The progress of the defensive ferment reaction of Abderhalden / by Bayard Holmes.

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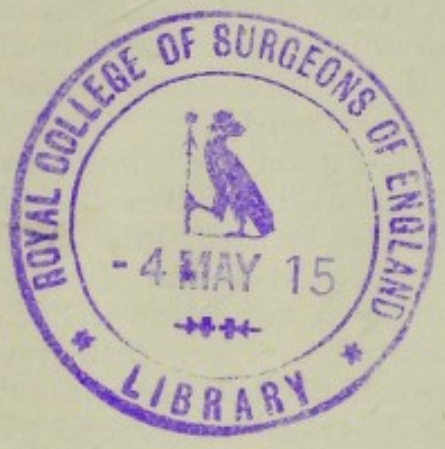

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THE PROGRESS OF THE DEFENSIVE FERMENT REACTION OF ABDERHALDEN.

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The advances which go on by the study of the body in health and disease using the reactions of Abderhalden are so rapid that they are almost confusing. In the beginning Abderhalden proposed only two methods of recognizing the defensive ferments. One of these methods depended upon the fact that the catabolism brought about by the defensive ferment in the test tubes diminished the rotary power of the solution to polarized light. The other method depended upon the simultaneous change of the colloid albumin, the building blocks of the tissue examined, into crystalline peptones, poly-peptones and amino-acids, thus producing a condition in which dialysis was possible. The resulting liquid readily passed through the dialyzing thimble and the dialysate responded to the delicate ninhydrin reaction.

During the past two months Abderhalden has published two new methods of recognizing the defensive ferments, both of them dispensing with the dialyzer, and one of them involving a new principle and dispensing entirely with the ninhydrin reaction. This latter method is so simple and novel that it is quite fascinating and attractive to the clinical student.

Briefly, we may say that this method depends upon the liberation of coloring matter in the albumin molecule of the fundament by the action of the defensive ferment. After the fundaments (substrate) are prepared peptone-free, they are each stained in a weakly alkaline but saturated solution of carmine in water. In this solution they must be boiled until they are almost black with the stain. In order that every particle of the fundament may be deeply stained, it should be first divided into as fine particles as possible before it is put into the carmine dye. When, after an hour or two, the fundament has taken up all the carmine possible, it is washed in the running hydrant water for hours, until the wash water contains no trace of color. The fundament is then boiled in distilled water as long as any trace of the carmine appears in the boiling water. It is then tested for peptone in the usual manner, and if found all right it is ready for use.

The test is made in the following manner, and commends itself on account of its directness and simplicity: To the usual amount of finely divided and now almost black fundament in a test tube is added a cubic centimeter and a half of the ferment bearing serum, which has itself been centrifuged until it is a perfectly clear, light straw color. The fundament and the serum are mixed by swinging and shaking the test tube, and then a small amount of toluol is poured over the surface and it is set aside to incubate for ten hours. If the serum peptonizes any of the highly stained albumin, the stain for so much albumin will be set free and it will give a carmine color to the supernatant serum, while if none of the albumin is peptonized the light straw color of the serum will remain above the fundament. Thus, as soon as the tubes are taken out of the incubator, the results declares themselves to the eye.

This method is not yet to be recommended for general use. There are times when it is not positive. A small amount of

alkali is fatal to the test, as it liberates some of the carmine. The contents of the doubtful tube should be put in the dialyzer and treated in the classical manner. Nevertheless, it is so rapid and positive in many cases that it is bound to be tried in commercial and in clinical laboratories.

The material accumulates constantly to show the value of the test in gynecology, in obstetrics, in general medicine, and in psychiatry. In chorea, for example, there is regularly a metabolism of the fundament of brain cortex, and also that of the long nerves. This is one of the diseases of known etiology, but practically of unknown biochemic and morphologic pathology. Nevertheless, a therapeutic measure of great promise has recently been recommended. It consists of the subcutaneous injection of a freshly prepared emulsion of cerebral cortex and cord taken from the rabbit and treated the same as for rabies. Just how the freshly prepared emulsion acts in curing the sick dogs and the sick children it is impossible to say, and until we know more about the origin of the defensive ferments it is unwise to speculate too freely.

One is, however, tempted before the elucidation of this observation to undertake somewhat similar therapeutic measures against other conditions of equally unknown origin. It may not be so simple as the proposed adage "When the Abderhalden reaction discloses the disfunction of an organ, give subcutaneously the freshly made emulsion of that organ," but at least it is somewhat in that direction.

Cretinism and myxedema are such old and bizarre conditions that in their full maturity they can scarcely be mistaken for anything else, nor can they be overlooked, but in their incipiency the most experienced clinician would hardly promise to make a diagnosis except of the most guarded sort. It is, however, in just these early cases of the disease that the catabolism of the recessive or dystrophic thyroid is most active,

and the recognition of the defensive ferment the easiest and the most pregnant with therapeutic possibilities. Cretins may be greatly benefited by the use of thyroid extract after the condition is so advanced as to be clinically evident, but it is more than likely that an earlier recognition would give a better opportunity for organotherapy and prevent even the development of the most meager symptom of bodily cretinism.

