

ography given below I am indebted to Mrs. Lilian Davis, Medical Librarian.

### RÉSUMÉ.

1. Benedict's New Portable Respiration Apparatus gives most satisfactory results in its use for the estimation of the Basal Metabolic Rate, and of Vital Capacity.

2. Its adaptability and reliability are demonstrated by series of observations on a large number of unselected, clinical cases of all types, as well as on both trained and untrained subjects.

3. Comparisons with more elaborate methods emphasize its simplicity and practicability in clinical work.

4. Suggestions and information relative to technic, calculations, standards, and bibliography are offered.

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### SIDEPATHS IN MEDICINE.\*

BY JAY PERKINS, M.D., PROVIDENCE, R. I.

WHEN I was a boy in school, one of the reading lessons was that of some people who, traveling along a main highway, saw an alluring sidepath. They entered it, found it very pleasant, and dallied along until late in the afternoon a heavy thunderstorm came on, followed by darkness. They were lost and spent a terrible night in the woods.

Recently I read a review of a book which narrated the departure of another group from the main civilization into the outland. They, too, found it pleasant, kept going further and further, keeping track of their way by beds of flowers. They, however, were gone for some time, long enough so that the flowers changed with the season, and when they tried to find their way back, the marks had been obliterated, and they, too, were lost. They, however, had found the new country so beautiful and satisfying that they were content to remain there, and gave up seeking to find the way out.

In medicine we have the straight road traveled for centuries; we have the established modes and lines of thought, and he who travels within these limits is safe, and many are satisfied. There are, however, from this main road of established routine many sidepaths and many outlands. In fact, all the specialties are, or have been, sidepaths, and beyond the former realm of medicine. The Hippocratic oath forbade certain lines of surgery. Now, even surgery has its sidepaths, as abdominal surgery and brain surgery. The familiar specialties, the eye, ear, nose, and throat, obstetrics and the others, are sidepaths used but comparatively recently, but now are well-worn, and considered as main roads. There are numerous other sidepaths; some may lead into swamps, some into briar patches, some into woods, but, until we travel them, we do not know but that these, too, may lead into fertile fields. For instance, bacteriology; I can remember while I was a student, there were many who questioned germs being the cause of disease. I was one of the two students who first took bacteriology as an

\* Read before the Providence Clinical Club.

elective course counting on a degree in the Harvard Medical School. Bacteriology was then a comparatively little used sidepath. Now it is a main dependence in the practice of medicine. When I entered the Rhode Island Hospital, I brought the first oil immersion lens that was ever at the hospital. The only laboratory was a little room, at one time a part of the dispensary. Now it would be hard to carry on the work of the hospital without its laboratory.

The x-ray is another more recent sidepath, the value of which we do not yet know. In both of these, bacteriology and the x-ray, some things which were formerly shrouded in darkness were made clear, and because of these successes, great hope and reliance were placed upon them, much greater than later developments have justified.

The same is true in reference to blood examinations and physiological chemistry, especially as relating to work of the stomach. All of these things are of great assistance, and have helped to put medical work on a more solid foundation; but even at that, they have not been an unmixed blessing. They have caused us to depend too much upon these objective evidences of health and disease, and to neglect too much careful observation of clinical symptoms, and have made the practice of medicine too much the exercise of scientific formulae and too little of human thought.

There are other sidepaths not in such good repute, as Homeopathy, Christian Science, and Osteopathy. Some of these lead into the wilderness of the unknown, or into swamps and briar patches, but not all knowledge gained through them is useless. The harm comes in that the travelers entering them have no knowledge of the main highway, and think that these paths are the only ones, and are able to persuade others to their way of thinking. Time and education alone can restore them to the road of science and common sense, but in the meantime, they are adding something of value to our knowledge, if we will but learn. At present, the devotees of these various methods of treatment are content with the outland to which they have gone, and have no desire to return; but is it not the fault, in part at least, with the regular medical profession for failing to observe and practise, to teach in the schools observation and practise, of all that it of benefit to the sick and ailing, instead of practically

denying that which cannot be demonstrated in the laboratory, or proved by experiment?

