The adequate treatment of the subject enzymes would naturally include a detailed account of the digestive enzymes and their action, but as this has already been given in the article *Digestion* in this handbook, it it will not be repeated here.

Relation of Enzymes to Serum Therapy and to Immunity.—There is no subject in the medical world at present which arouses greater interest than serum-therapy and immunity, and from the immense amount of work done in this field the following facts (among many others) are regarded as demonstrated:

(*a*) That the serum of certain animals destroys the red blood corpuscles of certain others (globulicidal action).

(*b*) That the serum of certain individuals has the power to destroy bacteria introduced into the system.

(*c*) That the blood (serum) of certain individuals has the power to destroy the toxic products of bacteria when injected into the system.

(*d*) The most potent factors in immunity from disease are (*b*) and (*c*)—especially (*b*).

The substances which confer this activity on blood serum have generally been regarded as proteid in nature, and these active proteids in (*b*) and (*c*) are commonly called "*defensive proteids.*" Two of the most prominent authors who have written on this subject are Buchner and Hankin. Buchner called these active substances *alexins*, while Hankin divided them into two classes: sozins and phylaxins, and these names are in general use at present.

Quite recently, in a series of articles in the *Münchener medicinische Wochenschrift* (1899 and 1900), Buchner has come out for the theory that his alexins are proteolytic enzymes, and he has advanced certain explanations of their action, involving the theory of immunity. Part of his theory has been disputed by Ehrlich, and an interesting discussion of the subject has followed, the details of which would be out of place here. It is interesting to note, however, that the increasing scope of zymolysis has extended to giving enzymes a possible place in this most advanced line of medical research.

George T. Kemp.

EOSOLATES are salts of sulpho-acids of the aliphatic creosote esters, representing twenty-five per cent. of creosote. *Calcium eosolate* [$Ca_3(C_7H_7S_2O_{12})_2$] is a gray, gritty powder like pumice-stone, with a slightly pungent, rather ethereal odor, and a somewhat acrid and leathery taste. It is soluble in eight to ten parts of cold water, seven of hot water, slightly in alcohol and acetic acid, and freely in the presence of hydrochloric or citric acid. It is insoluble in chloroform or turpentine. H. Stern recommends it in dose of 0.25–0.7 gm. (gr. iv.–x.) three or four times a day for diabetes mellitus, diabetes insipidus, and phthisis. In larger dose it may cause diarrhœa and griping.

Eosolate of silver has been used in gonorrhœa, and *eosolate of quinine* in malaria and influenza.

W. A. Bastedo.

EPHEDRA ANTISYPHILITICA. — *Mountain Rush. Canutillo. Mormon Tea. Grease Wood. Whorehouse Tea.* The twigs of *Ephedra antisyphilitica* C. A. Meyer (fam. *Gnetaceæ*). This peculiar shrub, and various other species of the genus used similarly, are found in great abundance over the arid regions of our great plains. The plant reaches a height of two or three feet and produces a dense mass of erect, green, leafless branches, half the thickness of a lead-pencil and striate or channelled, with membranaceous scales at the joints. Wherever it is known, it bears a high repute in the treatment of venereal diseases, which are seldom differentiated in the reports. It is both bitter and astringent. The latter property might give it some value in gonorrhœa, while the former would render it tonic and perhaps alterative. No systematic study of its properties has been made, and we can only conclude that it probably has some merit. It is chiefly given in decoction; the dose employed representing one to two drachms of the drug. The remedy may also be administered in the form of a fluid extract. The drug contains a glucoside, *ephedrin*. *E. monostachye* L., of Asia, has a similar reputation.

Henry H. Rusby.

EPHEDRINE ($C_{10}H_{15}NO$).—An alkaloid derived from *Ephedra vulgaris* Rich. and *E. helvetica* C. A. Meyer. It is crystalline, colorless, and soluble in alcohol. It is used in the form of the hydrochloride, which is soluble in water. It is poisonous, resembling atropine in some respects. While it lowers the blood pressure, it causes the temperature to rise and the pupil to dilate. It is used like atropine for the latter purpose, one to two minims of the ten-per-cent. aqueous solution being instilled. It usually requires nearly an hour to obtain the desired effect, but when once obtained it usually lasts for from a half a day to one day, but accommodation is not affected.

Ephedrine, Pseudo-, has the same composition as the above and its hydrochloride has the same properties and is used in the same way.

Henry H. Rusby.