The diagnosis of acromegaly is today an interesting neurologic maneuver, and it furnishes a field for the most spectacular and tragic surgical adventures. But, for the most part, this diagnosis is too late; the damage is done, and even the most successful surgery leaves much to be desired. The Abderhalden reaction shows a defensive ferment in the blood of the pre-acromegalic, which ferment catabolizes fundament made from the human pituitary long before the most experienced and cunning neurologist could guess at an oncoming destructive disease like Marie's. By this means without doubt the tragic hypophysectomies so skilfully planned and courageously executed by our surgeons may be averted by an earlier diagnosis followed by pituitary feeding and other measures suggested by the coincident serologic findings.

The production of a special combination of physical and mental features in the offspring may be one of the problems of the eugenists. This does not seem so improbable as it did a few years ago, now that the biochemical condition of the parents can be constantly studied during the course of gestation by means of the Abderhalden methods. The stature is already known to depend on the normal and lively function of a small group of glands of internal secretion, some of them found within the cranium itself, and a stature above the normal may be brought about by modifying the balance between these glands through the protracted use of similar organs taken from animals or by the injection of the gland extract. It may eventuate in the course

of such studies that heredity is a much smaller factor in the production of a healthy and vigorous offspring than the immediate physical condition of the parents and of the child itself during infancy and adolescence.

While the origin of dementia precox still remains unkown, the Abderhalden reaction sets it sharply out of the conditions still claimed by the psychogenists. It is without any doubt a toxemia of unknown origin, to be sure, as a result of which, or as a part of which the genital glands are early and permanently disturbed in their function. It is still doubtful whether the toxemia that is easily recognized is caused by the dystrophy of the sexual glands, or is the result of it. Personal opinions in such a matter are of little moment, but the evidence seems to me to warrant an hypothesis that the toxic elements are produced in the peripheral mucous glands of the gastro-intestinal tract, and that research in this direction is strongly indicated and ought not to be longer neglected. For the first time the internal condition of the nutrition of the dementia precox patient can be studied. We are again reminded that the blood is the life, and we must recognize the fact that its condition is for the first time becoming a decipherable hieroglyphic of the voltage and amperage of the various factors of life. In the institutions for the insane are collected the wrecks of humanity whose glands of internal secretion have been long thrown out of order by various accidents and by various conditions. Through the use of the Abderhalden methods and other well-established morphologic and bio-chemic methods of research, these wrecks may become the greatest object-lessons in hygiene and prophylaxis, and at the same time their own condition may suggest revolutionary methods of cure. The dominant influence of syphilis in the production of diseases of the nervous system has been reluctantly accepted by a conservative profession, only

after the uncontestable demonstration of the disease germ by the microscope, only after the recognition of the anti-bodies in the blood serum by the Wassermann reaction, and only after the absolute annihilation of the germs and the disappearance of the antibodies has been made possible by the use of salvarsan. While the prevention of malaria and yellow fever are the greatest hygienic lessons of the century, the recognition and the cure of syphilis is the greatest medical lesson of the present age. This lesson ought to arouse in the keepers of the insane such an urge for research as will open the doors of the insane asylums and change the cruel custody of the nineteenth century into an optimistic cure before the close of the present quarter of the twentieth century. Pessimism, nihilism and slothful inactivity should be displaced by enthusiastic and optimistic research. The squandering of millions on the custody of the hundreds of thousands in our American commonwealth should not go on without the" penny on the pound" for research.

The marvels disclosed by the Abderhalden method are enough to arouse the imagination and the enthusiasm of all but the pessimistic, senile and the deluded mystic. Blanche Foerster, in the May 3, 1914, Medizinsche Klinik, recites a considerable number occurring about her laboratories. Some are most remarkable, illuminating and inspiring, and give us a view of the intensive studies going on at Tubingen. The following is extremely suggestive and cunning:

A man, 43 years old, had complained for a few months of symptoms almost identical with those of many women at the menopause. This man's face was almost beardless, and was so feminine in expression that when he was properly attired he could scarcely be recognized as a man. Skiagraphs of the thorax and pelvis, however, showed a typical masculine skeleton. The thighs, however, were feministic in form, and the skin had a peculiar feminine-like feel. The

scrotum was normal in appearance and contained two testicles, about the size of beans. The penis itself was normal in form, but rather small. In the gynecological clinic a pelvic examination was made through the anus by a number of clinical men, but no remnants of the uterus or of ovaries could be palpated. However, the Abderhalden reaction was made against many parts of the body, and all proved negative except that of the ovarian fundament. Thus it was distinctly shown that a man, in all external features masculine, had somewhere concealed in his body an ovary undergoing the retrogressive process of the menopause.

This arouses in our minds the possibility of distinguishing by cytologic methods and by ferment reactions the exact masculinity and femininity of individuals, and thus answering the question which the eugenists have placed before us of distinguishing the adaptability of ostensible males and ostensible females for the production of desirable offspring.

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