

Some recent advances in the treatment of glycosuria and diabetes / by O. Rozenraad.

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Publication/Creation

London : John Bale, Sons & Danielsson, 1908.

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THE LANCET

THE JOURNAL OF THE MEDICAL GRADUATES COLLEGE LONDON

EDITED BY C. O. HAWTHORNE, M.D.

No. 12.

DECEMBER, 1908.

Vol. 12.

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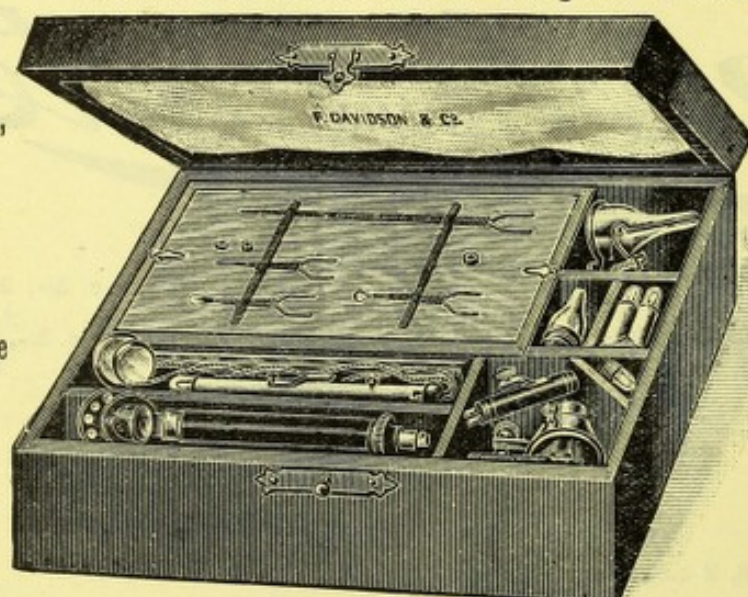
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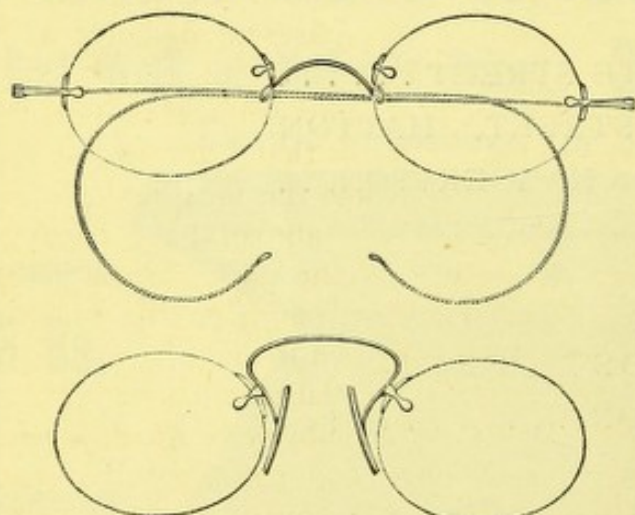
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EDITED BY C. O. HAWTHORNE, M.D.

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DECEMBER, 1908.

VOL. 12.

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SOME RECENT ADVANCES IN THE TREATMENT OF GLYCOSURIA AND DIABETES.¹

BY DR. O. ROZENRAAD,
Bad Homburg.

GENTLEMEN,—I must first thank you for the honour which you have conferred upon me by inviting me to deliver this lecture, the more so that this honour is conferred upon a medical man who has not come from your ranks, but has had his medical career and training abroad, in Germany and Vienna.

During the past two years, when I have been doing post-graduate work, I have had the opportunity to be in Vienna with Professor von Noorden, whose research work on diabetes and glycosuria began when he was in Frankfort-on-Main, and I treated, when in Vienna, about 150 cases of diabetes at his private sanatorium.

In choosing for my subject to-day Diabetes, I am conscious that I am dealing with a subject upon which the most eminent men of this country and abroad have tried "to throw a light into the dark corners of this branch of medicine," and yet the causes of diabetes are unknown to us.

