an aqueous solution of granulose can be readily made, which will be comparatively rapidly acted on by saliva.

That the conversion of starch is due to the presence of ptyaline, is proved by the experiment showed to you a few minutes ago, in which you saw that boiling saliva destroyed this property, from which, on the other hand, you would be justified in inferring that ptyaline is what is known as a ferment, and acts "catalytically," a convenient expression of our ignorance.

There is only one other point that I want to call your attention to in reference to the action of mixed saliva on starch, or rather, I should say, in reference to the result of that action; and that is that sugar dialyzes and starch does not.

Into one of these dialyzers, formed by tying a piece of parchment paper over one end of a bell-shaped tube, after having found by testing that they are perfectly tight, I have placed some dilute starch mucilage; in the other, another portion, with some saliva. Both were then suspended in separate vases of water for twenty-four hours. We will now examine them. Upon adding iodine to the fluid around the first there is no evidence of starch, nor upon testing with Fehling's fluid of sugar. While in the fluid around the second there is no starch, but there is decided evidence of sugar. Sugar therefore, dialyzes, but starch does not. All the preceding experiments can be made with an aqueous infusion of the salivary glands of most of the lower animals; e. g., guinea pigs, oxen, sheep or rabbits.—*Medical and Surgical Reporter*.

PREPARATION OF PEPSIN, AND THE GOOD TO BE OBTAINED FROM IT.

By Jos. ADOLPHUS, M.D., of Georgia.

IN 1872 I read an interesting paper on the preparation of Pepsin, by an American author whose name I have unfortunately forgotten. The simplicity of the process, the way of obtaining the ferment according to the manipulations of this method, so impressed my attention as to fasten itself on my memory.

The process is so simple and easy of execution as to permit the whole thing being performed in a parlor, and is as follows:

The mucous coat of the calf's stomach is carefully stripped from its other attachments, and is finely chopped. It is then macerated in water, slightly acidulated with c. p. hydrochloric acid of sp. gr. 1.17, at a temperature of between 80° or 90° for several days, during the time being frequently stirred, so as to wash out all the soluble pepsin from the gastric glands. The whole is then strained through muslin, and the residue pressed or squeezed with the hands to force out as much of the fluid from the magma as is possible.

The second step in the operation is to prepare a saturated solution of common salt in cold water, of which a quantity equal in bulk to the above solution is added to it, and the whole put aside and at rest for twenty-four or forty-eight hours. The pepsin will soon separate from the mother liquor and float on the fluid, from which it can be taken by a common spoon or perforated skimmer; it is then dried by pressing it between paper. Pepsin in this condition resembles plate paper and parchment. It is next dried in a cool, dry place, free from dust, and when well air dried, nine times its weight of good well dried sugar of milk is added, with which it must be well and thoroughly triturated. Ten grains of this represent one of pepsin. I have found the pepsin immediately after its preparation, and before it is air dried, to be readily soluble in glycerine at temperature of the body in the proportion of 15 grains to the third ounce.

I have twice prepared pepsin after this formula, which is much the cheapest yet that has come under my notice. If the sugar of milk triturate is kept in quantities of small bulk in well secured glass coppered bottles, it will in a dry climate keep for two years. In the South it will not keep six months, if the least exposed.

The author of this process, if I recollect aright, observed that one grain of this pepsin dissolved in a few ounces of water slightly acidulated with hydrochloric acid, will dissolve 500 grains of coagulated albumen. The glycerine process of obtaining pepsin is, to my mind, the best, but not as easy as the above. The only objection to be urged accuses the glycerine of taking up mucous and other impurities along with the pepsin. This, however, is reduced to a minimum if the tissue is well washed in soft water, so as to remove the mucus, which can be largely effected with care. I have frequently prepared pepsin after this manner, which is as follows:

