An attempt to ascertain the nature and treatment of diabetes : a probationary essay, respectfully presented to the Faculty of Physicians and Surgeons of Glasgow / by Wm. Macdonald.

respectfully offered to the
Rev.d Thos Menzies - M. A.
with the authors Compl.ts

AN ATTEMPT

TO

ASCERTAIN THE NATURE AND TREATMENT

OF

DIABETES:

A PROBATIONARY ESSAY, RESPECTFULLY PRESENTED TO THE FACULTY OF PHYSICIANS AND SURGEONS OF GLASGOW.

BY WM. MACDONALD, M.A.

PHYSICIAN, ETC.

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TO

JOHN SPEIRS, Esq., M. D.,

President of the Medical and Chirurgical Association of Greenock, &c.

Sir,

Allow me, in this public manner, to bear testimony to the talents and virtues which have deservedly raised you to the head of the profession in this place, and which would have assuredly secured to you the same honourable distinction in any quarter in which providence might have cast your lot.

If the present Essay had received every improvement of which it is susceptible, I do not know any person more deserving than you are to receive this humble mark of my esteem and my regard.

It is my warmest wish, Sir, that you may long enjoy every bliss, and be enabled to diffuse happiness as widely as possible by your eminent talents, and the practice of those virtues by which you are so distinguished.

I have the honour to be, Sir,
Your much obliged and faithful humble Servant,
THE AUTHOR.

GLEBE OF GREENOCK,
2d May, 1832.

ESSAY ON DIABETES.

THE investigation of nature is delightful in the extreme. It is strange, but true, that the same round of phenomena occur without intermission. As in the moral world, during every era, we find the same characters appearing, modified indeed by education and circumstances; so, in the medical world, it is probable that the same distempers are incessantly appearing, although adventitious events alter their type. History, which Cicero calls the "light of truth," and the "directress of life," clearly demonstrates, by an endless number of examples, that from the beginning of the world men have been actuated by the same motives, and animated by the same principles; that some find the chief good in heaping up riches, others in dissipating what has been accumulated through a long line of ancestry: the occupations of the camp alike are sought and shunned by some:—

> "Multos castra juvant, et lituo tubæ
> Permixtus sonitus, bellaque matribus
> Detestata."

Some find their delight in deeds of persecution, as if we had not enough of evil and to spare. The votaries

of fame in science and literature are, in this age, as in those that are past, both numerous and successful.

Now, in each of these cases we do not hesitate to assert, that it is judgment, with a conception of good, which directs every individual to his favourite pursuit; and it is judgment too, which truly or falsely indicates to each, a perception of differences in one's mental or bodily powers, and thus gives a bias to a particular avocation.

No less transporting than certain is the reality, that our best interest and true pleasures are inseparable. We cannot err in obtaining both, if we follow that which experience has shown to be most useful. Hence it would appear, that the maximum of prudence consists in turning to good account the fleet moments of life as they pass, and thus the course of an individual is commenced in a way which will at least be advantageous in after life. His plans are early laid, and, if he does not arrive at eminence, he assuredly will attain respectability of acquirement. Fickleness of mind never fails to lead to disappointment.

For my own part, however slowly I follow it, my pleasure lies in the attentive study, and conscientious discharge, of my professional duties, as well as in the pleasing hope that I may be enabled to do so to the day of my decease. Almost from the commencement of my pupilage, I have been ambitious to associate myself with the highly respectable body constituting the Faculty of Physicians and Surgeons of Glasgow. It is generally known that it is imperative on every

candidate for admission to its privileges, to write and print an Essay in addition to the requisite examination. This is my excuse for writing at this time.

I acknowledge, indeed, that this subject has received my most serious deliberation; yet it is not without some misgivings that I respectfully submit the following observations to my medical friends: and in doing so, I fondly trust that my inexperience may not expose me to the imputation of presumption, in attempting to give some account of what appears to me useful in the disease known under the name Diabetes.

