

diphtheriæ. On this account this example was dismissed for want of corroboration until a second, and more peculiar experience again brought it to mind.

On Dec. 20, 1894, through the courtesy of Dr. L. B. Tuckerman, of Cleveland, I received a Prudden swab from the throat of a girl, a domestic, who exhibited certain suspicious symptoms of diphtheria. She had considerable fever, some pain and extensive redness in the throat, swollen tonsils, and a small, isolated patch of grayish membrane on the left tonsil. The patch of membrane did not increase much in extent; the patient was much improved on the second day; and was pronounced well after the third day. About a week later the girl again consulted Dr. Tuckerman for a debility and depression which had persisted since the acute illness.

A tube of Löffler's medium was inoculated as soon as the first swab was brought to the laboratory. After twenty hours in the incubator the surface of the medium was covered with an uneven grayish coat resembling an early culture from true diphtheria. The usual microscopic examination of stained preparations was made, and as great numbers of irregular bacilli with the morphologic features of the typical Klebs-Löffler bacillus presented themselves, together with a few micrococci, a diagnosis of true diphtheria was made. The next day another swab was obtained from the patient, and on subsequent examination only micrococci were obtained from it. This happened also with a swab obtained on the third day of the disease. Due care was taken in the use of disinfectants in the throat before the swabs were obtained; and there was nothing in the treatment which could account for the strange behavior of the bacteria in this case. The *Staphylococcus pyogenes aureus* was subsequently identified as the predominating coccus in the cultures obtained from the second and third days. The Löffler's medium employed in the course of these experiments was all of one batch, and was found by numerous control experiments to be above suspicion.

A scratch attenuation on a plate of Löffler's medium was made from the first culture tube of this case on December 9. Colonies of considerable size developed in twenty-four hours at the incubator temperature, and cover-glass specimens from several of these colonies showed only micrococci, notwithstanding the fact that the mother culture still showed the bacilli noted in the first examination, in great numbers. In thirty-six to forty-eight hours the colonies on the plate assumed a pronounced orange-yellow color, and transfers from these colonies to gelatin tubes gave a liquefying growth resembling the *staphylococcus aureus*. In fact, this species was subsequently isolated and identified in detail.

A second scratch attenuation on Löffler's medium from an isolated twenty-four hours colony on the first plate also gave micrococci that proved to be the *Staphylococcus aureus*, though the second plate did not exhibit the subsequent peculiar behavior observed on the first one.

After two or three days the plates were removed from the incubator and set aside at the room temperature. On December 24, fifteen days after the scratch attenuation, a striking change in color was noticed in the colonies on the first Löffler plate. The colonies were no longer orange-yellow, but grayish or white. These altered colonies were now examined microscopically and gave vast numbers of bacilli, closely resembling the bacilli seen in the original culture tube,

though staining more faintly. In order to watch the development of these bacilli, another scratch attenuation was made from the original tube culture on a plate of Löffler's serum. For six or seven days, at the room temperature, the growth on the plate, both the confluent lines of the first scratches, and the isolated colonies, exhibited the orange-yellow of the *Staphylococcus aureus*; and only micrococci could be discovered in stained preparations. Gradually, however, the white growth appeared, first at the edges of the confluent lines, and then at the periphery of the isolated colonies until, at the end of two weeks, the yellow color was entirely lost; and the grayish or white colonies gave hosts of bacilli and very few cocci, in stained preparations. Curiously enough, in both of the plates which underwent this transformation, every colony, either isolated or confluent, was overgrown by the bacilli.

After these failures to separate the cocci and bacilli by the scratch-plate method, several attempts were made to effect separation by the ordinary dilution-gelatin-plate method. This was impossible, however, on account of the rapid liquefaction induced by the *Staphylococcus aureus*, as the plate ran down before any other growth appeared. Agar plates have not been tried up to the present time.