The mucous coat of the calf's stomach, obtained in the same way as the other process, is well washed in clear, lukewarm soft water to free it from mucus. It is then well dried between cotton cloths, to abstract all superfluous water and moisture. After this it is chopped fine, and placed in a wide mouth, well fitting glass stopper bottle, and covered with pure glycerine at 100° F.; then the stopper is carefully replaced so as to exclude the air and moisture. The bottle must be kept in a warm place and frequently shaken. Three days' maceration is long enough. The glycerine is then decanted, and the magma, which has been well pressed, is replaced in the bottle, and half as much water as there was originally of glycerine, slightly acidulated with hydrochloric acid (about 3 drops to the fluid ounce) is poured on it and the bottle again placed in a warm place, and frequently shaken. Eight or ten hours is long enough for this last maceration. The fluid is decanted, and the magma is pressed. After allowing time to settle, the fluid is carefully decanted from the dregs. The decanted fluid is then evaporated to one fourth its bulk, and is added to the glycerine first obtained. This will keep for several years. I have had as good results from it after three years as when first prepared. It should be kept in bottles of one or two ounce bulk, well stoppered, so as to exclude the air.

If properly prepared, 10 drops of this will dissolve 250 grains of coagulated albumen in water, slightly acidulated with hydrochloric acid.

Now for the use of pepsin. Omitting dyspepsia and the long list of its kind in chronic affections, for the cure of which it has been so well applied, few have thought of turning its valuable properties to assistance of patients suffering from acute diseases, to weather the storm till convalescence comes around.

In acute diseases the safety of the patient, in a great measure, depends on the quantity and duration of resisting stamina the organic forces are able to present to breast the surging wave of the destroying process called disease. Comparatively brief, indeed, is the time consumed by these acute diseases in making their march, but brief as it is, the whole organic life forces of the economy are being rapidly sapped in different ways, but notably in largely cutting off the supply of nutrition in different ways, and, as a secondary result,

the impairment of the integrity of the histologic elements of those tissues which largely compose the organs most essential to life.

Not having the space to enlarge on this interesting topic, let us proceed to the practical facts.

In typhoid fever experience has taught me that the major percentage of deaths occur between the close of the second week and the middle of the third; just the time when inanition would tell the heaviest on the resisting forces of the economy. If we omit such accidents as hemorrhage, perforation, and the like, which are few in comparison as a cause of death, in typhoid fever, with exhaustion, the case clearly presents the truth of my proposition.

I hold that it exercises dynamic force on organic and constructive processes of the economy after it enters the blood; by this means it increases the dynamic forces of nutrition, and saves life by increasing the molecular energies between the nutritive juices and the elements of the tissues. There are abundant facts to prove this. Very frequently convalescence is defeated because the patient is too much exhausted to get well.

This spring I was asked by a medical friend to see with him an old man who was very ill with typhoid pneumonia. The main features of his case, aside from the lung trouble, was very great exhaustion. I suggested pepsin, and the wine of it, which was of recent make, and was proven good, was used. In twenty-four hours a decided change for the better was observed, which brightened every day till convalescence was completed.

Two years ago I attended a lady through an attack of pneumonia. Her recovery was very problematic, on account of the extreme debility she was in. As a last resort I gave her pepsin that I had prepared with glycerine. Immediate improvement, almost, was visible after the taking. A notable point in these cases is the increased demand for food these patients soon make after taking the pepsin.

It is evident to all straight thinking people that, anything which will increase the powers of nutrition and assimilation in people suffering from acute disease, will increase also their chances of recovering.

This line of reasoning and the practice founded on it, apply to sick children in a very pointed manner.

Appropriation of nutritive pabulum can alone fortify against the collapse of the life forces and the cessation of function.

In pneumonia the largest percentage of deaths occur during the latter part of the first week and the beginning of the second. Death takes place from heart debility.

Without stopping to investigate the remote causes of death in pneumonia, we simply inquire: Will the intelligent administration of pepsin contribute anything toward retarding or removing the proximate cause of death? I think it does, and this, too, on the simple principles already alluded to.

When there is rapid destruction of tissue, the strain falls heaviest on those organs that are most used in carrying on the functions of life; among these prominently stand the heart and respiratory.

