still the risk is slight. As regards the treatment of suspected injury to the spine it seems to me that the same rule which we adopt in cases of suspected fracture of the skull applies also to cases of spinal injury, namely, to expose the bone and to ascertain if there be a fracture.

In answer to Dr. Crile's question concerning loss of sensation to touch, heat, and pain, I would say that there was absolute loss of all three functions. As regards the reflexes, the loss of knee-jerks was absolute and apparently of the superficial reflexes as well. As regards the vasomotor disturbances I am not positive. Formerly I have been under the same impression that the loss of tendon reflexes combined with paralysis contra-indicated operation. I have been led, however, to doubt the accuracy of these contra-indications as I have seen quite a number of cases of injury to the cord which have recovered without operation, where in the first hour or two after the injury the reflexes were almost completely abolished or at least were very hard to discover, and yet in a few hours these reflexes gradually returned, and in one or two days became normal. In the case referred to by Dr. Crile the operation was performed very soon after the injury, and it is possible had it been delayed for say eight or ten hours the reflexes might have returned. They were certainly abolished apparently for several hours, and yet one can not argue but that at a later period they would not have returned.

DIABETES MELLITUS IN CHILDHOOD;

WITH REPORT OF A CASE.*

A. C. COTTON, M.D.

CHICAGO.

The following is the history of a case which was first presented at my clinic Feb. 1, 1901:

Ruth M., aged 6 years, 3 months. Family history negative as far as diabetes, gout, tuberculosis and syphilis are concerned. Weight at birth 7 pounds. Was a healthy, plump infant.

Previous illnesses: Summer complaint at 10 months; whooping cough at 2 years, with protracted convalescence, since which time she has had occasional attacks of croup. At 5 years, chicken-pox. At 5½ years measles, from which time—April, 1900—she began to show nervousness, irritability, variable appetite, disturbed sleep and progressive emaciation. In August, it was noticed that she drank enormous quantities of fluids, to which fact her mother attributed the polyuria.

She entered school the middle of September, but was taken out after a few days on account of nervousness and frequent micturition. A physician was called and the child was treated for "nervousness and weakness," without improvement.

Status praesens: (Feb. 1, 1901.) On presentation to the clinic, the patient appeared undersized; weight 32 pounds; weak, anemic, with dry skin, harsh hair and carious teeth. Tongue red and clean, although there has been habitual constipation. Lungs and heart negative. No enlargement of liver or spleen. Very restless and easily fatigued. Extremely sensitive to cold. Pupils normal and no disturbance of vision. Patellar reflex absent. Blood examination showed 3,580,000 reds, 12,000 white cells and hemoglobin 85 per cent., notwithstanding pallor of the skin. Examination of 24 hours' specimen of urine; amount 84 ozs.; reaction acid; specific gravity 1028; thick cloud of albumin, sugar present, one drop giving marked reaction to Haine's test; no casts.

She was put on diabetic diet and pancreatic extract, with sodium salts for relief of constipation. A daily observation was made of the urine, the result of which is appended in the following table.

During the following 5 weeks the quantity of urine passed daily varied from 40 to 104 ounces; the difference in specific gravity, obtained by fermentation test, ranged from 13 to 32, the sugar from 1 1-12 to 6 3-12 oz. or from 2.99 to 7.36 per cent.

*Read at the Fifty-second Annual Meeting of the American Medical Association, in the Section on Diseases of Children, and approved for publication by the Executive Committee of the Section: H. E. Tukey, Edwin Rosenthal and Samuel W. Kelley.

Although a grave prognosis was given, the parents were much encouraged by her temporary improvement in strength and weight. The regulation of her diet was but imperfectly observed, owing to parental indulgence, and at times the fluctuations in the urinary findings were coincident with lapses from dietary regimen.

On March 11, she contracted a cold from exposure and developed symptoms which a neighboring physician, summoned hastily, pronounced croup. I saw her the following day and found her with a subnormal temperature, rapid pulse and exaggerated breathing, with crowing inspiration, without cyanosis. There was slight delirium and restlessness, with intervals of partial coma, but no suppression of urine. The next day the crowing inspiration ceased, although the dyspnea became exaggerated. She developed the characteristic "dyspneic coma" in which she died March 14, 1901. No autopsy was allowed.

