cheaper of physicians than automobiles and x-ray machines. Seriously, however, I have had two cases within three months of diffuse symmetrical scleroderma; one is passing into the atrophic stage, another is in the condition of elastic edema. Neither of the women can dress themselves; one is 28, the other 35. I do not know whether it would be worth while to refer these two distressing cases of symmetrical scleroderma to an x-ray therapist for treatment. I know many of them, according to Crocker and Stelwagon, get well spontaneously. There is also a case of xeroderma pigmentosa 12 years of age that I have had under observation from the time of her birth. Her sister, 28 years of age, died from the disease. She developed a sarcomatous tumor of the hand, which grew to the size of her head. If this little girl, who is now in the stage of tumor formation, can be helped by the x-ray, I would like to know of it. I also have a case of Darier's disease under observation which is far more extensive and distressing than the one reported by Dr. Lieberthal. If in these rare diseases the x-ray is of known curative power, I would be pleased to know it. I have also a case of blastomycetic dermatitis under observation which has had 65 applications of the x-ray without apparent benefit. I have readily cured four other cases by the cautery and by erasure. I think the x-ray has a very limited sphere in dermatology.

DR. C. W. ALLEN, New York City—In regard to the first cases I have had no personal experience, but I have had remarkably good results in the case of a young lady who has had lifelong ichthyosis, which is similar in character. In regard to xeroderma pigmentosa, I have had a patient under treatment for nearly three years. He has lost one eye; the cancer involving the globe, primarily the cornea, and his physician thought it better to enucleate the globe. Now the condition involves the opposite globe, and just for the present his family physician has put him in the hospital to try something new on the cancer of the opposite globe. The individual skin lesions will disappear. I have cured the man of at least fifteen cancers of the face, but others keep coming, although the ray in a measure keeps them down.

DR. BRAYTON—They will drop off of themselves, or you can take them off with your fingers or a spoon, as large as a walnut. How do you know that the x-ray has anything to do with this clearing off that is common in xeroderma pigmentosa?

DR. ALLEN—My personal impression is that the ray does something that the nature of the affection would not account for in the disappearance of the cancerous lesions. My assistant, Dr. Stern, is treating a subject of Darier's disease in his uptown dispensary, and he tells me he is getting very marked results and that his patient is getting well.

DR. L. DUNCAN BULKLEY, New York City—I reported a case of Darier's disease affected very favorably by the x-ray. The patient had been in the hospital for six months and was bed-ridden for several months. The disease on the feet was completely cleared up, though it remained about the margin of the hair and on the wrists, which places were not thus treated.

THE CUTANEOUS MANIFESTATIONS IN DIABETES INSIPIDUS.

REPORTS OF THREE CASES.*

ALEMBERT W. BRAYTON, M.S., M.D.

Professor of Clinical Dermatology, Syphilology and Clinical Medicine in the Medical College of Indiana; Vice-President of the College; Ex-President of the Indiana State Medical Society; Editor of the Indiana Medical Journal, etc.
INDIANAPOLIS.

Diabetes insipidus is a chronic disease characterized by the passage of large quantities of normal urine of low specific gravity. It should be distinguished from the polyuria of hysteria and chronic interstitial nephritis.

* Read at the Fifty-fifth Annual Session of the American Medical Association, in the Section on Cutaneous Medicine and Surgery, and approved for publication by the Executive Committee: Drs. H. W. Stelwagon, J. A. Fordyce and H. G. Anthony.

and also from the diuresis in connection with meningitis and tumors at the base of the brain.

Since Willis, in 1674, distinguished between the saccharine and the non-saccharine form of diabetes, it has been known that a low specific gravity and the absence of sugar readily separates diabetes insipidus from diabetes mellitus. The hysterical form of polyuria sometimes closely simulates diabetes insipidus, but its transitory nature, taken with its other protean but characteristic symptoms, renders the diagnosis comparatively simple.

Diabetes insipidus is a rare affection of unknown nature, and with no constant anatomic symptoms. As to its rarity, Dr. Osler states that but three cases occurred in twelve years out of a total of 329,000 patients treated in the Johns Hopkins Hospital and dispensary up to 1901, the date of the last edition of his work on "Practice of Medicine." Dr. Fletcher of Baltimore, however, reported seven cases in the medical wards of Johns Hopkins, or one in each 50,000 patients, in a paper on this disease read before the May meeting of the Association of American Physicians at Washington the present year.

