

We have complete tables of observations in each case on the red blood count, the hemoglobin, and the blood pressure of both the donor and donee, and records of urinary examinations in the donee, extending over a period of time. These tables will be included in the complete publication. Six clinical transfusions have been done. The donors in each instance regained the blood lost in from five to seven days. They had been

kept from their work only the day of the transfusion. All showed the usual temporary effect of the bleeding, no agglutinins, no hemolysins.

The donee showed neither nephritis nor hemoglobinuria, no laking of blood, and no evidence that the new blood had in any way unfavorably affected the donee, nor that the donee had unfavorably affected the newly transfused blood. In other words, the conclusions reached in the laboratory were wholly realized in the clinic.

The occurrence of spontaneous cessation of hemorrhage in two of the cases—each of which was pathologic—suggests strongly this method of treatment for cholemic, hemophilic and other forms of pathologic hemorrhage.

Since the healthy blood of one individual is apparently physiologically interchangeable with that of another, if the blood lost by one is replaced by an equal quantity from another, the factor of hemorrhage may by direct transfusion be eliminated.

The transformation in these cases has been unequalled in my surgical experience, except in the relief from asphyxia by intubation.

TWO ATYPICAL CASES OF SMALLPOX.

SAMUEL E. EARP, M.S., M.D.

Professor of Practice of Medicine, State College of Physicians and Surgeons; Consultant in Practice of Medicine, St. Vincent's Hospital and Protestant Deaconess' Hospital; Lecturer on Medicine and Dietetics, St. Vincent's Training School for Nurses, and Visiting Physician in Practice of Medicine, Indianapolis City Hospital.

INDIANAPOLIS.

CASE 1.—History.—On April 1, 1905, I saw J. H. at the Indianapolis City Hospital, who had been sent there on the previous day with (alleged) typhoid fever. There was no history of syphilis and the patient had had the infectious diseases of childhood. He had been vaccinated six years ago. The patient had been a moderate drinker of alcoholic stimulants. His present sickness commenced with a general malaise and occasional chilly sensations. There was no pain, appetite was good, bowels were constipated, and there was some slight fever.

Examination.—I found the skin dry, face slightly flushed, and a few papules which, in their incipency, a few days previous to admission to the hospital, had been designated as the rose-colored spots of typhoid fever. There was a slight elevation of temperature. Tongue was heavily coated, abdomen slightly tender, and palpation of the chest gave negative results. This was true in percussion also, except a dulness over the left lobe. Heart was regular and sounds were clear. On the second day, which was the first day I saw him, there were a few fine papules on the face which some had suggested might be aene vulgaris, since the patient had had this disease since childhood. There was an occasional papule on the chest and abdomen, but no indication of induration, unless it was an isolated one on the chest, which possibly gave the appearance of an incipient umbilication.

Diagnosis.—Dr. J. M. Wallace, the interne, and myself, made a provisional diagnosis of smallpox, although the evidence was not strong. The patient was quarantined. On the second day the spots on the chest, face and abdomen were more numerous, but with little induration. The temperature was normal. On the fourth day vesicles were well formed on the face and an occasional pustule. On the fifth day the disease was well developed, but very mild indeed, and one in which mistaken diagnosis could easily have been made.

Patient was discharged from the smallpox hospital April 21.

CASE 2.—History.—J. R., colored, aged 60 years, was admitted to the Indianapolis City Hospital, March 30, 1905, with

ascites, pulmonary edema and dyspnea as a result of myocarditis and chronic nephritis. The legs were edematous. The patient responded promptly to treatment and gave every evidence of having recovered April 1, with the exception of an occasional attack of dyspnea when doing chores at the hospital. These, however, were infrequent, and did not interfere with his duties as assistant. April 3, together with all patients, he was vaccinated on account of appearance of Case 1 in the ward, but it was unsuccessful.

Course of Disease.—April 17 he complained of not feeling well, seemed to talk irrationally, and had a subnormal temperature. April 18 I found the patient had left his bed and was sitting in a chair at a remote portion of the ward, with signs of collapse, pulse imperceptible. Following the hypodermic injection of digitalin and strychnia, his condition slightly improved. On the following day there was no change. April 20 my attention was called to a roughness on his forehead, and on close examination the same condition was present on the back, chest and abdomen. On the following day, on some portions of the body there were papules, others felt like bird-shot, and several pustules were on the abdomen and chest. In two locations on the abdomen several of the pustules seemed to coalesce and form a large one. At no time did the patient's temperature reach normal. The different stages were present on the same person and at the same time.

Diagnosis.—Diagnosis of smallpox was made, and although there was some little doubt in the case he was removed to the contagious pavilion. Three days the development of the eruption was sufficiently pathognomonic to confirm the provisional diagnosis. The case was seen by Drs. C. E. Ferguson, A. W. Brayton, Paul Martin and J. M. Wallace.

Some of the irregularities of the case will be recognized as follows: Pre-eruptive stage imperfect, absence of the gradual appearance of eruption, various stages of eruption at the same time, resembling varicella somewhat, the eruptions in some localities possessing the characteristic histologic formation, while in others the vesicles were inclined to be unilocular rather than multilocular, and the variation of temperature in the one case and subnormal in the other. The unusual features in these cases, especially in the last one, will be easily recognized, and, therefore, comment is unnecessary.

FATAL POISONING BY THE EXTERNAL APPLICATION OF BICHLORID OF MERCURY.

G. G. CRAIG, M.D.

ROCK ISLAND, ILL.

Patient.—I was called July 11, 1906, to see a young woman, aged 25, who had applied wood alcohol to her neck, back and left arm for rheumatism.

Examination.—She was hysterical, and said that the burning from the application was intolerable. The parts were very much reddened and inflamed, presenting the appearance of an ordinary scald or burn. I gave her a hypodermic injection of morphin and prescribed a local application of saturated solution of bicarbonate of soda. The next morning I was informed that the wood alcohol contained a large quantity of bichlorid of mercury.

Course of Treatment.—The patient passed an uncomfortable night. She complained of a burning sensation in her mouth, some vomiting, and a slight diarrhea. The back of the neck, the whole back down to the waist, and the left arm were thoroughly burned, and had become largely covered with blisters during the night. I treated the local injury as an ordinary burn, with a solution of bicarbonate of soda, punctured the edges of the blisters, preserved as much as possible the blistered skin for a dressing, and applied stearate of zinc. The burn improved nicely. She was nourished by white of egg and milk exclusively. The inflammation of the mouth, throat, stomach and bowels steadily increased and she died on the morning of July