Date urine was passed.	Amount of urine in 24 hrs. Fl. oz.	Sp. Gr. before fermentation.	Sp. Gr. after fermentation.	Difference in Sp. Gr.	Amount of glucose in twenty-four hours.	
					Grains.	Fl. oz.
Feb. 3.	40	1028	1015	13	520	1 1 12
" 5.	40	1031	1010	21	840	1 3 4
" 6.	48	1031	1014	17	816	1 7 10
" 7.	64	1032	1008	24	1536	3 1 5
" 8.	48	1031	1009	22	1056	2 2 10
" 9.	48	1032	1010	22	1056	2 2 10
" 10.	80	1033	1008	30	2400	5
" 11.	48	1027	1010	17	816	1 7 10
" 12.	72	1031	1006	25	1800	3 3 4
" 13.	64	1035	1009	26	1664	3 7 15
" 15.	48	1032	1006	26	1248	2 3 5
" 16.	48	1030	1005	25	1200	2 1 2
" 17.	56	1036	1010	26	1456	3 29 120
" 18.	40	1034	1011	23	920	1 11 12
" 19.	72	1031	1002	29	2088	4 7 20
" 20.	72	1035	1008	32	2304	4 4 5
" 23.	80	1034	1002	32	2560	5 1 3
" 24.	104	1031	1002	29	3016	6 17 60
" 25.	96	1030	1014	16	1536	3 1 5
" 26.	64	1031	1010	21	1344	2 4 5
" 27.	88	1031	1011	20	1760	3 2 3
" 28.	80	1035	1015	20	1600	3 1 3
March 1.	64	1035	1015	20	1280	2 2 3
" 2.	80	1010	1010			
" 3.	56	1034	1016	18	1008	2 1 10
" 4.	64	1032	1012	20	1280	2 2 3
" 5.	64	1033	1015	18	1152	2 43 120
" 6.	56	1033	1015	18	1008	2 1 10
" 7.	56	1028	1014	14	784	1 19 30
" 8.	88	1031	1012	19	1672	3 29 60
" 9.	72	1032	1013	19	1368	2 51 60
" 10.	64	1036	1011	25	1600	3 1 3
" 11.	72	1031	1014	17	1224	2 11 20

How many physicians make the examination of the urine a part of the routine practice in the diagnosis of the disorders of childhood? The fact that analysis of urine is now recognized by the mass of the profession as an essential procedure in the examination of adults may help to explain the recent increase in the total number of diabetic patients reported. If this be true, it may not be unreasonable to urge that the well-known neglect to examine the urine of little patients may partially account for the seeming rarity of this disorder in young children.

The fatality of diabetes during the first decade of life should give to records of vital statistics significant value in estimating the prevalence of this disease in the very young. The essential objection to this method of determining its relative frequency lies in the fact above referred to, viz., the want of accuracy on the part of the attending physician in assigning the cause of death in his report to the registrar.

Most of our standard text-books agree in the statement that diabetes mellitus is rarely found in the extremes of life, but give no comparative figures.

Since vital statistics, as kept by our city health departments, seem to furnish the only information on this subject, the writer begs leave to quote from Dr. H. Stern's "Comments on the Official Records of Mortality from Diabetes Mellitus from the New York Health Department," and also from statistics from the Health

Department of Chicago, furnished through the courtesy of Assistant Commissioner, Dr. Reilly.

MORTALITY STATISTICS WITH REFERENCE TO DIABETES MELLITUS IN CHILDHOOD.

NEW YORK FOR 11 YEARS, 1889-1899.

Total number of deaths from diabetes mellitus.....	1867
Average per annum	168+
Deaths under 1 year	4
Average per annum	16/44
Deaths under 10 years	24
Average per annum	2 8/44
AGE. DEATHS. PERCENTAGE.	
Under 1 year.....	4 0.21+
Under 10 years	24 1.28

CHICAGO FOR 4 YEARS, 1897-1900.

