

daily range 41, the mean variability was 2.6, the mean of the three consecutive warmest days was 93 and the mean of the three coldest days was 47, the maximum temperature for the month was 95 and the minimum 42 degrees. The lowest maximum was 65, and the highest minimum 66 degrees, the mean relative humidity was 28 per cent. The average hourly velocity of the wind was 5 miles. There was only a trace of precipitation. The percentage of possible sunshine was 83. No rainy days were noted.

For this month in the plateau the mean monthly maximum was 79.91, as against 83.8, the mean minimum was 49.2, as against 53.7, the monthly mean was 64.6, as against 68.8 on the plain. The relative humidity was 22 on the plateau and 28 on the plain. The wind velocity of the plateau was 12.6, against 5 on the plain.

Taking July for another comparison, we have a monthly mean on the plain of 91 F., the mean maximum 103.7 and the mean minimum 78.2, the mean daily range was 25.5, the greatest daily range was 32, the mean variability 2.7, the mean of the consecutive warmest days was 109 and the mean of the three consecutive coldest days 70, the maximum for the month was 112 and the minimum was 68. There were 31 days with maximum above 90, 29 days above 95, and 24 days above 100. The lowest maximum was 92 and the highest minimum 84 F. The mean relative humidity was 40 per cent. This is accounted for by the fact that July is the rainy month of this region. The average hourly wind velocity was 4.7. The total precipitation for the month was .87 inches. The percentage of possible sunshine was 78.

For the same month on the plateau the mean maximum temperature was 91.1, as against 103.7, the mean minimum was 68.9, the mean monthly temperature was 80. The relative humidity was 9 per cent. higher than on the plain. The rainfall was 2.89 inches, against .87. The velocity of the wind was 100 per cent. higher than the plain. The percentage of possible sunshine was about 15 per cent. lower on the plateau.

The month of October on the plain was as follows: Monthly mean 68.9, mean maximum 82.1, mean minimum 55.7, mean daily range was 26.7, the maximum temperature for the month was 96, and the minimum 40. The lowest maximum was 66 and the highest minimum was 72. The average hourly wind velocity was 4.3, the mean relative humidity was 40 per cent. The total precipitation was .3 inch. The percentage of possible sunshine was 78.

On the plateau the mean maximum temperature was 76.2, against 82.1, the mean minimum was 49.7, against 55.7, the monthly mean was 63, against 68.9. The humidity was .51, against 40 per cent. The velocity of the wind was 9.8, against 4.3. The percentage of possible sunshine was 66, against 78.

For the year the means were as follows: On the plain the mean monthly temperature 70, mean maximum 84, mean minimum 56. The total precipitation for the year was 5.19 inches. The mean relative humidity was 36. There were 245 absolutely clear days in the year, 86 partly cloudy, and 34 cloudy. The percentage of possible sunshine was 85. The average hourly velocity of the wind was 4.4 miles.

On the plateau the means were as follows: Mean monthly temperature 48.2, mean maximum 58.5, mean minimum 37.6. The total precipitation was 19.6 inches. The mean relative humidity was 52. There were 180 clear days, 149 partly cloudy, and 36 cloudy. The per-

centage of possible sunshine was 65. The average hourly velocity of the wind was 7.1.

Thus it is seen that Arizona presents a great diversity of climates within her own borders, varying from the subtropical to the almost perpetual snow on the peaks of the high mountains of the north. Yet there is a marked similarity in all portions in the essentials of a dry climate, namely, the low relative humidity and the high percentage of possible sunshine. No region in the United States, and perhaps in the world, equals or even approximates the southwestern plain of Arizona for the dryness of atmosphere, the days of sunshine and low velocity of the wind. As in all dry climates, there is a marked difference between shade and sunshine, day and night, but it is a difference which is regular and constant, and can be guarded against by the invalid, because it can be anticipated.

