

their students. He believed that it was mainly through the agitation of the retail drug-trade, and the presentation of such papers as this, that the colleges had been stimulated to give more attention to the commercial side of pharmacy, that, to-day, there were very few colleges in the country that did not make some provision for this form of instruction. The Pharmaceutical Syllabus, which was in process of making, made a particular point of this, and outlined a certain number of hours that must be devoted to the teaching of commercial subjects, such as bookkeeping, making-out bills, banking, the value of notes, etc., all of which were in use in the every-day practice of pharmacy. This course, was, of course, supposed to embrace, also, everything that pertained to the conduct of a drug-store, such as the handling of customers, and of stocks, buying and selling, etc. He believed in the future the pharmacists of the country might not only expect, but also might rely upon the fact, that the graduates from the various colleges,—particularly those who took up the Syllabus in the serious manner they should, and abided by its regulations—would come to them better prepared in the duties of this important and essential part of pharmaceutical education.

THE TREND OF MODERN MEDICINE.*

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In these days of rapid progress in both the fundamental and the special medical sciences, one hesitates to prophesy as to what the future may bring. Being in close touch with the drug men of my own state, Nebraska, I hear the complaints of the rank and file of the profession, and am forced upon every occasion to play the part of the optimist. The most common lament is, that pharmacy is a lost cause. Nebraskans are not alone in this belief for if I remember rightly, in the last five years, I have heard some half-dozen papers read by men of prominence in the National Association, urging druggists to take up urinalysis, bacteriology, and, even, first aid to the injured, as side lines, in order that they may have something of a professional nature to do. Of course, as usual, and as it must always be, the pharmaceutical manufacturer and the physician that prefers to prescribe the manufacturer's preparations rather than those made locally, come in for their share of the blame for the condition of things. But now, there is advanced another and a more serious cause, namely, that preventive medicine, serum therapy, and therapeutic measures, other than with the use of drugs, will make professional pharmacy superfluous. With this in mind, perhaps it is worth our while, for a moment, to glance over the field and note what physiological basis, if any, drug therapy has, and what we may expect of it in the future.

We are living in an age of medical fads. Like mushrooms, they appear in a night, mature in a day, and disappear as quickly and as silently as they came. Perhaps chief among the faddists, are those who have placed upon the nervous mechanism an undue importance,—maintaining that the various abnormal physiological conditions, that we find in disease, to be due to so-called nervous influences, and to be rectified thru some re-adjustment, mechanical or otherwise, of the nervous system, or of some structure in close relation to that system.

Such ideas are untenable, if we but stop to study the physiology of the cell

*Read by title before Section on Education and Legislation at Nashville Meeting, 1913.

or of the highly organized animal. In the single-celled animal, there occur all the usual physiological phenomena such as digestion, absorption, assimilation, excretion, reproduction,—in fact all the physiological processes necessary for the maintenance of life, and the preservation of the species, without the existence of a nervous system, or anything suggestive of it. In more highly organized animals, we have the appearance of a nervous system, which reaches its highest development in man. While the nervous system is necessary in our complex mechanism, for the production of quick motor-reactions, the fact should not be lost sight of, that the functions of the various organs of the body are regulated or correlated thru the action of chemical bodies and are primarily independent of the central nervous system. To illustrate what I mean, I shall discuss a few important tissue-products which are typical examples of chemical bodies producing physiological correlations.

The simplest, at least the most familiar example of a chemical correlation in the body, is the relation which exists between the carbon dioxide tension in the blood, and the activity of the respiratory center. It is now pretty definitely settled that while carbon dioxide may not be the only factor, it is certainly the chief factor in initiating the inspiratory act. At birth, the foetal circulation is interrupted, thru the detachment of the placenta. The carbon dioxide which is formed in the infant's body, by the tissue metabolism, can no longer be eliminated thru the maternal circulation. It therefore collects in the blood, until a sufficient quantity is formed to stimulate the respiratory center, and produce the first inspiration, and its constant formation maintains respiration thereafter. While the quantity of oxygen in the blood may vary greatly, without influencing the activity of the respiratory center to any marked degree, an increase of 8 percent of the carbon dioxide content of the blood, will increase the amount of air inspired 100 percent.

Largely thru the efforts of the Russian physiologist, Pawlow, and his pupils, and the English physiologists, Bayliss and Starling, many chemical correlations are known to exist in the digestive mechanism. For example, it has been thought that the activity of the pancreas was due largely to the effect of impulses reaching it thru the central nervous system, reflexly or otherwise. Now, it has been shown that the pancreatic cells become active, and produce their secretion, only when a definite chemical body reaches them thru the blood. This chemical body is known as "secretin" and is formed from "prosecretin," a product of the intestinal mucosa, and the hydrochloric acid coming into the intestine, from the stomach. The "secretin" enters the blood and, thru it, reaches the pancreas, where it produces a profuse flow of pancreatic juice. Again, the pancreatic secretion contains a powerful proteolytic enzyme known as "trypsin." "Trypsin," as such, does not exist in the secretion, as it comes from the gland but a zymogen, "trypsinogen," does. In the intestine, "trypsinogen" comes in contact with a body formed in the intestinal mucosa, known as "enterokinase" and, thru its action, "trypsinogen" is converted into "trypsin." Not only are there chemical bodies, elaborated in the digestive glands, which have a pronounced effect upon their own activities, but certain glands produce, in addition, internal secretions, containing substances which have a marked effect upon metabolism in gen-

eral. The pancreas is one such. It has been shown that the internal secretion of this organ contains a body, which enters and circulates in the blood and is absolutely essential for the proper metabolism of sugar.