Total number of deaths from diabetes mellitus.....	418
Average per annum	104½
Deaths under 1 year	3
Average per annum	33/44
Deaths under 10 years	15
Average per annum	3 33/44
AGE. DEATHS. PERCENTAGE.	
Under 1 year	3 0.71+
Under 10 years	15 3.58
Total deaths from all causes	95,046
Total deaths from all causes under 10 years	37,498
Average deaths from diabetes mellitus (all ages)	
to total deaths	0.44 per cent.
Average deaths from diabetes mellitus under 10	
years from diabetes mellitus	3.58 per cent.
Average deaths from diabetes mellitus in children	
under 10 years, to total deaths from all causes	
under 10 years	0.04 per cent.

ETIOLOGY.

Heredit.—That heredity plays a rôle in the predisposition to diabetes there seems to be little doubt, since its history or that of allied disorders, such as gout, tuberculosis and other diathetic disorders in the immediate or remote ancestry is found too frequently to be passed by as a mere coincidence. Thus, Frerichs notes hereditary influence in 10 per cent. of his cases. Seeger in 14 per cent., Bouchard in 25 per cent., as quoted by Von Noorden. Schmitz gives an analysis of 600 cases of diabetes in which 248 were hereditary. The late Dr. Purdy found heredity in 30 per cent. of his cases and states that he has seen diabetes appear in four generations. The same authority quotes Sir William Roberts, who speaks of a family of eight children, every one of whom became diabetic. Pavy mentions a family of seven, four of whom were diabetic. It is even claimed by some that diabetes may be congenital. In support of this, Ballantyne cites a case—reported by W. B. Bell—of glycosuria in an infant of 3 months with diabetic history. Ludwig, also, in 1895, refers to a case of a diabetic mother with saccharin hydramnion surrounding a dead fetus.

Somewhat closely allied to this form may be considered cases of congenital syphilis, in which diabetes may occur as an early complication. Such a case is reported by Lemonnier, in which the diabetes yielded after four months of anti-syphilitic treatment.

The term diabetes mellitus, like that of rheumatism, is employed to designate, not a single constant pathologic process, but probably a variety of deviations from the normal, in metabolism or in organic function. On this account it has been suggested that the name should be exchanged for one more expressive of the pathogenesis. In each instance the particular substitute would depend upon the favorite pathogenic theory of its advo-

cate, whatever that might be, whether alimentary, hepatogenic, pancreatic, neurogenic, bacteriologic, toxic, or plasmolytic. Even though a number of widely differing, separate disorders may be found to have been included clinically under one term, as was formerly the case in "Bright's disease," it still remains that diabetes mellitus expresses the common, most prominent, most pronounced and demonstrated clinical feature of this protean disorder.

Infectious Diseases.—It seems to the writer that the inclination of many to attribute to the infectious diseases of childhood a causal relation to diabetes is not based upon careful analysis of the evidence. Von Noorden, Herrick and others state that an attack of an infectious disease is frequently accompanied by a disappearance of sugar from the urine of diabetics. The same phenomenon has been observed during an attack of jaundice in a child, and Terrien seems to prove in his experiments that the existence of acute gastroenteritis in no way diminishes the glycolytic function. Hence it is argued that a pre-existing glycosuria, discovered through the closer observation during retarded convalescence, may be wrongly attributed to the acute infectious diseases.

Transient Glycosuria.—Many observers admit that any one of the exciting causes may act to produce a transient glycosuria and that the patient, recovering from the disturbance, may subsequently, even after a period of years, develop a serious diabetes.

Dr. Eugene Terrien, referred to above, has found, by injections of sterilized sugar solution into the circulation, that the glycogen storage capacity of the tissues is relatively high in infants. From this it might be inferred that transient glycosuria, at least as far as it is dependent on over-ingestion of carbohydrates, would be of less frequent occurrence in infants than in adults.

SYMPTOMS.

Since the obese type of diabetes is practically unknown in early childhood, an advanced case presents, briefly, a picture of extreme inanition, emaciation, muscular weakness, dry skin and hair, brittle nails, extreme irritability and sensitiveness to cold. The especial symptoms, polyphagia, polydipsia and polyuria are always present.