An attempt to explain the results of these experiments presents many difficulties. At first sight it would seem easy to assume that, since the bacilli on the plates cropped out only at a late date, and at the room temperature, they must have belonged to some slow growing saprophytic species. But it must not be forgotten that in the mother culture from which the plates were prepared, bacilli, indistinguishable morphologically from *Bacillus diphtheriæ*, appeared promptly in twenty hours at the body temperature. Further than this, the remarkably close association of the *Staphylococcus aureus* with this bacillus which absolutely refused separation by the scratch-plate method, and by the gelatin-plate method, can not be readily explained, and if it does nothing else, this occurrence forcibly impresses upon us the inadequacy of the plate method of separating bacteria. Then there remains for explanation the fact that in three swabs on three successive days from the same patch of membrane in a sore throat, diphtheria-like bacilli appeared only in the first culture, and micrococci, consisting principally of the *Staphylococcus aureus*, appeared in the other two cultures. The most probable assumption that suggests itself to me is that this bacillus, which was morphologically identical with the *B. diphtheriæ*, was forced to undergo these peculiar changes, both in the throat of the patient, and on the culture media, as a penalty for its symbiosis with the *Staphylococcus aureus*.

TOXICS.

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A poison is a substance, which when taken into the system is either absorbed or by its thermal action on the parts with which it is in contact produces deleterious effects. It may seem strange that almost all toxics are innocent, until they reach the circulation of the blood. Their slow or rapid absorption largely determines their deleterious effects upon the system. In our observations we are reminded from time to time of the idiosyncrasies of individuals and we sel-

dom inquire into the causes of these peculiar conditions. It is generally attributed to a perversion of the nervous system, but in truth is caused by a rapid absorption of the poison and is modified by the power of resistance inherent in the individual. Hereditary predispositions and peculiar cachexias in persons are dissimilar conditions, and are in no sense identical. Heredity has not been defined satisfactorily, but the conditions of progenitors are transmitted in an attenuated form, which underlies their maladies.

When disease is engrafted into the organism it destroys the equilibrium of the entire physical life, and there is a want of coördination and harmony that is essential to perfect development and health. The continued multiplication of these distorted and diseased germs can in no way be more advantageously studied than by the observance of the results that follow. The non-observance of this law enfeebles and annihilates entire families and races. As to cachexias, it is a law of nature throughout the animal and vegetable kingdoms that the multiplication of likes tends to weaken organic life and, on the other hand, that the aggregation of dissimilars strengthens the protoplasmic results of differential unions. The non-observance of this truth produces results to which we apply the word cachexia. In its application to animal life, it is so well understood and applied in the union of the sexes, that the consequent results are most advantageous. The same principles are applicable to man in his protoplasmic development, and if properly studied and understood are of the most benign character as to perfect physical development. The vulgar opinion prevails that hereditary diseases are innate and that they lie dormant for a time and then, as it were, explode and destroy their victims. This doctrine is as false as a general rule, as it is ridiculous, as simply a predisposition is transmitted. Were it true, all such weaklings would die in infancy. It would be infinitely better for all such to die in babyhood than to live and suffer from inherited disease. The great desideratum for the educated and enlightened part of the human race is to consider this truth and put it into practical use, so far as the health, intellect, strength and well being are concerned in the multiplication of the race.

It is not difficult for the acute and careful observer to indicate the affiliations that will in a general way insure the best results. Divine as well as human laws condemn consanguineous marriages on account of their painful results. This great truth has been taught by the most careful, aggressive and learned physicians and surgeons, down through the decades, that syphilis and scrofula are identical. The views of the immortal Dr. Samuel D. Gross have been constantly with me, in an experience of over twenty-eight years in the practice of medicine, and have been verified in my observations to my entire satisfaction. That the toxic germs of syphilis are transmissible in the various stages of the disease is incontrovertible and undeniable. It is probable that there is a living germ for all diseases, and as our knowledge increases upon this subject we will be enabled to prevent and cure many diseases that are now believed to be beyond prevention and remedial influences. When hereditary disease conditions appear and toxic causes are present, they find an easy access into the system and suitable influences for their propagation. The blood is the life of the body and constitutes about one-fifth of its entire weight, which enables us to

understand how deleterious must be the entrance of toxics into the circulation, and their effects upon the economy of life.