Furthermore, Arizona offers any altitude from sea-level to 13,000 feet, and she has mineral and thermal springs whose virtues are just beginning to attract attention. If a maximum of sunshine, a minimum of moisture, with the ability to live out of doors in any elevation desired, meets the requirements of the medical profession of America, Arizona presents claims which demand consideration.

PREVENTIVE TREATMENT OF MIGRAINE.*

E. W. MITCHELL, M.D.

Professor of Materia Medica and Therapeutics, Miami Medical College; Physician to Cincinnati Hospital.

CINCINNATI, OHIO.

The explanation of numerous diseased conditions on the theory of autointoxication has found ready acceptance because of its simplicity and because of much apparent evidence in its favor. This has been an especially welcome hypothesis to account for that obscure group of diseases known as the neuroses, for which all other theories have been so unsatisfactory. In this group it has been common to include migraine. Theoretical considerations, clinical observations and therapeutic results all point strongly in favor of such a hypothesis. But, however simple this theory seems in its statement, it in fact only throws the mystery a step further back. It is an explanation which needs explaining. It opens questions which involve the most complex problems of physiological chemistry. What are the toxic substances? Where and how are they formed? What organs are involved? These and many other questions have not yet been solved, and probably will not be for a long time. This is about the conclusion to which Ewald¹ comes in his recent elaborate review of the subject, which is the best summary of our present knowledge that has been published.

Bouchard's well-known work will remain one of great value, although all of his conclusions are not accepted, as will also the work of Alexander Haig on uric acid. How thoroughly the uric-acid theory has taken hold of the professional mind is evidenced in the frequency with which we find recurring in the medical literature of the past fifteen years the terms "lithemia," "uric-acid diathesis," "uricemia," etc.

As to migraine and similar disorders, Haig's results have been confirmed in so far as the increase of uric acid in the blood preceding the attacks is concerned, and as to the fact that preventing the increase of uric acid

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1. Berlin. klin. Wochens., Feb. 12 and 19, 1900.

usually prevents the attacks. However, it has never been accepted that uric acid alone was the noxious agent.

The discovery of ptomains and leucomains raised the presumption that some of these bodies, particularly the leucomains, might be the real causative agents, especially when it was found that the symptoms produced by the injection of these substances into animals closely resembled the symptoms of some of these diseases. As the leucomains may be supposed to fluctuate along with the uric acid in the metabolic changes of the body, we have in this supposition supplied exactly what has been wanting as a causal factor.

About 1895 I became interested in the investigations my fellow townsman, Dr. B. K. Rachford, was making along this line. He apparently demonstrated the presence of paraxanthin in excess in the urine following attacks of migraine and migrainous epilepsy.²

Not only did his experiments seem to be conclusive, but the results of treatment on the lines thus indicated seemed to confirm it. Unfortunately other experimenters have not been able to confirm Dr. Rachford's results. Dr. Pfaff,³ of Boston, has failed to find paraxanthin in the urine in such cases. Drs. Forcheimer and Stewart have apparently shown that the toxic properties of urine are due to bacteriological growth after it has passed, and that urine, either from a normal or migrainous subject, which is kept sterile is not toxic. These results throw considerable doubt on the reliability of Dr. Rachford's results, so that we must admit that however attractive and however probable, they are as yet not demonstrated.

To us, as therapists, the result of treatment is the main question, and here, as elsewhere, our therapy may be in advance of our pathology. Although I can not be sure of Dr. Rachford's pathology, I have had in cases of typical migraine great satisfaction in following his plan of preventive treatment as given in his various papers published in the *Medical News* and *Archives of Pediatrics*.

In its essentials this treatment, it is true, is not original. Since Haig's book appeared in 1892, I had, with fair success, followed his treatment of exclusion of meat diet, the administration of salicylates and other drugs which favor the elimination of uric acid; but my success has been much better in thoroughly carrying out the treatment of Dr. Rachford.