EPICARIN ($C_6H_5COOH.OH.CH_2.C_{10}H_6OH$) is a condensation product of creosotinic acid and beta-naphthol and is, chemically, oxynaphthyl-o-oxytoluylic acid. In its crude form it is a reddish powder, much used in veterinary practice, and called "Epicarinum veterinarium." From this, pure epicarin is obtained by recrystallizing from glacial acetic acid, and removing the excess of acetic acid by heating to 120° C. or by recrystallization from alcohol or benzol. It occurs in colorless or yellowish needles of a strong acid reaction, melts at 199° C., dissolves readily in alcohol and ether, and forms easily soluble neutral salts.

This remedy was introduced by Dreser as a non-toxic substitute for beta-naphthol, and was at once taken up by European dermatologists. Frick and Müller believe it to be slightly toxic, though others say it is harmless even to children. It is of especial value in scabies, for, though less destructive to the acarus than tar, lysol, carbolic acid, or creosote, it relieves the itching promptly, and is not unpleasant. Kaposi uses it in ten-per-cent. ointment, or in solution with alcohol and glycerin. He has had good results in certain eczemas, in scabies, prurigo, and herpes tonsurans. Pfeiffenberger rubs in every evening without preliminary bathing the following:

℞ Epicarin	7.5	gm.	(ʒ ij.)
Cret. prep.	2.0	"	(ʒ ss.)
Vaselin. alb.	30.0	"	(ʒ i.)
Lanolin	15.0	"	(ʒ ss.)
Adipis	45.0	"	(ʒ iss.)

In his experience, epicarin is well borne by delicate skins; but, as the skin tends to become red and dry from continued use, he follows its application with diachylon ointment. In eczema pure and simple it does more harm than good. Some writers recommend epicarin highly in ringworm and other mycotic skin diseases. A good lotion would be:

℞ Epicarin	10.0	gm.	(ʒ iiss.)
Glycerin	10.0	"	(ʒ iiss.)
Tr. lavand.	30.0	"	(ʒ i.)
Ether	30.0	"	(ʒ i.)
Alcohol	ad 120.0	"	(ʒ iv.)

For scabies the following is useful:

℞ Epicarin	15.0	gm.	(ʒ ss.)
Sulphur	4.0	"	(ʒ i.)
Ungt. zinci oxidi	ad 90.0	"	(ʒ iij.)

Sig: Rub in every second day.

W. A. Bastedo.

EPIDEMIOLOGY. See *Infectious Diseases.*

EPIDERMIN is made by mixing equal parts of melted white wax and powdered acacia, adding the same weight each of water and glycerin while boiling, and stirring until cold. It is used as a vehicle for skin medication.

W. A. Bastedo.

EPIDIDYMITIS. See *Testes, Diseases of.*

EPIGEA. See *Ericaceæ.*

EPILEPSY.—(Synonyms: *L'Epilepsie, Fallsucht, Epilepsia, Falling Sickness, Mal Caduco, Morbus Herculeus.*)

Definition.—A disease in which sudden losses of consciousness are attended by more or less convulsive muscular action.

The seizures of epilepsy have been called—because of their varying degrees of severity—*epilepsia gravior*, or *grand mal*, and *epilepsia mitior*, or *petit mal*. The first is characterized usually by the severe attack, which consists ordinarily of marked loss of consciousness and complete violence of muscular movement; while the latter is manifested by a trifling seizure, with transitory mental obscuration and little or no muscular convulsion. There are irregular varieties which have been called *masked* or *aborted* epilepsy, owing to the imperfect development of the more familiar symptoms. In these masked cases the attack takes the form of a psychical derangement without definite motorial expression. An attack of this character is known as the "psychical equivalent" of an epileptic seizure. There are, besides these, a form known as *l'epilepsie partielle*, or hemi-epilepsy, which is always dependent upon cortical degeneration or unilateral disease, and another to which I have given the term *sensory*, in which more or less disturbance of the special senses exists with imperfect mental and motorial symptoms. A number of special names have been applied to epilepsies with reference to their etiology, "gastric epilepsy" being a familiar illustration.

The lighter form, or *petit mal*, may consist simply of a momentary loss of consciousness, during which the patient becomes suddenly very pale, while the color recedes from his lips and cheeks, and the respiration for the moment is temporarily arrested and then afterward accelerated. The eyes may remain open and be rolled upward; less often the lids are closed. While in the midst of some occupation the patient may be taken, and the particular act is interrupted in its performance. The glass or spoon drops from the hand, the pen is arrested in the middle of a half-written word, and oftentimes the patient's trouble is so transitory as to escape notice, he himself, as a rule, being utterly unconscious of it. Then afterward the sentence is finished, and, beyond an occasional residual dizziness, nothing remains to remind the patient of the attack.