It was my good fortune to witness this distemper in eleven men, while I was studying my profession in the distinguished Universities of Glasgow and Edinburgh. I took particular notes of each case, and can bear testimony to the excellence evinced by my able teachers in the treatment of this disease. It may not be amiss to mention, that the name of the disorder is taken from a word similar in sound to the English term of the complaint; which word, ἡ Διαβητης, is used for a tube or syphon. The derivation is simply referred to διὰ, a Greek preposition, *through;* and the verb βαινω, *to go;* and as in this disease the quantity of urine made is much greater than in the sound state, we hence perceive the propriety of the term Diabetes.

There are two kinds of this disease. In the first, the quantity of urine is morbidly increased; in the second, it is sweetish to the taste, besides being morbidly increased in quantity as well as greater in density. It is this latter kind to which these observations especially refer.

Fortunately this disease is somewhat rare, and seldom appears before the age of puberty; in advanced life it is sometimes observed, and more particularly in persons who have led a life of folly and dissipation.

SYMPTOMS OF DIABETES.

Although the essential characteristics of Diabetes are two—the discharge not only of more but of heavier urine than in the healthy state—yet I have observed various other symptoms which appear to be inseparable from a true case of the malady: viz. general emaciation, and total suppression of perspiration, with great thirst; the appetite either excessive or altogether wanting; the tongue furred and the taste vitiated; the pulse always quick; the skin dry, rough, and occasionally scaly; extreme debility, and a decided falling off in the senses and faculties; with a complete absence of virile power. Indeed there were ever present a feverish disposition, and an indescribable consciousness of being out of order. When the cases proved fatal, profuse sweating supervened, with general hectic symptoms, and the patients died during a convulsion fit or sunk from exhaustion.

The statement, that one of the essential characteristics of this disease is the discharge of more urine than in the sound state, necessarily leads us to ascertain the natural quantity of urine in the case of a healthy individual. It is true that the nature and quantity of the liquids ingested, will powerfully affect the urine, both in respect of quality and quantity; but if the trial

be made on twenty healthy individuals, who have eaten heartily, and drunk no more fluids than is sufficient for satisfying thirst, the urine discharged will be, in the case of each, about three pounds one ounce. The proper time of day for ascertaining the specific gravity would appear to be early in the morning, because the urine then discharged is found to afford a just average specimen for the purpose of ascertaining not only its density, but its other properties. I invariably found, that in every healthy person who subjected himself to this trial, his drink amounted nearly to one-fourth more than what was passed as urine. I cannot indeed give a just average of the quantity of urine made daily in the eleven cases formerly referred to, because seven of them, whose prior history was partly unknown, died—three were cured and one relieved—and were I indeed able to do so, it would serve no useful purpose. The lowest and highest quantity may be stated at six pounds of urine when five pounds of liquid were taken, and twenty pounds of urine when seven pounds of fluid were received into the stomach : the proportions were not always the same, but varied from causes over which there was no control. The urine was sometimes clear and sometimes turbid ; it had occasionally a greenish hue, and might be sometimes compared to a mixture of honey and water.

The other characteristic of Diabetes is the discharge of heavier urine than in the natural state. Now, the specific gravity of the urine of persons in health I found to vary from 1021 to 1029, compared to water as 1000 ; whereas the urine, in the seven cases formerly mentioned, was 1036 at an average as compared

with the same standard. In general it may be affirmed, that, although no saccharine matter be found in urine exceeding in density and quantity the natural standard, it is, notwithstanding, to be regarded as a true case of Diabetes.

OF THE PREDISPOSING AND EXCITING CAUSES.

Of all the causes which predisposed to this disease the immoderate use of ardent spirits I have found to be the most frequent; six of the eleven persons affected attributed the cause to excessive drinking. In one person the disease supervened on chronic diarrhœa, with fever and premature decay. Two persons were affected by it after drinking cold, marshy water when much heated during harvest. Another man suffered from the complaint by sleeping during a cold night in an open shed, and one of them honestly confessed that he could trace the disease to no particular cause.

From a conversation which I repeatedly had with each of the seven persons whose cases terminated fatally, I found that the precursors of the malady were some symptoms of asthma, dyspepsia, with hysteria hypochondriasis, and indeed in all of them the health seemed evidently to be much broken.