The occurrence of the disease in youth is shown by the fact that in the 85 cases collected from the literature by Strauss, 36 cases were between 10 and 25 years of age.

As to causation, the consensus of opinion is that the disease results from a vasomotor disturbance of the renal vessels, due to local irritation resulting from various causes. In the secondary or symptomatic form, these vasomotor irritants may be aortic aneurism, abdominal tumors or tubercular peritonitis. Diabetes of either form is especially apt to occur where there is disease of the medulla, as was first illustrated experimentally by Bernard's famous discovery that certain injuries of the floor of the fourth ventricle in rabbits produced an abundant, pale and sugary urine. Probably the majority of the cases originate in lesions of the base of the brain, notably the lesions due to syphilis, as is shown in the fact that four of the Johns Hopkins cases had suffered from syphilis, and that the seven cases seen by Dr. Tyson in consultation were ameliorated by iodid of potash. Cerebral syphilis is not infrequently attended by polyuria and polydipsia.

Dr. A. Jacobi, discussing Dr. Fletcher's paper, thought most cases of the insipid form occur in young children seen in family practice; the diabetes followed cholera, anemia or whooping cough. He had seen cases in boys of 7 to 14, from falls on the occiput; these may have been due to tumors resulting from the fall. Some of Dr. Jacobi's cases were no doubt secondary or symptomatic, rather than primary or "idiopathic," as we say of those chronic cases having no discoverable nervous origin. Fright, injury, sunstroke, debauchery and malnutrition may precede diabetes insipidus.

Heredity plays a part, as is shown by Weil's cases. Of 91 members in four generations, 23 had persistent polyuria without any deterioration in health. Trousseau stated that the parents of children with diabetes insipidus frequently had glycosuria or albuminuria.

Diabetes insipidus presents some striking analogies with diabetes mellitus in both etiology and symptomatology, and still more by the fact that the one disease sometimes merges into the other. We know that in the diagnosis of diabetes mellitus we must keep in mind the symptomatic condition known as glycosuria, which is a more or less temporary phenomenon, occurring under the most varied conditions.

There is always sugar in the blood. Under many conditions, as an excess of glucose in the food, or functional disease of the liver, the blood becomes overloaded, sugar is excreted by the kidneys, and we have transient glycosuria, a very different condition from true diabetes mellitus, and which need not necessarily interfere with after good health or with life insurance.

There is a similar distinction between diabetes insipidus and polyuria. The ingestion of large amounts of beer or water; diseases of the medulla or cerebellum, chronic hydrocephalus and hysteria may all increase the flow of urine, but this increase is symptomatic and transitory, and is not the chronic, rare disease here considered.

Diabetes insipidus is a much milder disease than diabetes mellitus. The notable symptoms of diabetes mellitus, such as muscular weakness, rapid emaciation in the young, uncontrollable thirst, excessive hunger and loss of sexual power are not observed in the insipid form.

Nor is the non-saccharine diabetes followed by the notable complications which lead us to seek for sugar in the urine. Boils and carbuncles suggest diabetes mellitus, and the disease is frequently the background for pruritus and chronic eczema. Diabetic gangrene of the extremities is a common occurrence in the course of this disease. Balanitis in the male, eczema of the scrotum, troublesome and intractable pruritus pudendi of the female, due to the decomposition of saccharine urine, are among the cutaneous incidents of diabetes mellitus. On the contrary, the skin manifestations of diabetes insipidus are of minor importance, and yet may be the cause for which the patient seeks relief.

Such was the case with the second patient noted in this report. He came to me because of a general but mild pruritus. Questioned as to his urine, I found that he was drinking water inordinately at night and passing several quarts of water between retiring and rising. This was of specific gravity 1003 to 1005. He does not perspire enough to wilt his linen in hot weather, or when subjected to extreme muscular effort. The same is true of the third case who, from boyhood, has had an excessive thirst, has passed much urine, and has always an abnormally dry skin. And my first case, affected from his 50th to his 90th year, did not sensibly perspire and had more or less general pruritus.

The pneumonia and lung gangrene of saccharine diabetes; the nervous symptoms, such as coma, neuritis and symptoms of locomotor ataxia, have not been recorded in the complications of diabetes insipidus.

Indeed, when we compare the effects of the two diseases, the disparity of symptoms and complications is great, and all in favor of diabetes insipidus. Both present mysterious problems, the solution of which has not been discovered postmortem, though the histopathology and chemistry have been studied industriously and faithfully. It is not, at this time, possible to go into the theoretical discussion of the nature of diabetes of either form. Each is a pathologic entity, related in large part to affections of the nervous system. Both are very chronic diseases; one is very common and very fatal; the other is rare, and not infrequently overlooked both by the patient and the clinician.