MacKenzie has forcefully called attention to the present condition of putting younger men into the out-patient work in our hospitals, and having experienced men in the wards, thus putting upon those without experience, the task which they are incompetent to handle, of recognizing the early stages of the disease, and giving to the supposedly experienced observers, the handling of the very sick in whom the signs and symptoms are marked. The young men who have the task of recognizing disease by its early symptoms have been trained in the hospital wards, and in the laboratories, and have learned to put their dependence upon physical signs and laboratory examinations, and in the rush of a busy clinic, they do not take the time to study the cases from any other standpoint. Now, I think we can go a step farther, and, following the old adage, "As the twig is bent, so the tree is inclined," say that the majority of these men never get much farther than to base their diagnoses largely upon physical signs and analyses.

The study of pathology is an absolute necessity to one who would have a knowledge of medicine, but if we get into the habit of thinking a disease must present the pathology as taught and seen in the autopsy room before we make a diagnosis of that disease, we are many times of very little use to the patients, because we fail to recognize the nature of their ailments while they are yet in a curable stage. In recent years, more attention has been paid to the functioning of organs, and by this means, a marked advance has been made, which is of benefit to the patient; but even here, the study of functioning has been through laboratory experiments, and only the more marked cases of abnormal functioning have been demonstrated.

The sidepath which I wish to call to your attention tonight is endocrinology. In the student days of most of us, we were taught that there were such glands as the pituitary, thyroid, thymus, adrenal and the ovaries. The part played by these glands in the economy of the system was about as vague as was the use of the appendix. Recently, however, much study has been given to them, and an effort made to determine their functions. This has been done either by giving the dried gland substance or its extracts, and the observing physiological effects produced, or by removing the

glands and observing the changes which take place.

In this paper I shall limit myself to the thyroid. The extremes in abnormal thyroid states are exemplified on the one hand by exophthalmic goitre, and on the other by cretinism or myxoedema. These do not enter into the scope of my studies. My studies have been for the most part on cases which do not present the marked symptoms produced by toxic amounts, or the complete absence of the thyroid extract, but on cases in which the abnormal variations are slight, yet enough to produce abnormal symptoms, especially with reference to asthma. It is my belief that many cases of asthma are due to an abnormal functioning of the thyroid, and manifested before the changes in functioning can be determined by the tests on metabolism. I have long believed that many cases of asthma were due to some abnormality of the nervous system, though what the abnormality is, I did not know. I have never been satisfied with the theory that asthma is due to a special sensitiveness to certain proteids, although I have been ready to acknowledge and treat cases on the basis that certain proteids may bring on the attacks; but, just as nervousness or an abnormal functioning of the sympathetic nervous system is unsatisfactory in that it does not explain the origin of the trouble, so is this sensitiveness to proteids unsatisfactory in that there must be something to cause this abnormal sensitiveness. For a couple of years, I have stopped paying much attention to the proteid sensitiveness, but have tried to find some deeper explanation which will account for both the sensitiveness to the proteids and the asthma.

I am studying the question from the standpoint of the endocrine glands. I have had sufficient success using the thyroid as a basis, so that I am now working chiefly with that. I have not, however, reached such a point that I am ready to make any categorical statements, or to claim that I am going to cure all cases of asthma; but I am giving you this as an informal statement as to what I am doing, and what results I have obtained. I know that there are many who hold that the metabolic test is necessary before we can make statements as to the excess or deficiency of the thyroid secretion. With this I do not agree. Not that the test is not of value when we get positive results, but that the test is not sufficiently delicate or pathognomic for the early cases, which, however,

are sufficiently abnormal to cause asthma. I am much interested in the article in the *A. M. A. Journal* of April 10, by Dr. Woodbury of Clifton Springs, N. Y., reporting twenty-nine cases of hyperthyroidism operated upon between July 1, 1919, and January 1, 1920. He divides this group into two main types; first, the severely toxic cases showing marked positive epinephrin chloride reaction, and increased metabolic rate varying from 20 per cent. to 85 per cent.; second, a type showing symptoms milder in degree and without exophthalmos. The second type responded positively to the epinephrin chloride test in varying degrees, but showed a metabolic rate which was low, or not increased above the limits now accepted as normal. He further states "that there is a rather large group of patients who are in a definitely impaired physical and nervous condition, who, because of a toxic state of probable thyroid origin, are in need of positive medical or surgical aid, and yet whose metabolic rate is not increased."