The germ theory of intoxication is so well established that there are few members of the medical profession who deny or question its correctness. Toxics enter the circulation of the blood and their action on the normal cells produce toxins and the multiplication of these products bring on pathologic conditions. Nothing is more easily demonstrated than that the emunctories throw off toxics. All excrementitious matter when re-introduced into the circulation is poisonous; urine, bile, feces are poisonous and become more so after exposure to the air. In diseases many things have to be taken into consideration—the individual, age, sex and other conditions, as well as his environments. We observe at once upon the entrance of a toxic into the circulation of the blood that all the functions of the body are impaired to a greater or less degree, and that definite poisons are quickly formed such as ptomaines, leucomaines and others which are nothing more or less than an altered nutrition. The vital forces are at once disturbed or arrested. Primarily the circulation, and secondarily the nervous system are impaired, and a condition termed shock is superinduced. This state is a most interesting study to the pathologic student, difficult of comprehension and explanation. It may be remarked that all the vital forces are similarly affected at the same time. The *vis medicatrix natura* can at no time be more carefully studied and understood than when the vital forces struggle for an equalization, and restoration of the normal conditions.

In the state of shock, nature seems intent upon relieving herself of all effete matter, by the discharge of the contents of each viscus of the body. All such efforts should be assisted by artificial means in restoring a healthy condition. Vigorous health and strength are maintained by proper food, perfect digestion with healthful environment. In the germs of organic life, disease takes its beginning by the introduction of toxics; thereby the blood is changed and disease set up. Certain predispositions are inherited and the subject rendered more easily affected by specific toxic influences. That all persons exposed to the same influences are not affected is because of a weakened vital condition thereby rendering them more easily poisoned. All are impressed by the same specific toxic influence under similar circumstances. Molecular and cell life are great mysteries of which we know very little. When the physiologic laws of cell life are properly considered it is evident that the mineral and animal constituents are alike being prepared for the building up of the different tissues that constitute the body.

We begin life by the blending of cells that are healthy or diseased which determine the ultimate result. Farther on we are taught that the blood corpuscles are formed in the spleen and long bones, but I would inquire how they are formed, when neither spleen or bones are present in embryonic development?

In organic growth the circulation is first established, the nervous system follows on, and seems to regulate the entire development of the body. The truth I would establish is that disease begins in the cells and that all treatment employed must be directed and applied to the circulation of the blood, that while we may differ as to the utility and impor-

tance of remedies, we can not gainsay their benign influences when wisely and judiciously administered in diseased conditions. That a physician can practice medicine and deny the value of scientific medicines is the surest evidence of that want of knowledge to prosecute the work of the sacred art of healing. Toxics are poisons that produce conditions peculiar and distinct in their final results. We are fully aware of many different forms of toxic life, but at a great loss to know by what means they obtain entrance into the body and circulation. We know that food, drink, and the air we breathe are vehicles through which the germs reach the circulation. Contact is necessary; that most infectious toxic germs may be deposited in various stages of incubation, but are the same in each disease. Toxics may be classified as contagious, infectious, malarial and thermal. The vitality of disease germs is variable and in general terms can not be specified. The germs of many contagious diseases have been known to retain their vitality for long periods of time, and to readily prove toxic under favorable conditions. Smallpox, phthisis pulmonalis, scarlet fever, diphtheria, measles and many other diseases may be cited as illustrations of the viability of toxic germs.

It is true that in the organism there is a continual tendency toward toxemia from the normal physiologic processes, which is counter-balanced by the excretions of the body. If for a short time you modify or arrest the eliminations by emunctories of the body, the whole economy of life is disturbed, pathologic conditions are set up and disease established. Elimination must take place through five excretory offices; a disturbance or disarrangement of one or more destroys the vital equilibrium of life. The non- or partial elimination of the effete products of nutrition and disintegration generates toxics. The vital forces are a constant barrier through their tendency to equalization of the constituents of the protoplasm of the blood against the deleterious effects of toxics. The abnormal albumens escape by the kidneys, and destroy the renal epithelium; thereby inflammatory diseases of these organs are set up. It may be stated that leucin tyrosis, and many other toxic products of the liver are the results of imperfect excretion.

The body in a normal and pathologic state is a receptacle and laboratory of toxics. I am impressed, while considering this subject, that by the cravings of the appetite, nature in this way points out that which she in a general way needs for her sustenance. It has been a rule of practice with me to permit the sick to eat and drink that which the appetite craves. I have as yet to see good reasons for changing this course of practice.