Some of the Fathers of the profession have mentioned as the cause of Diabetes the excessive use of sweet substances. This, however, it is probable, they were at no pains accurately to ascertain, owing to the natural disgust at tasting any excrementitious fluid. Some

have accordingly doubted the existence of this disease in ancient times, and have regarded it as one of modern date; but if these prejudices against ascertaining its nature be taken into account, we can scarcely entertain a doubt of its having taken place much more frequently than it has been supposed to do, and that it was present even while it eluded observation. Assuredly Hippocrates witnessed a case of Diabetes, as he mentions a person who suddenly became emaciated, and discharged a great quantity of urine, and finally sunk from exhaustion: for the disease, however, he has given no name, nor assigned any cause, not having had an opportunity of examining the body after death.

From this period to the seventeenth century there is nothing of much importance to be obtained regarding Diabetes, either from the Arabic or Roman authors, until the publication of our distinguished countryman Willis. But from his time to the present day, it has been attentively studied by medical men.

It would greatly exceed the bounds usually allotted to an essay of this kind, were I to enter into the merits of the various hypotheses and theories which have been advanced in connection with this disease.

But the following questions in relation to it seem deserving of serious and deep consideration:—

Is the lymphatic system more developed in every case of the Diabetes than in the natural state?

Is there in health an established balance between the egesta and ingesta?

Are the egesta in this disease excessive?

Is the flaccidity of the kidneys the effect of the excessive evacuation from them?

Does the circumstance of healthy urine being always secreted before death, indicate that the original seat of the disease is not the kidneys?

Are the functions of the body which relate to external things generally impaired in this disease?

Are not these functions of the body which relate to itself generally disordered in this disease?

Of all these questions, the last seems to be the only one respecting the answer to which there is any difficulty. It appears to me, however, that the affirmative is proved by the waste of the system not being repaired, by the excessive evacuation, by the total absence of virile power, by the increasing emaciation, by the general impairment of the senses and faculties, and by the rapid sinking of the patients from exhaustion.

As in the whole of medical writing there is nothing to be found but opinions and facts, it would appear, if these questions be satisfactorily answered, that the conclusion will favour the opinion—that the disease is one pervading the whole system. This assertion is greatly strengthened by the fact, that there is a greater probability of curing the disease at the beginning than afterwards, when it has been established in the constitution.

OF THE DIAGNOSIS AND PROGNOSIS.

We are often in danger of mistakes while deliberating on complicated ailments, by attributing too much importance to minor symptoms. Hence the propriety of

the greatest precaution in our questions, as well as of the most fixed attention that we may rightly interpret nature.

But the disease under consideration presents none of these difficulties; indeed its diagnosis is the easiest of any complaint with which we are acquainted, because the taste of the urine is always a sufficient indication.

The prognosis in this disease is favourable in previously healthy individuals, when medical treatment is early applied for and diligently persevered in, more particularly when the symptoms appear to be overcome by the earliest remedies. On the other hand, the prognosis is unfavourable if the disease occurs in persons of broken health. Indeed there can be no rational hope of a cure entertained, if moral depression and a great degree of morbid sensibility supervene. It may be said, also, that an unfavourable issue may be expected, sooner or later, in proportion to the length of time which has elapsed without obtaining medical aid. Of a truth the disease gathers strength by time, as a falling body acquires velocity in the direct ratio of time that it has been falling.

OF THE MEDICAL TREATMENT OF DIABETES.

Our chief aims in the study of medicine should be —truth and utility. Truth, because otherwise we embrace error; utility, because that appears to be the proper business of life—the great and ultimate end of all our pursuits. Now, while it may be said that truth

animates the physician whose practice is founded on axioms and on facts—how shall I find terms sufficiently graphic to pourtray the empiric! This person acts more from habit than from mature deliberation. That person from conclusions founded on general principles, and generalizes accordingly: for instance, he finds that the circulation is accelerated by the use of wine, and retarded by certain quantities of tartarized antimony. He can prove that such results will invariably take place, as well when these substances are administered to a person in health as to one labouring under disease. He knows the intimate relation between cause and effect. He is conscious, that, if the same antecedents precede a certain phenomena at one time, so must they also go before another of the same kind. Hence, by the powers vested in him he brings all events under his control to a great extent. Knowing, as he does, that every occurrence is preceded by a combination of phenomena, he generalizes his observations, and renders them important in his future progress. Truly, a rational physician must be a philosopher.