The etiology of diabetes has been for the past fifty years the subject of much interesting physiological and pathological research work. After the discovery of the piqure by Claude Bernard much importance was given to this experiment, and the cause of diabetes was brought in relation to an affection of the nervous system. A very important fact to know is that traumatic neurosis causes

¹ Lecture given at the Medical Graduates' College and Polyclinic on November 13, 1908.

glycosuria; this fact is important to insurance companies, as no insurance company likes to take a policy on the life of a person suffering from glycosuria.

Diabetes is a disease in which continually glycosuria and hyperglycæmia are produced—this is the notion of the disease in Germany; the difference between diabetes and glycosuria is not recognized in that country, as it is believed that glycosuria will change into diabetes, and that diabetes has its own characteristic forms of disease. In the etiology two important views are maintained in addition to the theory which attributes the disease to the nervous system. I refer to the theory put forward by Lépine and Kauffmann, that a diastatic ferment in the blood prevents the production of glycosuria. If glycosuria is produced there is a lack of the diastatic ferment, and in dogs and cats which were diabetic the extirpation of the pancreas caused the diastatic ferment to decrease within twenty-four hours. Messrs. Lépine and Kauffmann have come to the conclusion, therefore, that the diastatic ferment of the blood is identical with the ferment of the pancreas, but it is not increased or decreased in proportion to the amount of glycosuria produced.

Probably the liver, which is known to contain glycogen, is unable to assimilate the carbohydrates into glycogen, and grape sugar is produced. Now, this grape sugar circulates in the blood and reaches the muscular cells. As the muscles cannot assimilate grape sugar for their function, but only glycogen, an order is sent from the muscles to the liver to send them glycogen, but as the liver is unable to produce glycogen, more grape sugar is sent to the muscles—a *circulus vitiosus*. This is von Noorden's theory; a fact is that glycogen, even grape sugar, introduced intravenously is better assimilated than when given *per os*. This is corroborated by the fact that chronic gastric troubles, especially duodenal catarrh, seem to have an effect on the etiology of diabetes, yet the extirpation of the duodenum carried out on dogs does not cause diabetes.

Of course, this is a theory which does not answer all questions. I am now coming to the third theory, which was put forward a few years ago by von Mehring and Minkowski, that the extirpation of the pancreatic gland caused diabetes. Great enthusiasm was felt in the scientific world, and the cause of diabetes seemed to be proved; but, as experiments were carried on, the enthusiasm was rather lowered when it was found that in some cases where chronic diabetes had existed, and the patient had died, no pathological condition of the pancreas whatever had existed. Physiologists have replied to this that there may be physical changes without pathological conditions noticed in the *post-mortem*.

Further, sometimes a tumour at the head of the pancreas was found, and yet no symptoms of diabetes had occurred. Even in necrosis of the pancreas, when the part which adheres to the duodenum was still existent, no diabetes occurred.

Then we have the bacteriologists' view, who protest that diabetes is due to a bacterium. It is quite natural in an age when every disease has been attributed to bacteria that glycosuria or diabetes should have its special bacterium. Some, in fact, have found in the urine a species of microbe, but it is difficult to explain why a disease which is marked by metabolic changes should be affected by a microbe.

Even the recognized fact that wife and husband sometimes suffer from glycosuria only seems to prove that as both have lived under the same conditions the influence of the surroundings has caused diabetes. (Arterio-sclerosis has certainly a relation to the diabetic condition.)

Taking these various views on the etiology of diabetes, it seems as if the etiology is not due to one organ only, but that different causes and various pathological conditions of the blood-vessels of the nervous system, of the liver, the muscular system, the pancreas, are all in close relation to each other in causing these metabolic changes.

It is a fact that diabetes is on the increase.

Statistics have shown an increase in the United States :—

1860, per 100,000	...	...	1'2
1870	"	...	2'1
1880	"	...	2'8
1890	"	...	5'5
1900	"	...	9'3

Perhaps this is due to the " strenuous life " in America.