This fact points sharply to children, and explains why death in them so frequently commences at the heart and lungs. In point of fact, the major part of instances in which death is supposed to commence at the brain in children, is no more than defective blood supply to the brain, either in quantity, from heart feebleness, or in quality, from lung defectiveness.

The abdominal affections of children being attended by great emaciation and exhaustion, the value of pepsin to them cannot be well overestimated. The period of the disease in which it is proper to use pepsin is at the time, or immediately after, the disease has reached its height. In typhoid fever this is true; in pneumonia, seeing how rapidly heart failure comes on, the acme is reached no doubt very early, often on the third day.

The conditions that call for stimulants also call for pepsin. While stimulants can spur the naked and jaded energies into quicker movements, pepsin communicates to the molecular elements of the tissues a higher impulse, and awakens in them a more exalted energy to take food and live.

The dose of pepsin in all acute diseases must necessarily be small, not to exceed one-eighth or one-fourth of a grain every two or three hours, and always in a weak solution of hydrochloric acid, which must be strictly chemically pure. It may be, though in an humble way, the principles and facts set forth in this paper are a new departure from the philosophy of the schools.—*Southern Medical Record*.

MICROSCOPICAL OBSERVATIONS IN YELLOW FEVER.

By J. B. MARVIN, M.D., Professor of Chemistry and Microscopy, Hospital Medical College; President of Microscopical Society, Louisville, Ky.

THE literature of yellow fever is very voluminous, but our knowledge of the pathological anatomy of the disease is very meager. I believe by calling to our aid chemistry and the microscope most valuable additions will be made to our knowledge of the disease. While resident physician at the Louisville Yellow Fever Hospital, I improved my opportunity by making frequent and extended chemical and microscopical examinations. I present you to-night a brief summary of my work as far as I have finished. I present you bare facts, illustrating my remarks with mounted specimens. I offer no theories or deductions from my work, believing that our knowledge of this disease will be best advanced by a careful and conscientious record of facts instead of vagaries and theoretical hypotheses.

The Breath.—Pure glycerine was smeared in the center of a clean new glass slide, and held an inch or two from the nostrils or mouth of the patient. After a few minutes' exposure to the breath the slide was examined under the microscope. Large quantities of very active vibrios were revealed; they were of the short, dotted variety. There were also found roundish, oval, moving bodies, probably bacteria.

The Blood.—A drop of blood from the finger was received on a slide covered with thin glass, avoiding pressure, and examined. The corpuscles were more or less jagged and crenated. In some severe cases there was a large increase in the number of white corpuscles. Scattered among the corpuscles were small oval and rod-shaped bodies, yellowish in color, and quite active in their movements. They were probably bacteria, but do not resemble vibrios or any form of bacteria that I am familiar with. More extended observations in this and other fevers must be made before attaching undue importance to the existence of these bodies in the blood and breath. The question naturally suggests itself whether these bodies are the cause or the result of this disease. In-

cline to the belief that they are the result. Every precaution was taken, in making these examinations of the breath and blood, to avoid contamination. The examinations were made with a Folles one-tenth inch immersion objective and a "B" ocular.

The Urine.—The points of interest in the urine were the constant presence of granular tube casts, renal epithelium, and granular matter, all more or less stained yellow with bile; the tube-casts in severe cases appearing as soon as the second day, more generally on the third or fourth day of the attack. In all cases there was an admixture of vesical epithelium. In some few cases there was a great abundance of vesical epithelium for a few days before the appearance of tube-casts or renal derivatives. The quantity of tube-casts may be small or very large. The severer the case, the greater the quantity of casts. Tube-casts are very valuable guides in the prognosis of the disease. As convalescence sets in, the casts generally disappear. In some cases, however, they continue in considerable quantity till after the patient is up and walking about.

The Vomit.—After the stomach had been emptied of food the vomit was glairy mucus and epithelium streaked with blood, bearing a striking resemblance to the sputum of pneumonia. Bile in greater or less quantity was generally present. Frequently pure blood was vomited in large quantities, the ejection of blood frequently alternating and following black vomit. The coffee-ground or black vomit consists of blood more or less digested and broken down by the gastric juice and bile. There were large quantities of vibrios, an oval, not recognized growth, and frequently very large crystals of hæmatoidin.