In diabetes insipidus the dryness of the skin, the absence of sensible perspiration and the pruritus may lead the patient to the dermatologist; the thirst, the large quantity of urine passed, the inconvenience of water drinking and the frequent demands to empty the bladder may lead the patient to consult his family physician. He may pass from 20 to 40 pints of urine daily of a

specific gravity of 1000 to 1005, but containing the normal amount and variety of soluble ingredients.

The patient may be well nourished and healthy and with ordinary appetite, or he may even have an enormous appetite, as is the frequent condition in diabetes mellitus. Such was the case of one of Trousseau's patients who inspired such terror in the keeper of one of those Parisian eating houses, where as much bread was allowed without extra charge as each patron wanted, that he gave this victim of diabetes insipidus money to prevent him coming back to dine. The tolerance for alcohol has in some cases been as marked as in cases of diabetes mellitus.

When a patient comes to us complaining of dry mouth and scanty saliva, with a harsh and irritable skin, with a generalized pruritus intensified at night, and also complains of night thirst, we may find on examination of his urine that it is of low specific gravity and great quantity, and that he is not suffering from diabetes mellitus, but from the much rarer and more innocent, but not less chronic disease, diabetes insipidus.

The future course of such a patient will depend largely on the nature of his primary trouble. If organic disease is the cause, whether of the nervous system or of the circulatory or abdominal organs, sooner or later we may expect to find the patient's health giving way, with increasing emaciation and loss of strength, but if the case is of the idiopathic type, we may assure him that it is comparatively inconsequential, for this affection has been known to continue half a century, and death to result from intercurrent disease or even from senile exhaustion.

Such was the history of one of my three cases—an old physician whom I had under observation for fifteen years, and who died after his 90th birthday. He often assured me that the same conditions had maintained in his case since he left the practice of medicine over forty years before—ingestion of abnormal quantities of water, the passage of abundant urine of low specific gravity, a dry, harsh skin and mouth, with more or less of pruritus and discomfort, and all these symptoms increased at night as compared with the day. And yet he worked a half day in his garden for over forty years, and remained a teacher in the employ of the state until his 87th year, passing into a most beautiful and painless senescence, and to the last with so even a balance of functions that when he passed away I could find no organ or system to accuse of failure more than another; and for once, the much-abused phrase, "senile exhaustion," which we give as a death return in cases of diagnostic disability, was written in the confidence that no better term could be devised or employed.

My second case is that of a man of 50 past, who for two years has suffered from diabetes insipidus with great thirst intensified at night; and at night the pruritus from which he suffers is also intensified. Otherwise he is apparently well. He gives no history of syphilis; his life has been exemplary; his labor severe and exacting. But following the success of Dr. Tyson with iodid of potassium in his seven cases, I shall offer him the chances of this treatment.

Our authors assure us that the treatment by drugs is, on the whole, unsatisfactory. Opium, codein and ergot have been recommended; also the preparations of valerian, the latter, on the whole, having the preference of the therapists. We are advised not to forbid the patient to assuage his imperative thirst, even if that were possible. The skin should be well cared for by baths and

frictions, and the general health and vigor promoted by nourishing food, outdoor life and the avoidance of worry.

The third case of diabetes insipidus under my observation I have known as a patient for some fifteen years. As a boy of 12 he was afflicted with alopecia areata of the scalp, including also the eyelashes and eyebrows. These attacks were recurrent for some eight or ten years, but have ceased, and his hair is now normal. He has been a great drinker of water, and has passed more water than the normal, as he says "ever since he can remember." He now fills an ordinary chamber vessel every night, passing more proportionally in the night than during the working hours. His skin is dry; he does not perspire under the hottest Cuban sun; his mouth and throat are dry. This is in part due to the excessive use of Cuban cigarettes and cigars. He has a pruritus intensified at night, as is the usual case with this affection from whatever cause produced. His urine is never above 1005; the solid ingredients are normal for his weight, diet and exercise. His habits are sedentary; his business is clerical. I find no other disease or aberrancy. Like the other two cases, the heart is rapid—always about 90 beats to the minute. His appetite is somewhat excessive; his digestion fairly good, except when exhausted by unusual office labor and the depression of a southern climate.

