

however, are intestinal diverticula, with a constricted base. The possibility of the diverticulum being an implantation cyst is also to be excluded, as the ovarian cyst was a simple, benign, unilocular cystoma without adhesions and a fluid content changed to a greenish yellow by hemorrhage occasioned by the pedicle being twisted. Cystic malignant disease is excluded for obvious reasons.

## PATHOPHYSIOLOGY AND THERAPEUTICS.\*

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About thirteen years ago Virchow, in an address before the German Anthropological Society, outlined the principle on which this paper is based. He drew a distinction between pathology and nosology. The first he showed is a disturbance of the physiologic balance previously existing and not necessarily connected with disease (nosos). The ordinary conception of pathology is pathologic anatomy, meaning thereby the destruction produced by disease. Through this conception of pathology as pathologic anatomy, illogical as it is, has resulted an enormous number of errors in the clinical conceptions and in the resultant therapy of disease. Pathologic anatomy deals with the destruction of physiologic structure, produced by disease, rather than the disorders of biochemistry and physiology produced by any factor which disturbs the physiologic balance previously existing in any organism. It is true that when the physiologic balance is disturbed by a nosologic factor physiology is perverted to the assistance of disease, albeit the particular function so perverted remains a physiologic function. The toxins of the malarial protozoon, for example, pervert the temperature-regulating apparatus to nosologic ends. The same is true of the toxin of tuberculosis which perverts the normal regulation of temperature through perspiration to nosologic ends. It is in the treatment of these perversions of physiologic function, rather than in the treatment of disease, that therapy has achieved its great and lasting successes. In all diseases there are perversions of physiologic function, from the balance of health previously existing, which constitute the serious danger of the disorder rather than its specific factors.

In epilepsy, for example certain pathophysiologic factors are evident in the condition of the epileptic in the interval as well as in the attack itself.

The nervous irritability of the epileptic manifests itself in one particular direction. The cerebral vasomotor center between the thalamus and subthalamic region and the pyramidal decussation below is **affected**. Irritability of this produces the sudden arterial spasm in the carotid distribution which is so marked in the epileptic onset. Simultaneously, without recontraction, pupillary contraction occurs with resultant relaxation in both cases. Sudden interference with the brain circulation produces unconsciousness and destroys the checking influence of the higher centers on the reflexes in like manner to shock. Meanwhile there has been a sudden deprivation of arterial blood with sinking of intracranial pressure so far as the great brain masses are concerned. A sudden blood influx to the unaf-

ected vertebral artery district occurs, thereby rendering its territory hyperemic. As a result the great convulsion center (the medulla) being over-nourished, functional excess (convulsion) occurs unchecked by the cerebral hemispheres disabled by their nutritive shock. Impeded return circulation of venous blood now comes into play. The venous blood through accumulation of proteid substances acts as a toxic agent, producing the severer symptoms noted during postconvulsive periods. The aura recurs through the well-known physiologic law that any nervous process, normal or morbid, having run through certain paths, these are henceforth paths of least resistance for that process. To this law are likewise due the convulsive equivalent and pre-epileptic and postepileptic mental states. The great elements in epilepsy are the cerebral irritability and excitability and an autotoxic state. Elimination is checked, whence toxic material accumulates in the circulation, excitant to the great convulsive center.

Before this accumulation there is generally strain of the oxidizing organs or on the eliminative organs taking the line of least resistance. Under normal circumstances the toxic elements produced in the organisms are eliminated by various channels. Some are transformed in the alimentary canal into innocuous substances. Gases are eliminated by the lungs, other compounds are decomposed in the liver, and others eliminated by the kidneys and skin. When any of these emunctories is interfered with in discharge of its duties autointoxication phenomena occur. The liver, which embryologically and functionally is two organs—one an eliminative and poison-destroying and the other sanguifactive—by the intrinsic action due to the specific activity of its cellules can diminish toxicity of substances with which it is brought into contact. Such action occurs not only in poisons introduced through various channels into the organism, but likewise in toxic products elaborated within the organism itself because of changes due to tissue activity. In epileptics the liver, like the nervous system, suffers from the general instability. It has extra work to perform, but has not sufficient balance to do ordinary work. Through this the toxic products of oxidizing organs are thrown back on them. The thymus disorders so relatively frequent in epileptics are due to the thymus thus becoming a point of least resistance. The kidneys are also weakened by an undue proportion of sodium chlorid in the circulation. Sodium chlorid undoubtedly has a disturbing influence on renal functions in epileptics, nephritics and diabetics. The adrenals are also imperfectly oxidized because of aggravated insufficiency due to dissociation from their overactive center in epileptics.