According to Comby, furunculosis and other skin lesions, common features in adult diabetes, rarely appear in children. This same authority attributes the rareness of the complicating albuminuria to the integrity of the kidneys and greater suppleness of the vascular system in early life. However, in the case cited above, albumin was almost constant while under my observation.

Of the nervous and ocular symptoms frequently associated with diabetes, such as symmetrical neuralgia, neuritis, motor, sensory, trophic or psychic disturbances, amblyopia, cataract, iritis or retinitis, none were observed in the patient whose history is given, with the exception of the diminished knee-jerk and occasional transient pain in the legs and epigastrium.

The disease in childhood is essentially acute. Reports of cases that survive more than a few months are rare.

TREATMENT.

So long as the etiology, and even the pathology, is involved in the obscurity which obtains at present no routine treatment applicable to even the majority of cases may be formulated. Of the many drugs and remedial agents that have found advocates, such as

opium, bromids, antipyrin, sodium salicylate, alkalies, etc., few, if any, have met with the approbation of more than a very limited number of clinicians. With perhaps the exception of opium, which seems to retard the progress of the disease, and alkalies to counteract the "acidosis" and impending coma, the benefits of drug therapy are admittedly restricted to rare, exceptional cases. Against the high rate of mortality from this disorder in childhood, the limited utility of opium affords but a modicum of encouragement as to help from medicaments. The prolongation of a life, with the establishment of the opium habit at its threshold, is not sufficient compensation.

At the present time the regulation of diet seems to be the most important therapeutic measure and by far the greater number of important improvements have been attributed to diet.

That the severe form is the one most frequently seen in early childhood is acknowledged, and the rapid course of the disease, rarely influenced by therapy, is the experience of all. The death certificate follows hard upon the diagnosis. If from this gloomy outlook concerning the prognosis in early childhood there be one ray of light it seems to the writer that, for the present at least, it must be sought along the lines of prophylaxis.

It is now believed that diabetes, if not an hereditary disease, at least develops along the lines of a somewhat positive diathesis. To the extent that the function of the family physician is supervisory over his patients, may he hope to avert such disorders by controlling their development through attention to hygiene, in order that the young, whose immediate or remote ancestry show diabetes, gout, tuberculosis, neuroses, or even syphilis, should be sedulously guarded. Dietary errors, such as ingestion of food beyond the child's capacity for absorption and assimilation, preponderance of saccharin substances, as sweetmeats, confections and pastries, must be carefully avoided.

That the elimination in these little patients is of the utmost importance receives additional significance when we consider that some observations emphasize autoinfection and reinfection as an etiologic factor. It is of interest in this connection to mention that injection of feces as well as the urine of diabetic patients in lower animals will reproduce glycosuria. A thorough care of the digestive tract, including the teeth, is all important. So, too, the care of the skin and respiratory organs, that elimination by the former and oxygenation through the latter may attain the highest possible perfection. Adenoids should receive attention, as well as other evidences of lymphadenitis and struma.

Especially should we protect these children from mental strain, shocks, frights, trauma and exposure to inclement weather, since cases are reported in which the development of glycosuria was preceded by such disturbance.

In a child thus carefully observed, diabetes may be anticipated by the appearance of pre-glycosuric signs, such as incontinence of urine, muscular debility, irritability, with progressive emaciation in spite of voracious appetite, even though a single test of the urine fail to reveal sugar. The importance of an early diagnosis is evident, for it is admitted that success in treatment bears an inverse ratio to the previous continuance of the disease.

The utmost care of the diet and hygiene is even more important in children than in adults, since a higher

ratio of metabolism is essential to growth in addition to repair. But the child will not bear radical dietary changes well. Hence, though so important, the reduction of carbohydrates should be gradual. The same may be said of the augmentation of fats, when indicated. Finally, too much stress can not be laid upon the importance of protecting the child from a sudden lowering of the temperature.

DISCUSSION.