In no one of these cases has there been apprehension, despondency, abnormal introspection or impairment of sexual capacity. They collectively illustrate the benignancy of a pathologic condition rare in occurrence, of unknown nature, and without discoverable organic lesions, or constant morbid anatomy, but undoubtedly connected with changes in the central nerve axis, the sympathetic nervous ganglion, or of the afferent or efferent nerves—most probably a vasomotor ataxia.

The condition may be far more frequent than the scanty statistics indicate, as the symptoms presented, namely, thirst, polyuria and dryness of the skin with pruritus, may not be sufficient to lead the sufferers to seek medical advice; or when they do seek such advice for the resulting manifestations the consultant may, if negligent in examining the urine as an essential step in his routine of diagnosis, overlook the cause and so fail to find the background of diabetes insipidus.

The reports of these three cases may be of value in relating some case of pruritus to the overexcreting function of the kidneys, even if the consultant is unable to determine the cause of this extreme exercise of their normal function.

330 Newton Claypool Building.

THE PHYSIOLOGY OF THE MIDDLE EAR.*

J. HOLINGER, M.D.

CHICAGO.

The scope of this paper embraces the following parts: 1, the drum cavity; 2, the attic; 3, the aditus ad antrum; 4, the mastoid antrum; 5, the mastoid cells; 6, the eustachian tube.

The function of the eustachian tube is, first, to ventilate the middle ear, and secondly, to drain the secretions from the middle ear into the nasopharynx. So far as the function is concerned, the tube seems to be the best known of all the parts of the middle ear, yet there is controversy whether the tube drains secretions,

since in postmortems it is always found empty. Only two years ago Dr. Lindt in Bern inserted an instrument similar to a cystoscope into the nose of a patient, and with it he could see and demonstrate and photograph the secretions emanating from the orifice of the tube, either as a thin thread of mucus or as masses of large bubbles.

The mastoid cells, the mastoid antrum and the aditus ad antrum belong anatomically and functionally together, and may, therefore, be treated as one. They are totally absent in the new-born. They develop during childhood, and have not even reached their full extent at puberty. This may be taken as evidence that these are not essential parts for the function of the ear. The opposite is known to be the fact with the ossicles and the labyrinth. They have reached their full form and size at birth, and do not change. The total volume of the antrum and cells is small during childhood compared with the adult, and it is reasonable to suppose that there may be a relation of cause and effect between this and the enormous frequency of inflammations of the middle ear during childhood. The aditus ad antrum and the antrum, together with the cells, act as a reserve air tank for the middle ear. The air is normally renewed only at intervals by swallowing or blowing the nose, etc., which explains the necessity of the reserve tank. Clinical observations support this view. In several patients, with the highest degree of retraction of the drumhead, air could be inflated into the middle ear by very low pressure, and the membrane brought to its normal position. After a very short time, a few minutes only, the retraction was as bad as ever. In all these cases I found on palpation an extremely small mastoid process, which contained few and small cells, as I had a chance to see in one case which had to be operated on. The tube was patulous, and still the air did not pass because the volume of the cells was too small to create sufficient negative pressure, and the retracted drumhead filled the drum cavity.

The function of these parts of the middle ear being explained, the attic and the drum cavity will occupy more time. They contain the drumhead and the ossicles, mallet, incus and stirrup with their muscles, the tensor tympani and the stapedius. It might be very interesting to study the mechanism and function of each of these parts, but such is not the purpose of this paper. We consider them as a whole, and call them the middle-ear apparatus. The theories of Helmholtz on its function are well known and widely accepted. Still there are serious objections, of which we mention only two: We find many ears where suppurations of the middle ear have left large holes in the drumhead. Nevertheless, the hearing for whisper is often very little impaired. A lady from Colorado whom I examined had no trace of the membranes left in either ear, and the handle of the mallet hung free into the cavum tympani. She heard a whisper at a distance of 12 mm., and would have heard it farther had we been able to procure a larger room. More than that, otologists sometimes remove the ossicles, the mallet and incus and even the stirrup in order to improve the hearing.

Another very well-put objection is this: If the ossicles serve to conduct the sound, why have they joints? Why are they not ankylosed as in whales or a single columella as in crocodiles and birds? A straight rod will certainly conduct anything—heat, electricity or sound—much better than a chain. This and many other considerations have led some authors to look for other explanations of the function of the middle ear.

* Read at the Fifty-fifth Annual Session of the American Medical Association, in the Section on Pathology and Physiology, and approved for publication by the Executive Committee: Drs. V. C. Vaughan, Frank B. Wynn and Joseph McFarland.