It must not be forgotten that, notwithstanding some form of leucomain poisoning may be the efficient cause, those concomitant causes which are enumerated in the text-books under etiology should not be neglected. Perhaps the most important of these is eye-strain. So frequently is this found that some writers have been inclined to make it the chief pathological factor.⁴

But the correction of ocular defects does not always cure without further treatment. Uterine and menstrual disorders must have appropriate attention. In children, adenoid growths should be removed. Vicious habits and hygienic sins must be corrected. Some of the French writers have ascribed an important rôle to dilatation of the stomach and proptosis of the abdominal organs in the production of sick headache. By favoring fermentation and absorption they may be predisposing causes when present. One such case has come under my care.

CASE 1.—Mrs. J. W., aged 41 years, widow, mother of two living children, of lithemic diathesis and with lithemic family history. General health is excellent; she has severe headaches recurring every ten or twelve days, accompanied by nausea and vomiting, with dizziness and flashes of light before the eyes. Pain is worst on right side, but radiates over whole head; has some fermentative dyspepsia with coated tongue, eructations, etc. Bowels constipated, urine somewhat scant and high colored. Has been subject to migraine nearly all her life. Physical examination negative, excepting relaxed abdominal walls with descent of stomach, lower margin of which is one inch below the umbilicus. An abdominal bandage was ordered; daily lavage was made for two weeks, then tube used only when symptoms of gastric fermentation returned or a headache threatened. Meat was excluded from the diet; the constipation corrected; lithia water given freely; exercise in open air ordered.

There was an immediate improvement, the headaches recurring only with some violation or neglect of instructions. Since the migraine had existed prior to a time that it was likely her proptosis began, for there was a distinct tendency to lithemia, it is not likely that the proptosis was more than a minor causal factor. My observations have convinced me that the essential in preventive treatment is the withdrawal of the red meats from the diet. At the beginning this is a hardship for many patients, but after a time they lose the craving for meat and very willingly avoid it. The hearty co-operation of the patient is essential for success. I am accustomed to say to such patients: "Your headaches are due to a constitutional tendency which can not be removed, but you may have your choice of suffering or being practically free from them by practicing self-denial and following certain rules." This plan of treatment is briefly as follows:

1. Red meats are to be rigidly excluded; fish, bacon, brains, sweet-breads and eggs are allowed. Rich and highly-spiced dishes are to be avoided. Coffee, tea and alcoholic beverages are to be excluded. Sweets should be reduced, but when meats are excluded a moderate amount is well borne. Water may be taken very freely. Meals to be taken at regular intervals and overloading of the stomach to be avoided.

2. As much outdoor exercise is to be taken as possible—undue fatigue to be avoided—rooms always should be well ventilated, both by day and night; and hot baths taken two or three times a week. In some cases the Turkish bath is beneficial; in some cases the morning cold sponge bath is directed.

3. The medicinal treatment aims to regulate the bowels, to promote intestinal antisepsis and to stimulate the liver, the great organ for completing the oxidation of the products of metabolism, and protecting the body from poisoning. The same end may be attained by various means. The various salicylates are all useful. In obstinate cases an occasional mercurial is required. I have had the best result in the long-continued use of some of the formulæ recommended by Dr. Rachford.⁵ The one most commonly used is as follows: sodii sulph. (crystals), 120 grains; sodii phosphat., 30 grains; sodii salicylat., 10 grains; tinct. nucis vom., 3 drops; aquæ dest., to make 4 ounces. This dose is to be taken before breakfast each morning and is best taken in a glass of seltzer, or still better the ingredients are made up in these proportions in large siphon bottles charged with carbonic acid. The proportions are variously modified in different cases. In my own case I have so far seen no benefit from the use of potassium permanganate, which Dr. Rachford frequently uses.

2. Trans. Assoc. of Amer. Physicians, 1895, Med. News, May, 1896.

3. Trans. Assoc. of Amer. Physicians, 1899.

4. E. C. Seguin, *Cyclopedia of the Diseases of Children*, iv, p. 832.

5. *Archives of Pediatrics*, Oct., 1897.