The empiric, on the other hand, pursues a routine of practice. He is not acquainted with the physiological laws by which his means produce certain ends. He is, in short, a child in intellect: whereas, the rational practitioner, by his just investigations of nature, commands universal esteem; and, by his skill in the treatment of disease, he secures to himself permanent regard.

My respected teachers invariably followed the most rational practice. It is true, when the disease was of

long standing, they found no medicine, nor any class of medicines, capable of removing it. They generally succeeded, however, in relieving the patients; but a fresh attack of the distemper invariably supervened, which at length terminated fatally.

That opposite and confounding theories, as well as hypotheses, have been reared regarding the Diabetes is a melancholy truth; and that the practice corresponding to each has given rise to much perplexity is equally so, notwithstanding the fact that various medicines produce the same results by various operations.

In the practice of medicine, however, it is advisable to be cautious in adopting theories, as well as in acting on assumptions which have not been established; as nature does not exhibit diseases in groups invariably and in all respects of the same type. It is individual cases of disease that are ever witnessed differing in many important respects from others apparently similar. Hence, it will be acknowledged that it is the slow guide of experience, assisted by observation and reflection, that helps us in making suitable progress in the healing art.

"Ευρι φων ὁ ιατρος εροτηθεις τον διδασκαλον παρ ᾧ επαιδευθη παρα τῳ χρονῳ εφη."—Stobœus.

Every one, then, who regards his medical reputation, should keep himself at the greatest possible distance from empiricism. The medical quack always inculcates a method of practice proceeding in the same regular way, without alteration according to circumstances: the rational physician, on the contrary, is

guided by peculiar signs, which nature never fails to show him, for his proper interpretation. He ascertains causes and treats symptoms, and, when it is practicable, he obviates unpleasant sensations, and removes or relieves every source of uneasiness. But to restore the secretions which are deranged functionally, in all diseases—

"Hic labor hoc opus est."

It must be confessed, however, that there are cases of doubt and intricacy to be met with, where one would do well to stop short, and allow the invalid a little time to breathe, as it were—waiting patiently for a single ray of light to aid him in pursuing the path of nature.

Finally, there may be some cases of disease where there is no room for any thing else than attention to support the *vis vitæ*, and to reduce the evacuations, as nearly as possible, to the natural standard.

Having premised the foregoing facts, I shall now subjoin some observations on the remedies which I have seen employed; stating, at the same time, my own opinion regarding the most successful method of treatment which I have met with.

OF DIET, AIR, EXERCISE, AND CLOTHING.

Animal diet has been found useful in every stage of this malady. Dr. Francis Home of Edinburgh first suggested its exhibition. The late Dr. Duncan profited by Dr. Home's hints. The former found that the fatty part of meat had a wonderful effect in allaying thirst and diminishing the quantity of urine; but

its effects were entirely temporary. The patients were allowed to drink any fluid which was void of sugar. Dilute nitric acid, in the proportion of a drachm and a half to three pounds of water, was allowed. The exhibition of porter was thought serviceable. Moderate exercise in the open air, without causing fatigue, was directed with considerable benefit. Warm clothing, with flannel next the skin, was an excellent auxiliary in promoting perspiration, which, in this disease, is always absent.

OF BATHING, AND FRICTION BY THE FLESH BRUSH.

At the commencement of the disease much may be done by the assiduous use of the flesh brush, as well as by the sulphureous, warm, and vapour baths; providing the patients are not much exhausted by their application. We must be regulated in this, as in many other respects, by the effects produced on the individual under treatment. Bathing, on the whole, appears to be a very useful remedy in this disease.

The object was twofold for which the baths, and friction by the flesh brush, were exhibited:—

1. To determine to the skin, and thereby restore the perspiration;

2. To carry the remedies of the medicated baths to the system by the absorbents.

OF EMETICS, ANTIMONIALS WITH IPECACUAN.