In Paris per 100,000	...	...	14
In Vienna	"	...	4
In Prussia	"	...	2

In England and Wales :—

1900 per 100,000	...	...	8'6
1903	"	...	8'5
1907	"	...	9'7

These statistics are more exact than they were thirty years ago, when often consumption and diabetes were confused. Besides, people are more careful in having chemical examinations made ; " that little bit of sugar," as they say, of course does no harm, but the danger lies in diabetic complications, neur-osis, muscular pain, atrophy of the optic nerve, and so forth.

Very often there is general depression of the mind, which is sometimes so irritating to the rest of the world ; and to such an extent sometimes that I have known prominent men who had to give up their positions, as they were unable to keep the necessary self-control.

It seems also that with the depression of mind a certain peevishness is associated, a tendency to exaggerate or to minimize things, and not sufficient will-power to resist the " forbidden fruits " ; in fact, the patient does not die of his disease, but of his character. The French physicians have even gone so far as to describe a mental condition due to diabetes, which they call " diabète mentale," but their views have not been acknowledged in other countries, and the mental condition is due merely to the chronic intoxication through sugar.

It is advisable where cases of diabetes are known in the family that chemical examinations of the urine of the junior members of

the family should be made. The prognosis is known to be a very bad one with juveniles. With adults diabetes may last for fifteen to twenty years without causing serious symptoms. Perhaps there is a difference between a diabetic case in a young person and in an elderly person ; possibly the first is more due to a weakness of the nervous system, whereas the latter is more due to a pancreatic affection.

Now the difficulty in the treatment of diabetes lies in the fact that we do not know exactly where the basis of the treatment lies. As I previously said, the etiology of diabetes is unknown, so it is difficult to attempt more than a symptomatic treatment ; yet within the last few years strides have been made to place the treatment of diabetes exactly on metabolic and caloric values.

It is known that for every kilo of weight of a person 40 calories are necessary. We know that—

1 grm. fat	...	...	= 9'3 calories.
1 „ albumen	...	...	= 4'1 „
1 „ carbohydrates	...	...	= 4'3 „

From this we can make a balance and ascertain the number of calories demanded, from 2,600 to 3,000, according to the patient's weight.

It is desirable to allow the patient plenty of food, and not to put him on a starvation diet, as was done in days gone by ; and although the oxidation of the cells is lowered, the amount a diabetic patient can consume is sometimes surprising. It must be said, though, that the human organism is no machine, and that even an exact balance based on the principles of metabolism and nitrogenous equilibrium is sometimes found to be erroneous or misleading.

Treatment.

I think that the principles of diet are the only ones on which a diabetic patient can be treated. Codein and opium are the only remedies successfully applied. All others fail in the long run ; even jambul, derived from an Indian plant, which seems to be very effective

in the East, does not seem to have any effect in curing diabetes in our northern climate. Neither is thyreodin, an extract from the thyroid gland, of marked effect. A few years ago thyreodin seemed to be the remedy for every disease, but the enthusiasm about it has been markedly lowered, as observations have given the impression that when a toxin is introduced there is a strain upon the organism in the endeavour to neutralize it:

Neither is pancreon an effective remedy against diabetes; not even the most ardent believers in the etiology of diabetes through pancreatic conditions can pretend that pancreon is more than a remedy against gastric troubles—for instance, where fatty stools are produced through deficiency of the pancreatic gland.

Mineral spas, like Carlsbad, Neuenahr, Vichy, and Contréxeville, on the Continent, have the reputation of being very effective with diabetics. They certainly are effective where diabetes is connected with gout or obesity, and the large amount of carbonates and bicarbonates seems to reduce the amount of sugar if the case is not too far advanced. If it is an advanced case, they do more harm than good, for often diabetes is associated with Bright's disease, and then it is most disastrous for any affection of the kidneys. If anæmia and arterio-sclerosis are connected with diabetes, spas like Homburg and Kissingen can be more recommended. Homburg, which is situated in the height of a forest, is especially beneficial for a diabetic, as the patients have there to do more exercises and usually find benefit from the pure air and the forest trees, which give out so much oxygen.