The pathophysiologic picture drawn here points out very marked therapeutic indications. The usual theory of epileptic therapy is simply suppression of convulsions. How illogical that is is shown by the pathophysiologic just outlined. There are, it is obvious, several indications to be met in epilepsy other than the suppression of the convulsion. The improvement of the renal, hepatic and adrenal functions is eminently indicated. As the last can be favorably affected by the first two, it is obvious that treatment of these should be attempted. Dechloridization in epilepsy is eminently indicated from the renal standpoint, since epileptic phenomena, even as to the mental disturbances, are often duplicated by eclampsia of so-called uremic or essential fever origin. Dechloridization, because of the desire for salt which is so common to most of the mammalia, is at times a difficult problem, yet but a slight knowledge of chemical

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properties is needed to solve it. Epileptics may be given with advantage sodium bromid in lieu of sodium chlorid, since it has an identical flavor and is undetectable by the patient. If the patient be permitted to salt his food with sodium bromid the complaints and difficulties of dechloridization would vanish, while the drug may exercise, under these conditions, with effect and without evil results, the ordinary action of the bromids.

Dietetics here come into play. The starchy vegetables, carrots, potatoes, turnips, radishes, etc., the woody fiber vegetables, and fruits like the berries, pineapple, etc., all tend to produce fermentable products in the intestines, which take up proteid products, and these are not destroyed by the overworked liver, hence pass into the circulation and are excreted as indican to overstrain the already excessively worked kidney.

This phase of epilepsy, clearly demonstrated as it is by the pathophysiology of the disorder, is generally ignored, partly from the charlatan belief in specifics too common in the regular profession, and partly from the intellectual laziness which declines to analyze clinical phenomena on the omnisciently ignorant plane that this is "theorizing" and that the specific notion is an adherence to fact.

What is true of epilepsy is true of hysteria. The assumption that this serious disorder is simply a volitional simulation is far too general. The older notion that made it proceed from repressed and diverted sexual excitement was far more logical than this. Hysteria consists essentially in an instability due to undeveloped or removed checking influences of the forebrain, through which an undue response is made to a slight irritant. A large number of distortions of physiologic balance may thus occur. The hysteric, like the epileptic, notoriously has an explosive activity of the liver and kidney. From the first occur the hysteric mimics of gallstone colic, jaundice, etc., and the well-known pale urine of the grand attack. Before the grand attacks urinary acidity is either lowered below its normal degree or raised above this. In this last event imperfect oxidation has produced an enormous degree of acidity. In the first case the inhibition of renal action has interfered with elimination of acid. Not only do the kidneys and liver take on this excessive action from removal of cerebral inhibitions, but gastric and cardiac disturbances likewise occur. The last frequently mimics angina pectoris, and if permitted to remain would undoubtedly become this disorder.

For the constitutional treatment of hysteria, therefore, cardiac, renal, gastric, hepatic and pancreatic treatment is pathophysiologically indicated. Very frequently sodium bicarbonate will have a very marked effect not only on the urinary degree of acidity, but on many of the so-called hysteric states which depend on this. In the hysteric hemoptysis and hematemesis, amyl nitrite exercises more than its ordinarily beneficial influence on hemorrhages. It is indicated not only for cardiac and vascular reasons, but likewise because it makes a profound impression on the patient.

Glycosuria, the salient characteristic of many states, including diabetes, is the product of something more than simple imperfection of pancreatic functions. All the evidence so laboriously collected with regard to the influence of the islands of Langerhans simply indicates that these are secondary states, and while frequently present are a nonessential of the disease, diabetes. The ordinary conception that decrease of glycosuria is a physiologic test of improvement by itself is not justified

by analysis. Many states in which the amount of sugar decreases are attended by serious phenomena like insanity, optic nerve disturbance, coma, renal and cardiac crises and pulmonary states. Here the decrease in the amount of sugar is attended by an increase of the poisonous acids in the circulation, which are not eliminated but create the various disorders specified. It is for this reason that sodium bicarbonate often has such a wonderful effect on glycosuric disturbances of the kind named, which have astonished the practitioner by their appearance in the midst of an apparent decrease of the sugar output. From the standpoint of suboxidation it is pathophysiologically clear why such states should occur and, therefore, why many of the cures in diabetes are followed by the conditions named or by death.