From a number of cases which have been kept free or nearly free from suffering for a long time I select the following:

CASE 2.—Mrs. C. E. S., aged 42, large and fleshy, of indolent habits, has been subject to sick headaches since puberty, general health is good. She came under treatment in April, 1898, at which time she was having an attack of typical migraine every two weeks, of great severity. After ruling out ocular defects and other sources of reflex disturbance she was put on the course of treatment above outlined. The above mixture in siphon she took each morning for several months, and still takes it for a few days or weeks if she becomes constipated or is threatened with a return of headache. The headaches disappeared almost immediately after beginning the treatment, and now recur very rarely and only when she breaks some of her rules.

CASE 3.—Robert S., aged 9 years. In early childhood, as nearly as his mother can recall, when between 2 and 3 years old, he began to have paroxysmal attacks of vomiting with severe headache and great prostration. He continued to have these attacks every two or three months with occasional milder attacks between. In the severe attacks he became unconscious, with head strongly retracted, with pupils contracted. On several occasions physicians who saw him believed that he was developing meningitis. All treatment had failed to do more than mitigate the attacks. He was very fond of meat, and it was quite a struggle for him to give it up. However, he very manfully submitted to the ordeal and was rewarded by almost complete relief for the past year and a half. He is allowed to have a little chicken occasionally. He now cares so little for butchers' meat that he does not eat it if placed before him. He has grown stronger and more robust. The oculist's report in this case was negative. He took a mixture of salicylate, phosphate and sulphate of soda before breakfast for one year, and still occasionally takes it.

In two other school children of about the same age I have had the same result, except that in one but little benefit was derived until errors of refraction had been corrected, and the third had constant relapses, from failure to follow the treatment, although quite free when closely adhering to it.

CASE 4.—Mrs. G. D., aged 37, has family history of gout and rheumatism, is subject to rheumatism and neuralgia, has severe headaches just preceding each menstrual period, with extreme nausea and vomiting. The pain is supraorbital and on the right side. She is also subject to headaches which are not migrainous in character. She has astigmatism and myopia. She has also had pelvic inflammation leaving retroversion and adhesions. As her reflex disturbances can not all be removed and as the pelvic conditions do not allow vigorous exercise the result of treatment has not been entirely successful in her case. However, her attacks have been so greatly mitigated in severity and diminished in frequency that she very gladly adheres to the main outlines of this plan of treatment and most of the time has a siphon of the saline mixture on hand.

These are but a few cases chosen to illustrate the general outline and general principles of treatment of a large class of people, many of whom had life made miserable by the constant recurrence of their attacks of sick headache.

DISCUSSION.

DR. HEINRICH'S STERN, New York City.—The medical men of this country should be thankful to Dr. Rachford, of Cincinnati, Ohio, for pointing out that paraxanthin, which is the urotheobromin of the older experimenters, is found in increased quantities in the urine of persons who have been subjected prior to the enlarged excretion of this substance to an epileptic attack. Migraine possesses an epileptiform character, and I have found, repeatedly, a greatly increased output of this dimethyl-xanthin body in the urine of patients habitually suffering from migraine. Paraxanthin melts at 295-296 C., and forms glistening plates often 4 mm. broad. It crystallizes occasionally in needle-form crystals. It is hardly soluble in cold

water. In hot alcohol it dissolves readily. Its solutions react neutral.

The methods employed by Bouchard in his experiments are irrational, imperfect and in a measure nonsensical. As I stated some years ago—Recent Studies in Urinology—there are mainly two objections to the experiments alluded to by Dr. Mitchell: 1. The direct introduction of the urine of man into the circulation of the rabbit. 2. The application of the phenomenon thus produced toward forming conclusions as to the autogenesis of certain diseases in man. The poisonousness of the renal secretion, I contend, may depend on certain elements which are not preformed in the blood, and which are transmitted into the urine from another source.

I am sorry that the time allowed for discussion does not permit of going at greater length into Bouchard's experimental fallacies and subsequent irrational conclusions. We American physicians have no business whatsoever to accept every new fad in medicine on account of its newness or because it is imported.