Dr. C. F. WAHRER, Fort Madison, Iowa—When a school teacher, I had a peculiar pupil. He was a genius in spelling, but that was about all. He was finally apprenticed to a blacksmith. One day the boss sent him out to measure a wagon body, and the boy reported that its length was "8 feet 16 inches, and the length of the hammer handle, and so much," indicating a position on the hammer handle. This is about our position in regard to our knowledge of diabetes. I wish to speak in regard to a too emphatic treatment and dietary. Those who need the most enlightenment on this subject are, however, not the ones who come to these meetings, but those who stay at home and neglect even such simple measures as making analyses of urine. When young students in medicine we think we know something about diabetes. We have a few medicines which control the output of sugar in the urine, and perhaps also reduce the polyuria to some extent, but still we are unable to get at the root of things. Nearly all of these cases of diabetes mellitus die. I believe there are very few cases on record in which children under 10 years of age, suffering from true diabetes mellitus, recover. Why, then, take away from them the few things which they can eat and enjoy, and insist upon their eating things which it requires a strong stomach to digest. I do not condemn dietetic treatment by any means, but I object to the adoption of a routine treatment which may be more disastrous than the disease itself. Let us show mercy, and think carefully before we do things which are tyrannical or even cruel. I have a child who had scarlatina in connection with three of his brothers and sisters. The first child attacked was extremely ill, but the child I am thinking of was only moderately sick. All of these children made a very fair, and I may say, an uneventful recovery. This child was a boy who, with the exception of a tendency to obesity, was healthy in appearance. In the early part of August it was noticed that he often arose at night to go to the water closet. For a few weeks I paid no attention to this report, but then an analysis of the urine showed over 5 per cent. of sugar. I corresponded with many medical men, but received no more light than we have to-day. The case terminated fatally without any severe manifestations of the disease aside from those referable to the urine. Two weeks before death the boy enjoyed greatly a hunting trip, but he suddenly became very ill after it, and died after three days of diabetic coma.

Why diet and treat so radically that which we do not understand? Many who take no treatment whatever live just as long as others do. I do not want to disparage conservative treatment.

Dr. COTTON, in reply—Of course, there is much that might be said on this subject, for no doubt we have all had interesting individual experiences. I must say that I consider myself somewhat of a failure in the effort to arrest diabetes in children. The dietetic theories which have been advanced are quite confusing, but I am convinced of the importance of watching diabetic children.

The authorities quoted in the paper seem to me to show very clearly their belief in hereditary tendencies. Thus Purdy asserts that he is satisfied that he has found a hereditary element in fully 30 per cent. of cases. If the true function of the family physician ever comes to be fully realized, and he becomes medical supervisor of the family, he must take into consideration everything which shows a predisposition to diabetes. In this way it is not improbable that he may prove of great value in stopping diabetes before it has become thoroughly established.

There are pre-glycosuric indications which should not be disregarded. Then there are attacks of transient glycosuria which should always be regarded with suspicion, for there are cases on record in which diabetes mellitus has developed even months and years after the appearance of a transient glycosuria. Until the lay mind is educated to the point of appreciating the true relation of the physician to the family, namely, that of conservator and supervisor, we shall not be able to make ourselves very useful in such disorders as diabetes mellitus in young children.

ALBUMINURIA IN DISEASE OF THE KIDNEY IN INFANCY AND CHILDHOOD.*

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Diseases of the kidney in infancy and childhood are not so varied as in adults. They are chiefly active hyperemia and nephritis following the contagious diseases, especially scarlet fever. The acquired diseases of the kidney in childhood show considerable difference from adults, because acute affections, common to childhood, causing diseases of this organ, are seldom met with in after life. Under 15 years of age there is less likelihood to disorders of circulation than in later periods, and consequently under this age they are less likely to have chronic lesions of the kidneys.

Again, a child's kidney rapidly recovers from an injury. It is very rare to find a case of pyelonephritis, or hydronephrosis in children. But cachectic conditions lead to amyloid infiltration and this, in turn, to chronic albuminuria in children as well as in adults. Physiological albuminuria may occur at any period of infancy or childhood, but it is the most common between the ages of 5 and 15. The albumin is rarely present in the urine passed in the morning immediately on rising. Albumin alone being present, with an absence of blood corpuscles or other abnormal elements, indicates an absence of pathological changes.