The underlying factor of diabetes and glycosuria is very often a neurasthenia, through which the checks on the excessive action of certain organs are removed, thereby producing excessive action in these, followed by exhaustion. Very frequently, in diabetes treated by the rigid carbohydrate limitations, acid states occur with the peculiarly poisonous  $\beta$ -oxybutyric acid present, formed from the tissues themselves because of the need of energy food which has been produced by the rigid dietetic limitations. As diabetes undoubtedly produces strains on the kidneys, directly through the excessive elimination of sugar and indirectly through its removal of checks on the balanced action of the kidney, many renal complications occur and are a most serious part of the picture. Here the dietetic indication is in the direction of relieving the renal strain, through limitation of proteids like eggs, red meats, etc., rather than through limitations of carbohydrates.

Here is an instance of the pathophysiologic phenomenon which deprives a disease of its supposedly specific characteristic and gives it the clinical aspect of a supposedly distinct disorder. In nephritis there are very similar nonspecific characteristics. The pulmonary edema of nephritis produces the so-called asthma of that condition, and this is best relieved by hydragogue cathartics which remove the strain on the kidneys, lungs and skin, rather than by diuretics or by the ordinary pulmonary agents. Strychnin comes into play, as well as strophanthus and cactus, because of their effect in sustaining the respiratory center of the medulla and giving balance to cardiac and pulmonary functions. Without the use of these last-named agents the hydragogues are too apt to depress the heart, however beneficial their action on the general edema.

In dealing with these nephritic states it must be remembered that for reasons already pointed out they may mimic all the great neuroses inclusive of epilepsy, hysteria, exophthalmic goiter and the various psychoses. Furthermore, at the proper age true apoplexies may occur with all their mental and psychic consequences. This result is a logical effect of the strain on the arterial circulation.

These neuroses do not bear the specific character of the origin, and they do not vary from those of other etiology. It is usually assumed that syphilis is purely a specific disorder and that the consequences of it are all treatable by mercury or the iodids. There are a large number, however, of nonspecific results of syphilis in which these agents exercise no effect whatever. There are complimentary dermatoses of syphilis in which specific treatment is without effect, albeit mercury as an eliminant is of value, but falling below other treatments of more marked eliminative power. The neuroses and the

psychoses of the secondary period will yield to the same treatment as nonspecific disorders of like character. The sclerosis, which syphilis, like the essential fevers, produces, and which in its premonitory stages is the underlying factor of the parasymphiloses, can not be affected by an antisymphilitic treatment. The child whose development is arrested by syphilis, without any direct gummata or other specific characteristic, can not be benefited by antisymphilitic treatment.

The same truth obtains with regard to tuberculosis. Many of the phenomena that are most distressing are nontuberculous in nature, albeit the toxin is the primary cause of the very serious secondary causes. These latter need treatment rather than the tubercle bacillus or its microbic allies.

From what has been said, it will be obvious that the pathophysiology of disease needs attention rather than the nosologic label, and more even than the patient himself, otherwise than is viewed from this pathophysiologic standpoint.

#### DISCUSSION.

DR. ROBERT A. HATCHER, New York City, asked Dr. Butler what preparation of cactus he uses. Recently Dr. Hatcher had occasion to examine one of the popular cactus preparations offered to the medical profession, and though this preparation was injected into mammals and dogs, as rapidly as it was possible to force it into the veins in large doses, and given to frogs in doses up to 25,000 times the human dose, he was unable to perceive the slightest effect.

DR. W. E. ROBERTSON, Philadelphia, referred to some experiments with digalen in which Dr. Hoyt and he, at the University of Pennsylvania, injected large amounts into dogs, the dose being given 15 minims at a time, until they used one and a half bottles of digalen, equivalent to 22½ ordinary doses, in a dog weighing 17 kilos, before they got the effect that was produced by tincture of digitalis when only five minims were introduced.