The red meat, chemically speaking, does not seem to differ materially from the white meats. The xanthin bodies are contained in the white meats in about the same quantities as in the red. Birds excrete enormous quantities of uric acid. This substance is contained in goodly quantities in the liver and muscles of geese, turkeys and other poultry. Most flesh of poultry is classified as "white meat," but it certainly contains all or nearly all these substances which we wish to keep out of the organism, when we prescribe a diet without "red meat."

DR. J. H. YARNALL, Washington, D. C., said that he has all his life been a great sufferer from migraine. His diet has consisted almost exclusively of red meats, never having eaten but one vegetable. He has at different times tried strict dieting, abstaining from meats and living on milk, eggs and dried bread without noting any difference in the frequency or severity of the attacks. The treatment that affords him the most relief is perfect rest; as soon as he notices the scintillating sparks appear before his eyes in the premonitory stage, he goes, if he can, into a darkened room and lies down, takes a small amount of whisky, and remains perfectly quiet; he generally gets over an attack in this way in an hour, but if the circumstances are such that he can not do this at once, the acute attack ensues with the most intense headache, the pain being of such a piercing character that he has had to take a small dose of morphia for relief. This treatment is only palliative, and has no effect in diminishing the frequency of the attacks. His experience has been that there is no distinct line of treatment that will suit all cases, but that each must be studied and treated on its own merits.

DR. A. L. BENEDICT, Buffalo, N. Y.—What is most needed in a discussion of this topic is an agreement as to what is meant by migraine. Oculists say that it is a headache due to eye-strain; some clinicians say that it is a gastric reflex; others go so far as to declare that it is essentially gouty. If asked just what they mean by "gouty migraine," they will answer that it depends on an intestinal indigestion. If we question further as to the nature of the failure of intestinal function, we meet with no satisfactory explanation. In some instances migraine seems to be the expression of a bacterial development in the lower bowel. In such cases great relief may be obtained from thorough flushing of the bowels, both by the rectum and through the mouth. In the use of colonic lavage, we must be careful to avoid the time of gastric digestion, for the reasons pointed out by Dr. Fenton B. Turek, of Chicago.

Many of these cases of so-called migraine are due to deficient secretion of hydrochloric acid, and are best treated by the administration of this acid. I wish to emphasize this point because so many physicians, relying on the sourness of which patients complain, fall into the error of considering the condition one of superacidity. In a sense, it is superacidity, but of an organic kind and best combated by hydrochloric acid, though alkalies will give immediate relief. I admit the possibility of migraine due to hyperchlorhydria, but, in my experience, this symptom is very rare in patients who have an excess of hydrochloric acidity.

Dietetic causes are certainly operative, but I believe that the essayist has too severely condemned sugar and candy. Most of us, at least in America, eat about three times as much meat as we should. I do not mean this as a general statement, but as one representing an actual, though approximate, arithmetic calculation. If we estimate the amount of proteid contained in bread-stuffs, vegetables, eggs and milk, we shall find a very small amount left to be provided in the form of meat. The ordinary serving of meat at a first-class restaurant is considerably more than should be taken in the course of an entire day. If we eat more than one meat or fish course, or if, as most of us do, we eat meat, hot or cold, fresh or preserved, at every meal, we exceed the normal ration at least twice. Now, with this excessive diet of proteid and of proteid rich in extractive, that is excrementitious, matters, if we take two or three pieces of candy and have a headache, the average layman, as well as the average physician, ignores the meat and lays the entire blame on the sugar. Very few of us are using muscles or wearing out our brains to such a degree as to need very much reparative material, and this is the sole physiologic function of proteid, although it may, in an emergency such as diabetes furnishes, be employed as a producer of heat and force. Sugar, on the other hand, is a valuable and concentrated fuel-food. All carbohydrates are digested into glucose before being of use to the body, and we have a special intestinal ferment to split into glucose, the three double hexoses, milk-sugar, maltose and cane-sugar. In many cases of migraine we find an excess of indican in the urine and an excessive virulence of the colon bacillus, due to the presence of an excess of undigested but rotting proteid. It certainly is a mistake to incriminate sugar and candy in such cases, though their excessive use may aggravate the essential condition.