While albumin in the urine does not, of necessity, indicate serious organic disturbances in the kidney, neither does it necessarily render the prognosis of a grave character, yet its presence, however slight, commands the utmost watchfulness and care before a decision is reached as to its being of no clinical significance. Albuminuria is the escape of serum-albumin and serum-globulin from the blood vessels into the renal tubes, and this escape of albumin indicates slight or grave nutritional disturbances. One is scarcely able, however, to certainly locate the site of these disturbances. For in each kidney it is estimated that there are about fifteen miles of tubing. This tubing is lined with basement membrane covered by epithelial cells of a variety of shapes and sizes. It is probable that the very shapes and sizes of the cells are accounted for, not by any peculiar function they each possess, but by the fact that they fill in the lumen of a tube that takes on the form, in quirk and curl, of almost every geometrical figure, from the capsule of Bowman to the excretory duct of Bellini. Yet it is thought that the columnar cells of the tubes of Henle select the urea, though this has not yet been certainly proved. While the tests for albumin and the use of the microscope will show disturb-

ances, somewhere along the tubal track, yet nothing will appear that absolutely locates the lesion.

CAUSES OF ACUTE AND CHRONIC NEPHRITIS.

The scheme given here has been of much use to myself in locating the first appearance of the trouble and in giving the causes. It seems to me that it covers the whole field, as follows: The nutritional disturbances lie in the epithelium lining of the glomeruli, the tufts of capillaries, and the uriniferous tubules.

1. Renal Congestion.—Active: chronic liver, heart, pregnancy; passive: tumors.

2. Definite Lesions of Kidney.—Toxemia, scarlet fever, gout, amyloid and fatty degeneration, renal supuration, renal tumors.

3. Indefinite Causes.—Scurvy, syphilis, medicinal poisoning, kidney, pregnancy of, epilepsy, tetanus, injuries to head, apoplexy, exophthalmic goiter.

4. Accidentals.—Pus: cystitis, pyelitis, urethritis; blood: pelvis, ureters, bladder.

5. Febrile.—Typhoid fever, smallpox, yellow fever, diphtheria, scarlet fever.

6. No Definite Lesions.—Functional, dietetic, intermittent, cyclic.

Albumin is found in the urine after a rich meal, heavy muscular exertion, intense emotion, or cold bathing. The cyclic variety bears upon life insurance. However, when every other constituent of the urine is normal, the case under careful management ordinarily recovers and the life insurance people sometimes accept the risk. I care not how little stress may be laid on the so-called functional albuminuria, the cyclic variety, or what not, undoubtedly some changes, though apparently trifling, do take place in the kidney somewhere. Fortunately, however, for the patient, these changes are non-progressive. But sooner or later, it may be after months or years have passed, grave lesions will show themselves, and insidious degeneration has been going on in the meantime. So for no other reason than that a certain relief may come to the mind of the physician, it becomes a necessity for him to determine, by differential diagnosis, whether he is dealing with a case of renal albuminuria or functional albuminuria.

I desire to report the case of a child, where the cause of the disease is somewhat uncertain. Early in March, I was called in consultation to see a little boy 4 years old, who in development would ordinarily be taken to be 7. He had a very large head, large body and large limbs. At the age of 12 months, I was told, he weighed forty pounds. The history of the boy is that he was never sick until the beginning of this illness. He never had the diseases common to children, such as scarlet fever, measles, whooping cough, etc. The preceding Christmas time, he seemed to be indisposed and it was observed that his eyes and face and lower extremities were edematous. A physician was called and treated him for a few days, when the child apparently recovered. Two or three weeks later he became sick again, with the same symptoms. An examination of the urine showed the presence of a large quantity of albumin.

When I saw the patient, the albumin was about two-thirds of the bulk of the urine. The specific gravity was 1040, the color dark, and the amount plentiful. The temperature was normal, eyes almost closed from the swelling, the face also very much enlarged, and the feet, ankles and lower extremities very edematous. The abdominal cavity was ascitic, the hands and arms were swollen, while the pulse was fair but showed consider-

* Read at the Fifty-second Annual Meeting of the American Medical Association, in the Section on Diseases of Children, and approved for publication by the Executive Committee of the Section: H. E. Tuley, Edwin Rosenthal and Samuel W. Kelley.