The Liver.—The principal pathological changes are found in the liver. The color may be bright yellow, orange nutmeg, or normal. The organ is generally enlarged, the enlargement being very slight in some cases. It is very firm and tough. On section the hepatic cells are granular, frequently stained with bile, and have undergone almost complete fatty degeneration. There is generally an increase of the connective tissue and a consequent pressure upon and destruction of the cells. In one case, aged twenty-seven, not a drinker, who had suffered at intervals for two years with malarial fever, there was an enormous increase of the connective tissue visible to the eye, giving to the organ the appearance found in cirrhosis. On section all the appearances of cirrhosis were found, with marked fatty degeneration in parts, and in other places amyloid degeneration.

The Kidneys.—The kidneys are congested and in some cases considerably enlarged. On section there are found tubal and inter-tubal hemorrhages. The tubules are filled with granular matter and epithelium; in some parts the tubules are empty and completely denuded of epithelium. There is frequently fatty degeneration, slight in degree. In short, the kidneys present all the appearance of Bright's disease.

The Spleen.—The spleen presents no constant or marked deviation from health. In some cases, which gave history of previous malarial trouble, the organ was enlarged and pigmented. In other cases there was no enlargement or pigmentation.

The Stomach.—This organ does not appear congested as stated in text-books. The mucous membrane is pale, and is not destroyed. In only one case was there any thickening of the membrane or enlargement of the rugæ. On section, the glands and villi are but slightly changed. The villi, especially their free extremities, contain blood. I am convinced that the changes stated to have been found in this organ are really post-mortem changes, due to the fact that examinations were not made until some hours after death. Post-mortem changes are very rapid, and the sooner an examination is made the better.

The Intestines.—The intestines generally present the same appearance as the stomach. In some cases there is marked congestion, and the villi present appearance of acute catarrh.

The Bladder.—In those cases where there is suppression of the urine for any length of time before death, the bladder is badly congested, the mucous membrane being purple in spots. In other cases there is no marked change. The gall bladder is full of bile, frequently greatly distended and badly congested.

The Lungs.—This organ presents no constant change. In several cases there was recent pleuritic adhesion; in one case there was severe pneumonia. In some cases the organ is completely collapsed. The color is generally dark and mottled; hemorrhagic spots are frequent.

The Heart.—The heart may be full or empty. In some cases there is marked fatty degeneration, the walls being pale and friable. Most generally the organ is normal. The pericardium always contains more or less reddish fluid, the amount varying from one to six ounces.

The Brain.—No lesions were found in the cerebrum, nor constant change at the base of the organ. In cases which had marked delirium, there was marked congestion and softening at the base. I have not finished my microscopic examination of this organ.—*Louisville Medical News*.

APIOL, the active principle of parsley, discovered by Taret and Homelle in 1855, is an oleaginous amber-colored liquid, soluble in water in any proportion, of an acrid taste. It may be given in capsules. According to Marotte, of La Pitie, it brings on the menses, regulates menstruation, and calms the pains by which it is often accompanied. It has no action on the pregnant womb.

DISCOVERING SPERMATOCYTES.—Rovière (*La France Médicale*) gives the following: In summer cover the urine, in a bottle, with a layer of benzine, to prevent decomposition. In winter this is not required. Let it remain at rest for twelve hours. Decant the greater part, leaving the muddy bottom part. Mix with this about its volume of sulphuric ether in a test tube; shake violently. In a few moments the ether rises to the top of the liquid, carrying the spermatozoa with it, and can be drawn off with a pipette for examination.

PREPARATION OF HYDROGEN GAS.—H. Kollmann.—Hydrogen is easily obtained by treating ferro-manganese with dilute sulphuric acid. The gas thus obtained is not merely adapted for ordinary laboratory purposes, but also for Marsh's arsenic test.