DR. GEORGE F. BUTLER, Chicago, regretted very much that only the few immaterial, non-essential statements of his paper impressed his hearers. The principal point, he said, they failed to grasp, evidently. Some years ago he did a great deal of pharmacologic work. This he has abandoned and is now working on living human beings. In the course of his pharmacologic work, he fed a dog 10 grains of morphin to test the antidotal powers of potassium permanganate, when the dog smiled and wanted more. Of course, he said, it is well known that dogs are not susceptible to morphin, and they may not be to many other drugs. Dr. Butler did not know the action of cactus on dogs weighing so many kilos or pounds, but he did know that clinically he has had certain good effects from it, as he has had from digitalis. What he wanted to bring out was the necessity of a heart stimulant along with the use of hydragogues. He has used many preparations of cactus. From some he has had good results, and from some he has not. The same is true of digitalis, he said. Although he is a regular physician, Dr. Butler said he would use anything on the face of the earth put up by any man, whether he be eclectic, homeopathic or regular, if it gives promise of relieving his patient.

He has had excellent results from cactus made by various firms; not on dogs but on sick people, yet he does not consider the drug as powerful a cardiac stimulant as is digitalis. Its action is somewhat different, but as a steady tonic to the heart, he considers it very valuable. He stated that he simply mentioned cactus as an example. He might have said digitalis. He has used the active principle or concentration of cactus with good results.

DR. C. S. N. HALLBERG, Chicago, asked Dr. Butler in what form cactus was used.

DR. BUTLER stated that he has used the preparations of various houses, including Abbott's preparation known as cactin, which he understands is a concentration. Clinically he has obtained good results, and that is all he cares for. The paper was not on any drug but on a purely different subject, namely: "Pathophysiology and Therapeutics."

DR. ROBERT A. HATCHER said that he realized that his question was an unimportant one, but he waited, before asking it, until he saw that no one rose to discuss the important part of the paper.

DR. C. B. LOWE, Germantown, Pa., called attention to the point that digitalis is a heart tonic which slows and strengthens the heart. Cactus is a stimulant which does not slow it at all. It is not in the same class.

#### CLINICAL OBSERVATIONS IN THE ACUTE INFECTIOUS DISEASES.\*

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One of the most treacherous diseases with which we are confronted is scarlet fever. Knowing this, we can in a measure adopt and enforce certain prophylactic measures which will frequently prevent and modify complications. I have seen cases of septic scarlet fever sent into the Willard Parker Hospital in a moribund condition end fatally within twenty-four hours. On the other hand, I have seen patients exhibiting some of the most malignant types of scarlet fever recover. In spite of the severe type of cases the mortality in the Riverside and Willard Parker Hospitals is very low.

#### CASES OF SCARLET FEVER TREATED IN THE WILLARD PARKER HOSPITAL, NEW YORK CITY.

Year.	Number of Cases.	Deaths.	Mortality Per Cent.
1906. December 24 to January 1..	53	2	3.8
1907. January 1 to May 12..	478	41	8.6

#### CASES OF SCARLET FEVER TREATED IN THE RIVERSIDE HOSPITAL, NEW YORK CITY.

Year.	Number of Cases.	Deaths.	Mortality Per Cent.
1903.....	835	76	9.1
1904.....	899	75	8.3
1905.....	585	56	9.5
1906.....	458	32	6.9
1907, to May 15.....	169	14	8.2
Total.....	2,946	233	8.5

A careful study of the foregoing statistics affords convincing proof that the mortality is certainly very low. Bearing in mind that the cases are from the poorer classes whose food and hygiene can not compare with those of the wealthier class, then the mortality must appear surprisingly low.

My greatest anxiety occurs in private practice, first, because it is hard to keep older children in bed for several weeks, and second, because it is difficult to convince some parents of the necessity of keeping their children in bed for several weeks after a normal temperature has been reached.

The average up-to-date mother looks on the thermometer as her guiding star, and believes that as long as febrile temperature exists sickness abounds, and that when the temperature is normal convalescence is at hand, and, ergo, she plans to dismiss both physician and nurse.

Our duty is plain, and this is one of the most important points that I wish to dwell on, namely, to emphasize that the heart action and the pulse should be watched much more closely than the temperature. A feeble, intermittent or irregular pulse with low tension means much more in determining a prognosis than a sudden spurt of temperature.

The scarlatinal poison shows a peculiar predilection

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