Now, coming back to MacKenzie, I believe here is an instance in direct line with his argument for more exact clinical observation and study of symptoms without reliance upon physical signs and laboratory tests. Although I have been studying this for some time, I am not yet able in many instances to differentiate between the hyper- and the hypo-thyroid cases except by therapeutic tests. At one time I thought I had some fairly good symptoms for differentiation, but they failed me. While I can guess nearer than I used to, I cannot positively tell. The physical standard of an enlarged thyroid by itself is of no value, for as you all know, this enlargement may be an increase in the gland, the thyroid substance proper, or it may be the result of disease, impairing the function. Headache, I used to consider as an indication of hyperthyroidism; but the worst headache I have ever seen, was due to hypothyroidism. A condition of nervous excitement is common with hyperthyroidism, but I have seen it with hypothyroidism. A sluggish condition accompanied by inability for marked mental or physical exertion, I associated with hypothyroidism; but I have seen it a number of times with hyperthyroidism. And so it is through the whole list of symptoms which these people may give, so that at the present time, it seems to me that the symptoms obtained by both hypo- and hyperthyroidism are due to instability of the nervous

system produced by the abnormal functioning of the thyroid without, so far as I can yet determine, anything pathognomonic of either state.

Before going on to report some asthma cases, I will state that my interest in this subject was first aroused by some functional heart disturbances and my medical treatment of the hyperthyroid cases has followed the line which I used with some success in treating certain functional heart disturbances. An interesting incident, while treating one of these cases, though at the time I did not associate the patient's condition with the thyroid gland, has helped me more than once since. This patient was sent to me by a gynecologist for treatment of the heart condition. I was enabled to relieve the heart condition, and at the same time, she got well of a membranous colitis which she said the doctor who sent her to me had never been able to relieve. I have since tried this method of treatment on several patients with a diarrhea which others had never been able to relieve by ordinary methods. One was a patient at the tuberculosis clinic this year who had been a sufferer from diarrhea for years without getting any relief, and was sent to me to investigate as to tuberculosis. Within two weeks, his diarrhea was completely relieved. Another, a patient in my office, came to me with practically the same history, and she, too, was relieved of the symptoms of diarrhea. After a few weeks, she came back with some return of the trouble, though with nothing like the previous severity. I have not seen her since, and whether this symptom has remained in abeyance, I do not know. Another case of extreme interest to me was a child eleven years of age, whose mother, grandmother and aunt were extremes of the so-called nervous type. Both parents died of pneumonia. Among other symptoms the child suffered from a diarrhea which the physician living near them in the country was unable to relieve. She was taken to another physician at a distance, who diagnosed the case as tuberculosis. The child was living with an aunt and her husband who are relatives of mine. As soon as the diagnosis of tuberculosis was made, they consulted me, and the aunt being a trained nurse before marriage, I got an excellent description of the child, and felt that I could say her trouble was not tuberculosis, and that it probably was hyperthyroidism. I treated her upon this basis, and am pleased to say that the

diarrhea disappeared, and there has been a marked improvement in the child, so that she is now not only free from her diarrhea, but able to attend school regularly, which she could not do before, and is much better in every way. One time this winter the medicine I sent failed to reach them, and she herself felt the lack of it so much that she sent word to me that she wished I would send her some more, because it made her feel better. In the children, I believe, my experience enables me to say that after a time, the treatment can be discontinued gradually, giving it only temporarily, as symptoms appear, and ultimately, the child will become normal. These instances I mention merely incidentally with a suggestion for further observation and study.

The treatment of the hypothyroid cases is easy. The treatment of the hyperthyroid cases in the early stages is not so simple. When the disease is advanced, the problem is a different one, and I do not consider it within the scope of this paper. If the symptoms are pronounced, and have lasted for a long time, I cannot believe that medicine holds any great hope for cure. I have sent a number of these cases to Dr. Peckham for x-ray treatment, and have been pleased with the results. It seems to me that in the milder cases, the over-activity of the thyroid is often intermittent, and, as we know, the activity of the thyroid is increased by any excitement, either mental or physical; that this increase of over-functioning is progressive; that, taken at its beginning, this increase in thyroid activity can be lessened by medical treatment, and its ordinary subsequent progress and climax or explosion can be prevented. In youth, this regulation for a time, I believe, may be sufficient to establish a normal stability and thus, if these symptoms can be recognized early, many cases can be prevented from becoming life-long invalids.