Of the ductless glands of interest in this connection, the thyroid and the suprarenals are the most important. The physiologically active body in the thyroid secretion, is a combination of iodine with a protein molecule. As is well known, the absence of this compound in the infant, results in a lack of development in every tissue in the body, and a lessened mentality. If the thyroid is removed, or the normal secretion is interfered with thru disease of the organ, a series of symptoms follow which ultimately prove fatal. These conditions may be prevented, either by the intransplantation of a normal gland, or by the constant administration of the fresh, or the prepared gland. Epinephrine, a basic substance, is the active constituent of the suprarenal and is supplied constantly to the blood. This body is essential for the maintenance of tonicity in the muscles,—skeletal, vascular, and heart. Removal of the gland, results in death in a very short time.

A most interesting set of correlations, is found to exist in the reproductive organs. The general effect upon metabolism, of the removal of the male gland, is too well known to need discussion here. A similar effect is observed in the female, after removal of the ovaries, a more important relation, however, has been proven to exist between the ovaries and menstruation, and between the ovaries, uterus and the mammary glands. It has been shown that menstruation is brought about by a chemical substance, formed in the ovary at certain times, which stimulates the mucous membrane of the uterus to greater activity, resulting in increased growth. This process is not interrupted, even when all nervous connections with the organs concerned are severed. Likewise, the mammary glands atrophy, with the extirpation of the ovaries. There is no doubt but that the secretion of milk is profoundly influenced by nervous impulses. On the other hand, Bayliss and his pupils have shown, that the growth of the mammary gland, which takes place during pregnancy, is due to a chemical body which is formed in the foetal body *in utero*. This body enters the maternal circulation, and stimulates the growth of mammary tissue or causes the formation of milk. These experiments using rabbits, macerated the foetal bodies, and made a watery extract. By introducing this extract into the circulation of non-pregnant rabbits, they were able to cause an increased growth in mammary tissue and ultimately the formation of milk.

While I have mentioned some of the more important chemical correlations which are known, there are many others, and it is not unscientific to presume, from what we already know, that there are many more, the chemical and physiological nature of which we do not know. From our present knowledge, it would appear that the fundamental physiological processes are due to chemical reactions of a more or less complex nature, and that the nervous system is a system that has become specialized as a necessary convenience, rather than as an absolute necessity in the production of those processes.

Ehrlich, and many others, have raised the question that if there are chemical bodies elaborated within the animal body capable of producing such profound

physiological changes, why is it not possible, or even probable, that there are many substances, which are normally not a part of the body, which may produce similar changes in whole or in part. The utopian dream of medical science, is to find a set of such substances with which the physician can control the functions of the body at will. Ehrlich believes there are many such bodies, and, to me, it is a significant fact, that he who has done so much work in the field of immunity, has practically deserted the field of serum therapy, in order to devote the best years of his life to the study of the physiological action and therapy of drugs. At present, his efforts are being directed toward the discovery of drugs which act as specifics in certain diseases, such as quinine in malaria. While his discovery of the specific action of the arsenic compounds in syphilis, is an epoch-making discovery, we may be sure that it is only a beginning of the revelations which the future has in store. The establishment by our leading universities, of laboratories for the experimental study of drug therapy, is a most potent proof of its importance.

Viewing the future of medicine from the standpoint of how physiological phenomena are produced in the body, knowing to some extent how these phenomena may be modified by the intra- and extra-corporeal products, and realizing the work to be done in connection with the collection, preservation, preparation, standardization, and dispensing of such products for therapeutic use, it seems hardly proper to consign professional pharmacy to the superfluous science class.

HEALTH IN GEORGIA.

What North Carolina is doing and what Georgia is not doing for the health of their respective populations makes a suggestive contrast. The Progressive Farmer, of Raleigh, tells us, in an editorial The Constitution reproduces, that in a state-wide campaign against typhoid the state furnishes the vaccine free and the county the services of physicians free. The process extends through the regulation three treatments.

It is merely a matter of arithmetic that in course of time, and a comparatively short time, North Carolina will subjugate the scourge of typhoid. The vaccine is about as absolute a preventive as cowpox vaccine for smallpox.

Georgia's attitude toward disease shows in discouraging contrast. It is not the fault of the State Board of Health. The hands of this body are tied by lack of authority and still greater lack of money. It is willing and ready to practice the conservation of human life on a large and habitual scale, but it can do nothing until machinery is placed at its disposal.

Georgia has long enough been neglectful of her greatest asset, human life. It is the only state in the Union without a system for collecting vital statistics. The Legislature that assembles to-day can perform no service of a more constructive nature than by enacting the vital statistics and the public health bills.—*Atlanta Constitution*.