The arterio-sclerosis can equally be treated there by carbonic acid baths, based on the Nauheim principles.

Treatment in a Sanatorium.

Within the last few years it has been found very useful in Germany to send a diabetic patient to a sanatorium or home. As in cases of tuberculosis and of nervous diseases, a diabetic patient will be relieved in a sanatorium from the wear and tear of life, from

the worries of his family and home; and in a sanatorium, where he is under constant medical supervision, the medical man has an easier task to arrange his diet according to modern dietary principles and to influence the mental condition, which is always a little disturbed in a diabetic patient. To diet a patient properly is the sole object in the treatment of glycosuria. It is not sufficient to give a patient a few rules on diet when he comes to your office, his diet wants constant supervision for several days, for it is surprising how often mistakes are made even amongst the well-educated classes.

The principles on which the diet was carried out were as follows: For the first two days the patient was kept on the diet to which he was accustomed, in order to ascertain the amount of sugar produced; then for two or three days on a diet which Dr. von Noorden calls the "standard diet," and in which 100 grm. wheat bread are allowed. Now if the sugar increased on a diet of 100 grm. wheat bread, we knew we had to deal with a severe case of glycosuria; if the sugar did not increase, or practically disappeared, on the two following days 150 grm. of bread were given; if these were tolerated by the organism without an increase of sugar 200 grm. of wheat bread were allowed.

To give a patient more than 200 grm. of wheat bread might produce a sugar reaction, even with a healthy person. We notice this in cases where men have taken champagne, and the next morning sugar is produced. These are the cases of "alimentary glycosuria." If the patient cannot stand 100 grm. wheat bread, the amount is reduced to 75 grm. *per diem* or left out entirely. If there are still signs of glycosuria, we have to deal with a very severe case of glycosuria, for manifestly the patient produces grape sugar even from albumen or fat. The prognosis in such cases is serious, and it demands great art to give the patient a certain amount of carbohydrates so that the sugar does not increase. *To withdraw for any length of time all carbohydrates* proves very disastrous to the patient,

for after a few days he will find the diet not suitable to his taste, signs of indigestion will occur, which may be the first symptoms of commencing coma. It is indeed very much better to allow the patient from 50 grm. to 75 grm. of wheat bread, and to introduce each week a day in which he receives nothing but vegetables and eggs. On such a day, naturally the amount of sugar will go down, sometimes even to zero, and the patient will find much comfort through this "vegetable day." To compensate for the amount of carbohydrates which we withdraw by albumen, and even more so by fat, is the line of treatment to be followed out.

It is more essential to increase the amount of fat than to increase the amount of albumen, for it is not proved that fat produces acetone, though acetone is sometimes produced from albuminous substances. On this point scientific researches have not been carried out sufficiently to make possible any full statement whether it is the albumen or fat which produces the acetone. It is, however, a fact that when acetone has once been produced, the allowance of a certain amount of carbohydrates will relieve the patient from acetone.

This is very essential to know, as a patient sometimes falls into the hands of a quack, who allows him potatoes. The patient feels perfectly well when taking these, and as the signs of sugar seem to disappear he laughs at all former advice given by his medical man.

The notion of this has led to a very interesting discovery, made by Professor von Noorden a few years ago by giving a patient a certain amount of oatmeal. His first observations were as follows: He had a patient suffering from severe glycosuria, and at the same time suffering from gastric troubles. As the patient did not take any food properly, it was thought best to give him some oatmeal with cream, disregarding the presence of glycosuria. Strange to say, under the oatmeal treatment the gastric troubles not only became better, but the glycosuria diminished.

Observations were continued, and it was noticed that in cases of glycosuria where there is a certain amount of acetone produced, the acetone is reduced when one day of carbohydrates, like oatmeal, is given.