The occasional use of emetics has been much adopted, and I must bear witness to the great success which attended their exhibition in the early stages of Diabetes. Antimonials, also, in combination with ipecacuan and opium, have much effect, because they determine to the skin, and restore perspiration, without acting on the urinary system.

It may be remarked that opium is calculated to be very serviceable in this disease, because it lessens the quantity of urine, calms any uneasiness, as well as gives quiet to the excited mind of the sufferer. The quantity of opium which I have seen exhibited daily seldom exceeded a couple of grains, as it might be naturally anticipated that very pernicious consequences would result from a greater quantity continued for any length of time.

BLEEDING.

It is a fact that much discredit is attached to any remedy provided it is used injudiciously. Venesection, to be usefully employed, requires the greatest judgment, as well as the utmost decision, on the part of the physician. I never saw it prescribed but at the com-

mencement of the disease, and especially if nephritic symptoms, or pain in any part of the system, indicated the use of that excellent remedy. I have had no experience regarding the use of the lancet as recommended by the ingenious Watt, a member of the Faculty of Glasgow. Should I, however, at any time have to treat a case of this disease, I would readily give it a trial, especially if the patient were young and strong. Watt's method of treatment appears to be,—1. To diminish the quantity of blood in the system by venesection, as well as by every competent evacuation; 2. To lessen the supply of blood by abstinence; and finally, to apply stimuli by blistering and the use of mercury.

Neither have I seen Dr. Ferriar's method tried. He recommends the exhibition of lime-water four times daily, each quantity taken to contain twenty grains of Uva ursi and bark, with half a grain of opium.

Nor have I seen the benzoat of ammonia, as recommended by Dr. Latham, of which he speaks highly. But of Dr. Rollo's plan every practical man must approve. It will be seen at a glance that this author's work abounds with sound reasoning, with most rational views as well as with a profound knowledge of the disease.

OF ELECTRICITY.

With the view of giving a shock to the body, and by this means dislodging the disease, I have seen the use of electricity of some benefit. It was applied twice a-day to different parts of the patient's limbs. I must confess, however, that it was in protracted cases that its application was attended with any advantage. It strongly affected the system, and superinduced very considerable change in the body for the better.

ANALYSIS OF THE URINE AND BLOOD.

I satisfied myself fully that there was generally an excess of urea in the urine of a Diabetic patient, and in no case did I find that animal principle diminished below the natural standard. The opinion of those who assert that in this disease the urea is converted into sugar I have endeavoured to substantiate, but without effect.

The principal difference between urea and sugar consists in this, that there is a volume of nitrogen more in the former than in the latter.

That there is no sugar to be found in the blood of a Diabetic patient, I am perfectly convinced. The examination of Diabetic serum did not indicate a trace

of saccharine matter, neither could any urea be found in Diabetic blood. Indeed urea cannot be found in the blood of any person unless its secretion by the kidneys is either impeded or altogether prevented.

I have now stated the substance of what I have learned regarding this disease, and I must confess that my knowledge of it is very imperfect. Great indeed is the difficulty of ascertaining, with precision, the nature and operations of the living body, as well as the changes effected upon it constituting disease. Men of literature, of undoubted talents and great experience, have been contributing to the world the result of their observation and reflection for nearly three thousand years, and yet, with all this information, we are but too little acquainted with diseases and their cures. We cannot *a priori* say that the same remedies will always produce the same effects on the same individual at different periods, nor shall we be able to understand why the very same medicines produce very different phenomena on various individuals, until we have a more accurate knowledge of the principle which regulates animal life.

Again, are not the ablest natural philosophers the first to acknowledge their ignorance of matter, as well as of the properties and laws which pervade it? Now the physician has all this to encounter, and much more, when he applies himself to the study of organic matter. Here he is perplexed by the peculiarities of life, which cannot be satisfactorily explained by the laws which regulate inanimate matter.

On the whole, then, is it not pleasant to anticipate that these difficulties may be removed, and the perfection of our art established? May this thrice-cheering hope animate those who aim at deserved estimation in the healing art! Let the thought of this blessing cause the lamp of life to burn with a steady flame, without its being unnecessarily hurried to its close, by those rude blasts which frequently exhaust its powers and extinguish it before the natural period.