DR. J. N. UPSHUR, Richmond, Va., wished to refer particularly to the use of red meat and the supposed lithemic cause of migraine. He thought, after reading Haig's book, that Haig has a hobby and rode it, booted and spurred, for all it was worth. The speaker had seen many cases of migraine, in which it would not apply, cases of headache from other causes beside digestive disturbance. Many of his patients presented symptoms of overwork of the nervous system, one of the first symptoms of breaking down in some of these was the failure of digestion, but not from any dietetic cause. There is probably in many of these an accumulation of uric acid in the emunctories of the body, as the result of disturbance incident to nerve strain. Like the gentleman from Washington, he had himself personally suffered from migraine, but in his case it was a condition of lithemia due to overwork. The attacks were associated with intense pain in the colon; requiring several weeks to break it off by careful treatment. Patients may suffer from migraine without committing any errors of diet, but as the direct result of overwork and nervous strain. There is a prominent member of the ASSOCIATION, a tireless worker, who, finding himself suffering with lithemia, followed out the plan of Haig, although he was the smallest eater of any man the speaker had ever seen. He did not need to be dieted, but did require a careful building-up treatment. The result of following out this plan of Haig's treatment in this case has been most unfortunate, and the distinguished patient is practically "laid on the shelf" in the midst of his usefulness. We do not yet know the pathology of gout and lithemia. The speaker noted a distinction between gout and lithemia. In a case of gout we have a history of a man who eats heartily and takes his bottle of Burgundy and goes to bed, feeling very contented with himself and the world, but wakes up at 2 o'clock in the morning, feeling as if a blacksmith had his toes in a vise. The next day he feels well and does it all over again. That is the result of indulgence in the pleasures of the table and is common in England. In this country, on the contrary, we make eating entirely a secondary consideration. A man here usually will only take twenty to thirty minutes for his meals, and really does not give enough attention to the subject. Personally he is a very small eater and cares little for food, but lives under constant strain and pressure, and from this overstrain of the nervous system he has a condition, from time to time, of something which he calls lithemia, although he does not know whether it is uric

acid or some other error of metabolism. In the treatment, however, some action must be had upon elimination, either by the kidneys or the liver, in order to overcome it; and until evidence is obtained of proper secretion of bile from the liver, all other remedies will be of no effect. You must use one of the mercurials and follow this up with phosphate of sodium, which is the best solvent of uric acid that we can have. He gives it in hot water several times a day, until full action is obtained and then he follows it up with salicylate of sodium. Some physicians prefer salol, which is the most infamous concoction that has ever been introduced. A man does not want to put into his stomach anything that, for several days after taking it, will make him feel as if he had a hornet's nest in his stomach, from the eructations of gas. The principal thing is to relieve the nerve-strain. What the condition needs is rest, not dieting but every patient must be treated according to his individual merits, by taking away the red meats in some cases, while others needing nourishment are allowed the red meats in moderate quantity with other food. In most cases, the best nourishment is plenty of fresh milk.

DR. J. M. ALLEN, Liberty, Mo., said he had noticed that in regard to migraine, or old-fashioned sick headache, it subsides if the patient lives to be 55 or 60 years of age. The pathology of migraine is unsettled. It commences with pain in the head and is followed by nausea. Is the nausea due to the headache, or is it due to reflex, or other causes? In some cases it is observed that the stomach is intensely acid, and the intensely acid fluid passes through the pylorus. When there is not enough alkali there to overcome this acid condition of the contents of the intestine, in order to produce the necessary digestive changes, the result is interference with metabolic processes. The next phenomenon noticed is an increased flow of urine. As a result of the faulty metabolism, we have some noxious substance present in the blood, and this is thrown off in a large flow of urine. Some say there is deficient action of the liver. If there is any way of discovering when the liver does not secrete bile, he would like to know it. The liver keeps right on secreting bile. When the stools are pale, it is because the biliary ducts are obstructed, and all chologogue remedies do harm. Moreover, the retained bile can not be the cause, for we know that just where biliousness should be expected in catarrhal jaundice, where there is no obstruction of the gall-ducts and the white stools, these symptoms are absent.