Dr. von Noorden gives on his oatmeal days 250 grm. of oatmeal, 300 grm. of butter, 100 grm. of protein, and seven to eight eggs. He has even introduced a series of days: Two days standard diet, without bread; two days vegetables, with eggs only; three days oatmeal, 250 grm., with 200 grm. of butter, six to eight eggs, with some Burgundy or light Moselle; two vegetable days, and then a return to the standard diet.

It is not too much to say that in almost all cases the amount of sugar, which in days of standard diet, perhaps, was 1 per cent. or 2 per cent., was reduced to 1 per cent. and very often to a mere trace, and even after the return to the standard diet no sugar was produced. The principal thing was an increase in weight of the patient, who felt better and seemed to have greatly improved under these oatmeal days. Surely it is more essential that a diabetic patient puts on 1 lb. of flesh than that his sugar be reduced.

I remember the case of an American lady, aged 70, who came over from Chicago to Vienna. She was practically given up by the American doctors, and she arrived in Vienna in almost a comatose stage. She benefited greatly under this oatmeal treatment, and after a three months course had gained 8 lb. and was able to return to the country of the "Star-Spangled Banner."

May I relate an individual case in illustration of the general lines on which the treatment was carried out. The patient was a boy, aged 14, who was suffering from severe diabetes. In 1906 the chemical examinations had given 10 per cent. of sugar; in 1907 it was through dieting reduced to 9 per cent., the ferric chloride reaction being strongly positive. He came to the sanatorium, being practically given up by the local doctors.

He underwent the oatmeal treatment. During the first three days he received the

standard diet, with 75 to 50 gm. of wheat bread, the amount of sugar being 6.2 per cent. = 96.1 gm.; acetone, 1.7 gm.; nitrogen, 11.2 gm.; ammonia, 1.5 gm. On the third day of a standard diet it was 4.1 per cent. = 41.0 gm.; acetone, 2.5 gm.; nitrogen, 11.4 gm.—ferric chloride reaction remaining strongly positive.

After two vegetable days there were only traces of sugar to be found by Nylander's test, the acetone still being high, namely, 2.2 gm.; nitrogen, 4.5 gm.; ammonia, 1.3 gm.

On the first oatmeal day the sugar was 1.0 per cent., acetone being lowered to 1.9 gm.; nitrogen, 4.6 gm.; ammonia, 1.3 gm.; uric acid, 0.6 gm.

On the third oatmeal day there was practically no sugar, and acetone was lowered to 0.8 gm.

After two vegetable days the sugar remained at zero, the perchloride reaction still positive. The boy's weight was 39.3 kilos. when he entered the sanatorium, 39.5 kilos. when he left.

I saw the boy weeks afterwards, and the family could not say too much in praise of the "wonderful cure."

I wish to say that these oatmeal days do not seem to agree with some cases. It seems that persons generally above the age of 55 cannot stand these oatmeal days—certainly young people benefit by it. It is difficult to give an explanation of this—perhaps the pancreas is more or less affected in people above the age of 55.

It is also difficult to give an explanation why these oatmeal days agree with diabetic patients. It does seem a paradox that the very substance which, when given together with meat produces an increase of sugar, should reduce the acetone when it is given alone. The theory of fermentation which was put forward by Dr. von Noorden does not seem to give sufficient explanation. Possibly a glycosuric patient demands for a certain time in his circulation a certain amount of glycogen, which reaches the muscular cells through the circulation, and the blood con-

taining such glycogen affords the possibility to the muscular cell to absorb the amount of glycogen necessary for the vitality of the cell.

It is known that when physical exercise is ordered, a large amount of carbohydrates is used and that the sugar diminishes. I think we ought to recommend to every diabetic patient a certain amount of physical exercise, but walking is not sufficient. Riding on horseback, rowing, fencing, boxing, or anything of a like nature will answer the purpose.