In other cases, or at other times, the seizure is more grave, as regards both the unconsciousness and the severity and extent of the spasms. The patient may become rigid and then agitated by limited twitchings and cramps of the fingers. The color leaves the face, and the pupils are widely dilated. In a few seconds he is able to arise and go about his business. Delasiauve[1] and other French writers speak of *absences*, *vertiges* and *accès intermédiaires* as forms of petit mal, while Reynolds divides the light attacks into those without evident muscular spasm and those with spasm. The light attack may, according to writers generally, consist simply in an interruption of speech or the act of writing such as I have detailed; or of a momentary confusion of ideas. The mouth is drawn to one side or the other, or widely opened, and there is a rapid alternate contraction of the muscles of the neck, so that the head executes movements backward and forward with great rapidity; or the chin is thrust forward and upward to one side, giving the individual the appearance of a person suffering from torticollis.

These attacks may simply consist in a temporary aphasia, the so-called *epileptic* aphasia, during which the patient is speechless or substitutes words.

The *petit mal* is either found alone, or the attacks occur in association with those of a more grave character. There are numerous cases in which light seizures alone exist, or for many years precede a more dramatic manifestation.

The fully developed attacks (*grand mal*) are frequently preceded by certain *warnings* or *auræ*, which may exist in a simple or complicated form. These, in their order of arrangement as regards frequency and constancy, are sensory, psychical, motorial.

The *sensory prodromes* of an attack are of the most diverse character, and the patient complains of such transient subjective sensations as tickling or tingling in the cutaneous surface, chiefly commencing in the extremities, on one or both sides, and centripetal in character, the morbid sensation appearing to advance toward the head from some distal point. This is a peculiarity of what is known as the *epigastric aura*, which consists of a very disagreeable sense of pressure beginning below the sternum and ascending. Patients complain of constriction of the throat, of a sensation as if ants were running or wind was blowing over the surface, of fugitive pains, and of a great number of sensory troubles. Certain visual warnings are complained of as immediate precursors of the attack. The epileptic is occasionally apprised of the coming on of an attack by the perception of colored rings, spots, or broad fields of color, in which red or blue most commonly predominates. Scintillation and *muscæ volitantes* constitute the auræ in some cases. The existence of these latter is of much shorter duration than the distal sensory warnings referred to above, and so sudden is their onset that the patient is frequently unable to describe them. Sometimes the optical illusion is likened to the recession of objects or their advance; or again, the patient alludes to his being environed by a cloud. It is by no means uncommon for patients to complain of double vision and of hemiopia, and, as a rule, this accompanies a grave form of the malady dependent upon coarse cerebral disease. There are sometimes auditory hallucinations, such as rushing sounds, the ringing of bells, or the whistling of the wind. In some instances the sound of the ordinary conversation carried on by the persons who are in the same room with the patient, may be greatly intensified in pitch. *Psychical warnings* of a more complex nature take the form of imaginary voices which speak imperatively or give commands; and in rare cases a visual hallucination is the immediate precursor. Foul odors, such as that of smoke or of ordure, or those of aromatic substances, are sometimes perceived by the epileptic. Vile tastes of nauseating substances are spoken of occasionally. In such cases the individual often carries his hand to his nose, or smacks his lips, or makes efforts at expectoration. Sensations of great heat or cold are mentioned (Champier, Delasiauve). Among the rare prodromes may be mentioned a desire to defecate, to urinate, or to vomit, and certain patients belch forth large quantities of gas. The patient in some cases talks unintelligibly or utters meaningless cries, occasionally with something like regularity in expression.

There are many premonitory *motor disturbances*, such as limited trembling of the small muscles, blepharospasm, or twitchings of the facial muscles or of the fingers. Some epileptics present automatic disorders of motility which are continued for some seconds.

The condition of the patient may be such, for several days preceding the attack, as to indicate impending trouble. There may be despondency of manner, listlessness, malaise, or a sense of danger ahead. The eyes are often injected, and the temporal vessels stand out rather prominently. There may, on the other hand, be a state of unusual vivacity or excitement, possibly headaches, tremor of the lips or tongue, and varied subjective disturbances, which in some cases are very peculiar.

Auræ are by no means constant; in fact, the majority of patients cannot give a satisfactory account of any special warning.

Of 519 cases collected by Delasiauve, of which 229 were personal, but half presented any history of auræ. Of the writer's cases, only 40 per cent. gave the history of anything that could be called a true and distinct prodromal symptom. Gowers' experience, based upon 1,000 cases, is that a special warning "was always absent in