DR. E. H. BARTLEY, New York City, said that he would like to harmonize the various conflicting theories which had been mentioned with regard to the pathology of migraine. The accumulation of uric acid has been blamed by some; others hold that the digestive disorder is the principal factor, and others believe nervous disturbance to be at the bottom of the matter. Each view is partly right. There is impairment of digestive processes, but the nervous strain leads up to the digestive disturbance and the lithemia. The nervous strain is not the direct cause of the lithemia, but leads up to it. It must be remembered that Haig's method does not distinguish between uric acid and the xanthin bodies, so when Haig says uric acid, he means uric acid plus the xanthin group of bodies to which reference has been made by Dr. Stern. There is one point in diagnosis that is important. Where the nausea precedes the headache, it is usually a case of migraine due to stomach disorder, but where the headache comes on first it is likely to be one of nervous origin, often due to eye-strain. With regard to the cure of the patient, we can get the attacks to come a month or two months apart, or even at longer intervals, but in a patient with this tendency to migraine, he can not always expect to get entirely rid of the headaches, and he should be told this so as not to expect too much from the treatment.

DR. E. W. MITCHELL, in closing, said that in his paper he had spoken only of typical cases of migraine. In the discussion he had not heard anything to disprove the fact that the xanthin or alloxuric bodies are not present in the urine. While we may not accept the work of Haig to the full extent, yet it clears up the subject. It is quite probable that varying symptoms may depend on varying amounts of these partially changed bodies being carried over and not burned up. It is likely that the liver is the organ which has the function of

converting these bodies. So we come back to the former views as to biliousness and inactive liver, but we have a more scientific view as to what is meant and how the liver may be at fault. The essential point in the treatment is not one remedy, or single combination of remedies, but following out the plans of treatment indicated, which he had adopted with such success that he felt warranted in bringing it before the Section. In some cases, meats can be withdrawn and eggs substituted; he also recommended to his patients to use brown and particularly corn bread instead of white. In regard to the discussion about the red and the white meats, there is a difference independently of the question of the proteids. He considers the white meat more easily digestible. Where there is disturbance due to bacteria, it would be advisable not to use meat at all. In the laboratory we use meat broths for making cultures of virulent bacteria, and perhaps their use might favor such infection in the bowel.

CASES ILLUSTRATING VALUE OF RECTAL INJECTIONS OF SALT SOLUTION IN HEMORRHAGE AND THREATENED COLLAPSE

T. B. GREENLEY, M.D.

MEADOW LAWN, KY.

On Sept. 16, 1899, I was called to see a woman suffering from hemorrhage due to abortion, at the end of the second month. She was virtually in a state of collapse, being pulseless and very pallid. I gave, hypodermically, nitroglycerin and atropin, near the shoulder.

Then, as soon as I could have it prepared, I injected nearly a half-gallon of hot salt solution into the bowel and held it there by pressure on the anus for one-half hour; her pulse came up, and she resumed to some extent, her natural color. I then put her on turpentine and ergot every two hours.

There was no more hemorrhage. The entire ovum was expelled, and there being no placenta I did not, in her prostrated condition, examine for clots. I saw her the next day, and found her doing well, with no further hemorrhage.

CASE 2.—On the night of Nov. 3, 1899, I was hurriedly called to see Mrs. R. She was supposed to be in the third month of her pregnancy. She was flooding freely; a large pool of blood was on the floor, having passed through the bedding. She was nearly pulseless, her heart beating very feebly. I could feel a vibration of the radial artery, at the wrist. I used the same treatment in this case as in the first, and, in addition, washed out the womb with hot water, and removed the remaining clots with my fingers. She rallied in less than an hour, when the hemorrhage was completely arrested. I put her on turpentine and ergot, as in the first case.