As I have stated, my treatment of these cases started before I had any clear idea of what I was treating, and I have continued the same method with a good deal of success, but on the theory that hyperthyroidism is the probable cause. The generally accepted medical treatment of hyperthyroidism is rest. This needs to be mental as well as physical, and this I try to employ in these milder cases, as far as is practicable, varying the degree of rest in accordance with the severity of the symptoms and the environment of the patient. My further treat-

ment is the use of some drug of the sedative group. Bromides I have not found satisfactory. A probable explanation of the action of a sedative is both to lessen the secretion of the thyroid gland, and to lessen its effect upon the nervous system, and thus in two ways lessen the effect upon the organs of the body. Before the war, I used a combination containing asafoetida, sombul and apomorphine. During the war, the drugs were not obtainable except at exorbitant prices, and then were unreliable, and I fell back upon the old formula containing camphor, hyoseyamus and valerian, and recently I have used hyoseyamus, valerian and sombul. I am hoping to find something better, but the results I have to report were obtained by these. I sometimes use iodine, though I am not satisfied as to its benefits. I use it because of its advocacy by others upon the theory that the function of the thyroid gland is largely to furnish iodine, and that if this is furnished in some other way, the necessity for the gland's activity will be lessened, and the secretion will lessen, and the toxicity will become less. The most evidence I have in favor of it is that I have relieved many cases of asthma in children by the use of iodine and a tonic, my favorite being iron and calcium phosphate. In the treatment of adults, both in the hyper- and hypothyroidism in the cases under consideration, I also use a tonic; but have learned that in the hyperthyroidism, the symptoms are aggravated by anything which contains strychnine.

The following cases are mentioned as examples of results in asthma on the basis of endocrine gland treatment:

CASE 1. L. L., male, aged 11. Maternal great-grandmother had asthma; also, probably, maternal aunt. Began to have asthma November, 1912. Tonsils and adenoids removed 1913, without any improvement. Has trouble winters; no asthma summers. Tested thyroid and found supersensitive; then given sedative treatment as described above, and now, one year later, is getting along very nicely. Has had no severe attack since beginning present line of treatment ten months ago.

CASE 2. M. E. B., female, aged 54. Always had bronchial trouble; asthma for ten years; came on gradually, now constantly for a year; tires easily; terrible pounding headaches mornings and evenings five years ago, then they left for a short time; steady all summer. Feet always cold. Burning asthma powder at night. Given varium, 5 grains, three times a day. She now reports it seems good to feel like going

somewhere and seeing people; never used to go anywhere or see anyone. If people came to the house, she wanted to get away from them. Now has no occasion to burn asthma powder, and but very little trouble in breathing.

CASE 3. J. H., male, aged 41. Began to have asthma, 1914. Seen by me, April, 1917, in an attack which started about December, 1916. Attacks would come on at 6 or 7 P. M.; get worse after going to bed. Again he would awaken 2 to 4 A. M. Burning an asthma powder and using Tucker's Asthma Remedy. When I saw him, he had just returned from a southern resort, where he had been given an autogenous vaccine, a bottle of which he brought home, and which I started to use on him. Following the second injection, he had a severe chill, and his condition became much worse, so that he was kept in bed, and had a trained nurse. I then found the temperature was running 95 to 97, and that he had always been extremely sensitive to the cold. He was put on thyroid extract, maximum dose,  $2\frac{1}{2}$  grains three times a day. After one month's treatment, he was nearly recovered, and had warm hands and feet for the first time at that season of the year. By using a small amount of thyroid, he has kept in good condition since.

CASE 4. E. P. B., male, aged 20. Had influenza nine months ago; bronchitis and asthma since then. Has to sit up some at night. Troubled with cold hands and feet; has headaches. Temperature, 97.6; pulse, 72. Was never very active physically; is effeminate in appearance and voice. Was given thyroid extract,  $2\frac{1}{2}$  grains; gradual improvement until at the end of three months, the temperature was normal for the first time. He felt better, but was still nervous; not sleeping well. Two months more and there was marked improvement; the voice became more masculine. One year from the beginning of treatment he was perfectly well; temperature normal; taking  $2\frac{1}{2}$  grains thyroid extract every twenty-four hours.

CASE 5. B. G., aged 11. Eczema since a baby. Asthma since four years of age. Perspires easily; headaches occasionally; car sick on electric or steam cars or in closed automobile. Given iron and calcium phos., camphor, hyoseyamus and valerian. Six weeks later, mother reported child was having no trouble; had a cold recently, but no asthma; that she is a completely different child: more even disposition, skin clear and cheeks red; does not get so nervous in school work; is much better natured; stands much more from brother two years older; fools more with him instead of getting into tantrums.