Diabetic patients very often complain of pain in the back or arm. Often these are the first symptoms which bring the patient to ask medical advice. Under a proper diet this pain generally disappears. Against this muscular pain I found it very useful to use the electric baths of Schnée, of Carlsbad.

May I speak a few words more of the "standard diet" I mentioned? At 8 a.m. 200 c.c. coffee or tea, two tablespoonfuls of thick cream (I wish to lay stress upon cream, and not milk, as the latter contains lactose and increases the sugar); to this 150 gm. meat with plenty of butter, 50 gm. of wheat bread. At 10 o'clock a cup of bouillon or a glass of Burgundy and two eggs. At 1 o'clock plenty of meat of any kind, 200 to 250 gm. vegetables, such as spinach, cauliflower, asparagus, with plenty of butter, 50 gm. cheese with plenty of butter, one glass Moselle or Burgundy, 50 gm. wheat bread. At 5 o'clock a plain cup of tea. At 7 o'clock cold meat or beefsteak; 100 gm. salad with oil, some eggs, one glass Moselle or Burgundy.

You will see from this that the principal meal is during the daytime, and that surely the patient is not underfed. He receives 100 gm. wheat bread, and butter and meat are given in such quantities as he can take. To substitute a kind of bread containing no starch for wheat bread has been the great object for many years. Callard, of Regent Street, London, and Rademann, of Frankfurt-on-Main, manufacture various kinds of bread containing very little starch.

It would be going too far to enumerate all these breads. One or two preparations,

however, I found very useful, viz., Callard's gluten bread, and also Rademann's luft brot; the latter is especially useful for persons travelling, as they can take a quantity in a hat-box or other receptacle, where it remains in good condition for several weeks; the luft brot has the further advantage that a good deal of butter can be taken with it.

Aleuronet has also been found to be very useful, but I think that it is better, when making out a patient's diet, to allow him a certain amount of wheat bread, say 75 grm., and substituting for the rest an equivalent to bread, such as potatoes, oatmeal, fruit, milk, rice, sago, or any other farinaceous food. Very good also are American grape-fruits, bananas, particularly for persons from the Colonies. A certain amount of bicarbonate of sodium in the morning or a mineral water is prophylactic to the formation of acetone bodies; to give medicine is only necessary where there are certain indications for it, and one can even do without opium or codein.

To give an exact list of the various foods allowed or not allowed would be too much for such a short lecture as this, where I can only indicate the general lines on which the treatment of diabetic patients has to be carried out.

On Diabetic Coma and Formation of Acetone.

It is known that in every case of glycosuria which has lasted for some time acetone is produced, a fact which can be ascertained by the perchloride reaction, and if such reaction be positive, an exact calculation of the quantity of acetone through Meissinger's test can be made.

I wish to recommend, in all cases in which the perchloride action is positive, that Meissinger's test be made. It occurs often that the amount of sugar does not seem to increase, but the acetone goes up without our knowledge.

In fact, it is the amount of acetone produced which must regulate the diet. In protracted cases where acetone exists, aceto-acetic acid is produced, and in more advanced cases beta-oxybutyric acid is produced. This acid is supposed to produce coma.

We find that acetone is produced in inanition, typhoid fever, obstinate constipation, maternal cases, and so forth, but all these cases bear no relation to glycosuria; there is therefore some indication that acetone is due to some disarrangement of the intestinal tract or some gastric trouble. We know that gastric troubles are the first symptoms of a comatose stage in cases of diabetes; combined with this is a feeling of unrest, fatigue, for which we have no explanation. This stage often comes so suddenly that no grave symptoms have occurred before.

Patients who have travelled long distances arrive fatigued at their destination, say Carlsbad, and then suddenly go off into a comatose stage. The diagnosis of a comatose stage due to glycosurial intoxication is sometimes difficult to distinguish from the diagnosis of an alcoholic intoxication.