CASE 3.—This was a neglected case of cholera infantum in a child of eight months. It had vomited and purged nearly three days when I saw it, and was nearly exhausted. The small vibration of pulse at the wrist could not be counted. It had kept food on its stomach only a few minutes at a time since it had been taken sick. It was very restless, and reached and cried for anything in a glass or cup, from intense thirst.

I injected about 1/40 grain of morphin with a minute portion of atropia, in its arm; as soon as I could have the salt solution prepared, I injected nearly a pint into the bowels, retaining it by pressure. In less than an

hour its pulse came up, and it became quiet. I then allowed a teaspoonful of milk every fifteen minutes. It ceased vomiting, and in a few days, under proper treatment, was restored to health.

It is astonishing with what rapidity the sigmoid flexure and colon can absorb fluids in conditions where the blood-vessels are virtually empty, as illustrated in the above cases. It seems to me that this would be a better, if not a quicker, mode of introducing salt solution into the system than by hypodermic injections, likewise less painful to the patient and less dangerous than transfusion. In cases of emergency, like those above related, it is essential to get the fluid into the circulation as quickly as possible; it can be done by enema much sooner than we can get ready to do it by either of the other modes.

Another advantage is that the sterilization of instruments is not necessary; no time is lost thereby. We require only a fountain syringe, and in its absence a common hand syringe will answer the purpose. The salt solution should be sufficiently warm, about 110 to 115 F., and of the strength of an ounce of sodium chlorid to the gallon of water.

In using the hypodermic injections, we have to be prepared with the proper size of needle, which should be sterilized before using. This operation should be only done by the physician. Transfusion is attended with more risk to the patient and should only be done by the most careful and painstaking physician, and in fact it would always be advisable, when this operation is performed to have consultation.

In cases of emergency, like those above related, we have not time to send for instruments or medical assistance. Therefore, we contend that the quickest and safest plan, in such cases, is the best.

Salt solution is not only used as the proper fluid to restore the lost volume of blood to the system, but is also regarded as an effective antiseptic.

DISCUSSION.

DR. J. M. ALLEN, Liberty, Mo., approved of the teaching of the paper, which was on a comparatively new subject. Not every physician is in a position to transfuse blood, but rectal injections of normal salt solution can be practiced by every one. The one great difficulty experienced is in getting the fluid to rise above the sigmoid flexure. His own plan has been to raise the hips of his patient by allowing him to lie across, and partly over, the bed, with his shoulders near the floor. By this expedient the injection is very easily introduced and retained. With the aid of ergot to constrict the tissues and strychnin to overcome the anemic condition of the brain, and the use of this method, he does not see that it is necessary to lose a single case of this character. Time is what is wanted, and only a short time, and this expedient keeps the patient up until the blood-vessels are again fully supplied with blood.

DR. J. TRACY MELVIN, Saguache, Colo.—In the treatment of cholera infantum, there is one fact which must impress itself on every practitioner, i. e., that the saline injection is the one remedy for the relief of genuine cholera infantum. There is generally too much time lost in trying other remedies. If the author of the paper can persuade other physicians to overcome the collapse not only of hemorrhage, but also of cholera infantum, by saline injections, he will render valuable service and save many lives.

DR. T. B. GREENLEY, in closing, said that the first time he used the normal salt solution this way was in a case of collapse following postpartum hemorrhage. It occurred to him that if he could by any means fill up the blood-vessels, he might overcome the collapse. He made the experiment of injecting the saline solution into the bowels; the patient soon afterward came out of the collapse and made a good recovery.

*Presented to the Section on Materia Medica, Pharmacy and Therapeutics, at the Fifty-first Annual Meeting of the American Medical Association, held at Atlantic City, N. J., June 5-8, 1900.