CASE 6. A. F. C., male, aged 47. Had bronchial trouble 17 years; more severe last five or six years; worse at night between 2 and 3 A. M. Headaches two weeks steady, off and on, for

years. Perspires easily; considerable tremor to hands. Never could eat eggs or bananas without much distress. Given thyroid as test, and found supersensitive. Given sedative treatment as above, and at the end of five months, can eat eggs and bananas freely. No longer has that "tired and dragged out feeling." Instead of coughing for an hour, he coughs about fifteen minutes at 3.30 A. M., and about ten minutes on getting up. The rest of the twenty-four hours, he is very comfortable.

### CASES IN WHICH BASAL METABOLISM MEASUREMENT IS USEFUL.

BY OLIVER H. STANSFIELD, M.D., WORCESTER, MASS.,  
*Physician to the Memorial Hospital, Worcester, Mass.*

THE splendid results from investigations into the normal and abnormal physiology of the thyroid gland have given us a more definite knowledge of the diseases of that organ. This is especially true of states of hyperthyroidism, in which estimation of basal metabolism provides a standard for judging severity, hence for a more uniform plan of treatment, and for accurately following progress.

The diagnostic value of measurement of the basal metabolism is also very great, particularly in that large group of ailments, the neuroses, and in clarifying such cases as contain a thyroid element of unknown influence. Examples of these obscure cases are presented in abstract, below, and, although notes cannot convey the sharp impression made by observation, yet they do show in what type of case, knowledge of basal metabolism is useful, or, in view of the lack of adequate clinical criteria, is even necessary.

**CASE 1.** A woman, 42 years old, complained of headache and nervousness of eight months' duration. The headache recurred frequently, and was "dizzy, not violent." Irritability of temper, nervousness, attacks of palpitation of the heart, and dyspnoea on exertion also were present. During the first two months of illness she received twelve doses of arsphenamin and then was advised to follow a course of mercurial injections, and had her teeth extracted. No improvement was noted after this treatment. She had lost fifteen pounds in weight. Her appetite was good. There were no gastrointestinal symptoms. No menstrual disturbance was noted. The past history was unimportant.

On examination, psychic instability was evident. There was a periodic widening of the eyelids, causing a transient stare, but there were no other eye phenomena. No tremor of tongue and only a very slight tremor of the

fingers was present. The thyroid was not enlarged, but was quite soft. The heart was negative; the rate during fourteen days, from 78 to 94. The blood Wassermann was negative. There was no lymphocytosis. A prolonged high blood sugar followed oral administration of 100 gm. glucose. X-ray showed a moderately enlarged thyroid, but not intrathoracic. The basal metabolism was 152% above normal.

The several points of interest in this case are: the, to palpation, normal-sized soft thyroid, the transient stare, the absence of frank signs of hyperthyroidism, especially the absence of tachycardia. The consistency of the gland would seem to be connected with the disturbance of function, but without microscopic examination nothing can be stated on that point. The transient stare is perhaps a forerunner or abortive form of exophthalmos and is probably as significant. The absence of outspoken tremor and tachycardia, particularly the latter, are features to be particularly noted, for they are apt to lead to error, as in this case, the final suggestion as to diagnosis having come from the brief stare. From the above, it seems necessary to add hyperthyroidism to the possible causes of neurasthenia.

**CASE 2.** A Russian Jewish woman of 40 years, whose complaint was nervousness and weak spells. She was referred by her physician, "largely for the sake of the family." For five months she had suffered from a soreness in the epigastrium, with frequent feelings of weakness. She has had nocturnal attacks of gasping for breath, accompanied by a tight feeling in the chest. Her appetite was poor; she was constipated, but had no other gastrointestinal symptoms. She worried about the housework and, apparently, everything else.

The past history suggests a longer duration of the condition than five months, inasmuch as she had frequent headaches since a motor car accident three years before. A miscarriage five years before had resulted in a shorter intermenstrual period.

On examination, she was anxious and depressed. There were no ocular abnormalities. The thyroid was somewhat enlarged, firm and smooth, with no *bruit* audible over it. The heart was not enlarged, had but a poor muscular tone to the first sound of the apex, and a rate of from 70 to 86, during three weeks. There was no tremor of tongue or fingers. The hands were cold and moist. The blood Wassermann was negative. A lymphocytosis of 57% was found. X-ray examination of gastrointestinal tract was negative save for slight general ptosis. The basal metabolism was 111% above normal, and again six days later, it was 113% above normal.