There must be a perverted nutrition in order that infection can take place in man, with a single exception, and that disease is syphilis. In order that disease can attack and harm the human body it must first be prepared for it by pathogenic influences. If it were not for this necessity the human family would have perished from off the earth before this time in the world's history. Nutrition is life, and all influences that tend to destroy must first impair it. We must study nutrition in all that pertains to it in its equilibrium; any disproportion in its constituents impairs and unfits it for its normal use. Perverted nutrition leads to the formation of new substances which become toxic. That much can be done to prevent and cure disease by change of location is

well established. Many lives are saved and much suffering averted by careful and accurate knowledge of climatic influences. Therapy is too general in its tendencies. A few remedies properly prepared and wisely administered give the best general results.

It is to be lamented that venesection is almost forgotten and neglected in the treatment of diseases. We are taught that our civilization has brought about systemic conditions that forbid the use of the lancet. Is it true that we can bring about the same results by our modern therapeutics? We may enumerate a few therapeutic agents, mineral and vegetable, that aid nature in overcoming the pathologic results superinduced by the introduction of toxics into the circulation of the blood. Gold, arsenic, mercury and iodine with their compounds, and opium, Peruvian bark and their alkaloids, with digitalis, aconite and veratrum virid.

That the practice of medicine is becoming more empirical in the age in which we live, is not true but, on the contrary, is broad and general in research as to causation and treatment. Research as to the origin and effects of diseases is becoming more general and characteristic. Lesions of the body are more carefully and scientifically studied each year, as we bring to our aid helps in the investigations now going on in our laboratories that simplify and determine the causes of disease, as well as the changes it brings about. We now definitely know the causes of many of the most fatal maladies, and apply prevention and cures that modify their ravages, to a large extent, and annually save thousands of lives and prevent much suffering. *Contagium vivum* of the contagious germs is beyond all doubt established. The implantation of vegetable organisms in healthy man, their multiplication in the individual infected and their transmissibility to others producing a disease similar to the original, is the final termination of theories on the subject of contagion.

Parasiticism is established in a number of diseases in man, for instance, charbon, glanders, phthisis pulmonalis, gaseous, gangrene, blenorragia, erysipelas, septicemias, as well as in animals and fowls, swine fevers, symptomatic pustule and cholera. Each disease is produced by a microbe, and we must wait for the discoveries yet to be made in microbiologic research for those not already discovered. The dissemination of microbes is universal, and that all are not alike affected is not so easily explained. To a healthy man, the microbe is less likely to be dangerous than to one not in good health, as the individual circumstances are less favorable for development. A modification antecedent in nutrition, renders infection more probable. Fatigue, exposure to cold and wet, severe excitation, bad food and air and many other influences are disease developing causes. Hygienic causes such as excesses in eating, drinking and venery, with loss of rest and bad air develop nutritive disorders in which the cells are perverted, a tainted nutrition set up and among these cells the generative elements of ovule and spermatozoön are formed and by their union will cause the beginning of a new creature whose cells must partake of the disorders of its antecedents. In the entire domain of pathologic research, we know the least about the toxalbumens. As yet our knowledge of the normal physiologic albumen, in health, one of the most important constituents of the blood, is very limited. It is accurately known when there is a disproportion of the

red and white corpuscles, as well as the normal fibrinization of the vital fluid, the toxalbumens prevent the formation of the red and white corpuscles. It may be here observed that in certain pathologic conditions there seems to be a third corpuscle or something that very closely resembles it. In the field of antitoxic treatment, there has been in the past fifteen years a large amount of investigation and laborious work in laboratory research, and while we can but deplore the futility of results, so far as toxin treatment has advanced, we must very highly appreciate the advances so far as causation of diseases is concerned. While it is perhaps too early to draw positive conclusions as to the method of treatment, it may be fairly stated that thus far permanent results are disappointing. Remedies thus far highly beneficial have been obtained from the mineral kingdom, so far as prevention and cure have prevailed.

Prevention is better than cure, and each year the profession of medicine is accomplishing more in this direction. We are enabled by quarantine to circumscribe plague districts, and by cleanliness and disinfection to prevent the spread of disease. The good accomplished in this way is inestimable, and the number of lives annually saved can not be conjectured. The pestilences transmitted from foreign countries under our present immigration laws are a constant menace and danger to our people. I am unable to recall a single instance of the transmission of pestilential diseases from our country to foreign countries.