What are we to do in a case of diabetic coma? In the first place we have to see that the gastric troubles disappear, then to stimulate the heart by some alcohol—whisky or champagne. Champagne will be found especially useful, as it is well absorbed by the mucous membrane of the stomach, and we can also put a large amount of bicarbonate of sodium into it. We must not be economical with these doses; every two hours 8 grm. to 10 grm. may be given, but not more than 50 grm. per day, and this not longer than for two days. This bicarbonate is supposed to neutralize the acidity of the blood, and under it the urine becomes alkaline. Next to this we give lævulose, which is very useful. There are various ways of giving this; by the rectum is most efficient, next comes intravenous injection. The diet is a liquid diet, milk, bouillon, or oatmeal.

In the comatose stage the knee-jerks as well as the pupillary reflex disappear. If the comatose stage is not overcome within two days, the patient generally dies.

Gentlemen, these are the outlines of treatment for a diabetic. To ascertain the patient's toleration for bread, to allow him sufficient carbohydrates, and not to under-feed him are the principal points in the

treatment. A diabetic is sometimes mentally not quite normal, and to treat this demands the personal qualifications of the medical man.

HAND-LIST OF THE PORTRAITS ILLUSTRATING SYPHILITIC SYMPTOMS AND CONDITIONS.

NOW EXHIBITED IN THE CLINICAL
MUSEUM OF THE POLYCLINIC,
CHENIES STREET.

BY SIR JONATHAN HUTCHINSON, LL.D.,
F.R.S.

THIS collection (which is still receiving additions) already comprises nearly 400 subjects. They have been collected from various sources. The numbers given in the following list refer to the frames in which the drawings are placed, and not to individual portraits, several of which are often placed in one frame. Where the word *original* is applied it means that the portrait was taken in water-colours under my own supervision. Most of them are by Burgess, a few by Miss Green.

The portraits are arranged on the walls and on detached stands in the floor of the large museum, and occupy the whole of it. Almost all the exhibits are conspicuously numbered, and in many instances descriptive details are appended. The nature of the subject-matter does not permit of any very precise classification, but a certain amount of grouping has been attempted, as will be shown in the following hand-list.

Taken as a whole, I confidently believe that this collection will supply to the student of syphilis unique opportunities for an easy recapitulation of his knowledge, and that it will, in some instances, give novel suggestions which may prove valuable.

Our indebtedness to Chotzen's valuable Atlas must be especially acknowledged. The plates are accompanied by notes of the cases, which render it a mine of important facts in reference to syphilis. The publishers of this work have kindly placed an additional copy of it at my disposal for

my collection, and I have acknowledged with many thanks a similar courtesy at the hands of the editors and publishers of the new "System of Syphilis."

Amongst other works from which numerous plates have been taken are the chromos from the St. Louis Hospital, published by Rebman and edited by Pringle; Kaposi's Hand-Atlas; and "Syphilis," by Cooper and Cotterell. I must ask the indulgence of some to whom the collection has been indebted if the name of the author is not always affixed, as it has not always been easy to assign it correctly.

The collection, being (if I may use such terms) both national and international, is of much value, as enabling us to judge of the exact meanings attached by various authorities to the names which they employ. Thus the observer, looking through our long series illustrating primary sores and named "chancre," "ulcus molle," "ulcus elevatum," or "simple sores," will find that absence of specific induration or sclerosis is almost the only feature in which they agree. Unless I much mistake, he will be quite unable to pick out any one sore which deserves to rank as in any special sense the type of a "soft chancre." He will see that not infrequently the adjectives used are applicable to the stage rather than to any permanent feature of the sore.

Amongst other matters of interest illustrated in the collection I may mention that a number of drawings show that multiplicity is not always to be ascribed to auto-inoculation, and further that auto-inoculation may often attend sores which are those of true syphilis.

A very instructive group illustrates "herpetic chancres," in which great multiplicity occurs, but is always present from the first.

DIVISION I.—INDURATED PRIMARY SORES.

Group I.—Erratic or Misplaced Chancres; Non-Venereal Chancres.

No. 1.—Original portrait of young woman with very large, deep, hard-edged chancre near the chin.