The constant vigilance on the part of physicians as to the prevention of the spreading of disease in different ways is not estimated or appreciated by the people. We seldom hear it referred to but, on the other hand, the profession is frequently charged with carelessness in carrying diseased germs to their patients. Great care should be exercised in treating patients suffering from contagious and infectious diseases lest the germs might be carried in this manner. From these considerations it appears that when the toxic causes are present, their ready transmissibility and easy access to others, under suitable influences for their propagation, can not be overestimated. It is probable that there is a living germ for all diseases, and as our knowledge increases we will be enabled to prevent and cure many diseases that are now believed to be beyond prevention and remedial influences.

The profession of medicine is now tending toward specialism, perhaps not in some branches to its best interests, but it certainly is true that the bacteriologist is entitled to a more prominent place than he has yet attained. The sciences of bacteriology and therapeutics keep pace with each other and annually many thousands of lives are saved and much suffering averted. The causation of many diseases is beyond our present comprehension, yet the processes following primary elementary dystrophies, nerve reaction disturbances are antecedent to nutrition and infection. Diathesis is a permanent disturbance brought about by the blending of germs that provoke and maintain pathologic processes. It is generally considered a morbid temperament dwarfing all the powers of animal life.

In conclusion, the laboratory research and scientific investigation of toxics as to their propagation in cultures and their introduction into the bodies of man and animals for scientific results are the labors of the bacteriologist. We do not present you the labor of a volume but rather a short review of the

scientific work that has been done in this most interesting field of thought, and its application in the practice of medicine at the present time.

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FREE HYDROCHLORIC ACID—IS ITS ABSENCE FROM THE STOMACH A SIGN OF CANCER?

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It is important to know whether free hydrochloric acid is secreted by the stomach. It is important to know whether its absence from the stomach is an indication of cancer of that organ. Prof. Wm. Osler, of the Johns Hopkins University, in his excellent work on "The Practice of Medicine," published in 1892, states that, "great stress has been laid of late years upon the absence of free hydrochloric acid in the secretions. As an outcome of the enormous number of observations which have recently been made, it may be said that free hydrochloric acid is absent in a majority of cases of cancer of the stomach. This defect is associated with impairment of the secreting function of the organs. The examination should be made repeatedly by the methods already referred to, and with our present knowledge the persistent absence of HCl in the stomach contents, taken in conjunction with other symptoms, may be regarded as highly suggestive of cancer. As Kinnicutt expresses it, 'the presence of HCl in the stomach in repeated examinations in doubtful cases is of the greatest diagnostic value, and points very certainly to absence of cancer.' Rosenheim has very recently shown that in cases in which cancer develops in the base of an old ulcer HCl may be present throughout the course."

Kinnicutt's statement can not be proved.

Rosenheim contradicts Osler. If "the absence of free HCl is associated with impairment of the secreting function of the organ," then why should a cancer situated at the base of an old ulcer form an exception to the rule when, as a matter of fact, the ulcers themselves impair and often destroy the secreting function? If Rosenheim is right, then free HCl is absent in cancers not seated at the base of old ulcers. If cylindrical-celled epithelioma and encephaloid cancers constitute a major portion of all cancers affecting the stomach, as is stated by Osler, and if they have always a particular tendency to develop at the site of ulcers, scars and injuries, according to Paget, Holmes, Erichsen and others, then, if Rosenheim is any authority, are we not to conclude that free HCl must be present in the majority of cases of cancer of the stomach?

To obtain the gastric fluid for chemic examination, Ewald's test-breakfast is advised by the leading text-books. This consists in giving a roll of white bread and one glass of water or a cup of tea. One hour later, the contents of the stomach are removed with a rubber tube. No rule, no instruction of any kind, is given in any text-book whereby we may positively know that the stomach is actually empty at the time the test is applied. And in cases of stenosis of the pylorus it is not only possible, but probable, that the stomach is not entirely empty. However, as a result of Ewald's test, "free HCl should be present, but lactic acid absent." (Prof. Wm. Pepper, "An American Text-book of the Theory and Practice of Medicine," published in 1894, vol. II, page 735). "Should con-