The attempt to eliminate the bacteria themselves, or even their toxins, by means of the emunctories, as we have seen above, is very unlikely to amount to much, and powerful cathartics, diuretics, and sudorifics are more likely to prove harmful than beneficial.

One further resource, however, holds out the brightest promise as a successful means of combating the difficulties in question, and its realization seems almost if not quite within our grasp; I refer to the injection of the serum of immunized animals. The uncertainty of the results obtained by Marmorek's antistreptococcic serum seems in a fair way to be rectified since the studies of Van de Velde have thrown more light on the probable reason for its occasional inefficacy in cases apparently well suited for its employ. Van de Velde, namely, has tried to determine by experiment[23] whether a serum produced by means of a given variety of streptococcus is efficacious against all other varieties of streptococcus pathogenic for man, or whether it is active only against a certain number of varieties. To decide this question he makes use of a serum produced by means of a streptococcus A, and he inoculates a horse with another variety of streptococcus, P, which coccus is chosen because, *in vitro*, its development is not inhibited by the serum A added to the leucocytes of a rabbit; from the horse he acquires another variety of antistreptococcus serum, serum P. Now he observes that serum A is very active when injected in doses of 5 c.c.; it annihilates the effects of five thousand pathogenic doses of streptococcus A, but is able to neutralize the effects of only one hundred doses of streptococcus P. On the other hand, the serum P is able to neutralize the effects of five thousand pathogenic doses of streptococcus P, but is completely inactive against streptococcus A.

These researches, conducted at the Bacteriological Institute of the University of Louvain, have led them, at that institution, to modify the technique of the vaccination of horses for the production of serum, and their immunizations are now made with a mixture of streptococci coming from as many different sources as possible. The serum thus prepared has received the name of "polyvalent serum," and it is anticipated that a serum thus prepared will be more generally and uniformly successful in practice than the antistreptococcic serum prepared in the usual manner.

In the presence of probable, if not indubitable, streptococcic infection of a grave type, especially in cases in which streptococci have been demonstrated in the blood, the question of the administration of large doses of a reliable antistreptococcic serum merits, to say the least, the careful consideration of the attending practitioner.

Zmigrodski, whose distressing personal experience with an operation wound has been detailed above, heads his report of his own case with a pertinent quotation from Dr. Parkes[24]; it will not be unfitting to repeat it here:

"I believe these cases of severe septic infection, if they do get well, scarcely ever do so because of the doctor, but by the grace of God." —*Leonard W. Bacon, Jr.*

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**DISTOMA.** See *Trematodes.*

**DITA.**—The bark of *Alstonia scholaris* (L.) R. Br. (fam. *Apocynaceæ*), a large tree of Southeastern Asia and the adjacent islands, especially the Philippines, yielding a valuable fine-grained timber. The bark and its alkaloid have been much used at home, and to some extent in this country, as an antiperiodic substitute for quinine. It is a very rough, coarse bark, occurring in pieces as large as the hand and larger, and a fourth to a half inch or more in thickness. The outer surface is coarsely fissured and of a dark-gray or brownish color, the inner is buff and coarsely striate. The texture is largely cellular and it is easily ground or powdered. It is odorless but very bitter.

Numerous crystalline principles have been extracted from it, among them several alkaloids. *Ditaïne* (or echitamine, $C_{22}H_{28}N_2O_4$) is the most important. It occurs in brightly shining, prismatic crystals, soluble in both water and alcohol. It is said to act like curare, but its use appears to have been purely experimental. Other alkaloids are *ditamine* ($C_{19}H_{21}NO_3$) and *echitenine* ($C_{20}H_{21}NO_4$). "Ditain," as said to be used in the Philippines in equal doses with quinine, is a very indefinite substance. It certainly is very different from the poisonous bases noticed above.

Dita has not been found of much value as an antiperiodic; it is useful, however, as a general tonic. It appears to be a rather powerful abdominal stimulant, of value in





severe diarrhœa. The dose of the powdered bark is 0.2 to 0.5 gm. (gr. iij.–viij.) or as many minims of the fluid extract.

The similar bark of *A. constricta* F. von Mueller, of Australia, has there a similar repute as an antiperiodic.
*Henry H. Rusby.*

**DI-THIO-CALCIUM CARBONATE** ($CaCS_2O$) is calcium carbonate in which two atoms of oxygen have been replaced by sulphur. It is a hygroscopic, orange-red, crystalline powder, slightly soluble in water and less so in alcohol. On exposure to light and air its aqueous solution is decomposed, with liberation of sulphur and sulphuretted hydrogen. On account of its large proportion of sulphur it was used by Tommasoli and Vicini in five-per-cent. ointment or freshly prepared solution as an application in psoriasis, lupus, eczema, and other skin diseases. Sabbatini has found that a one-per-cent. solution prevents the growth of pyogenic bacteria, but does not kill them. A twenty-per-cent. solution caused a vesicular and pustular dermatitis. *W. A. Bastedo.*

**DITTANY.**—American Dittany. The herb of *Cunila origanoides* (L.) Britton (fam. *Labiatæ*). This aromatic perennial, found abundantly in rich woodlands of the Eastern United States, is a more energetic carminative than many of its relatives which are more frequently employed. It has a biting, peppery, aromatic taste and contains an abundance of volatile oil. This oil is distilled for the market and appears to be very similar to oil of thyme. The drug and the oil are more stimulant to the perspiratory glands than are most of the aromatics. The dose of the dried herb is 1 to 4 gm. (gr. xv. to lx.).
*Henry H. Rusby.*

**DIURETICS** are medicines which increase the secretion of urine. They are divided into two classes, *direct* and *indirect*.

To the first class belong all medicines that produce an increase of diuresis by influencing the kidneys directly; to the second, those that accomplish this by augmenting the general blood pressure.

In order to have a clear conception of the practical bearing of this division, it is necessary to understand the conditions that modify the urinary secretion in health and disease.

The activity of the kidneys, in their healthy state, depends upon the quantity of blood flowing through the renal vessels, and the amount of urinable substances (that is, substances that are eliminated by the kidneys, such as water, inorganic salts, urea, uric acid, etc.) which it contains. As both the quantity and quality of the renal blood undergo marked changes, the urine secreted at different times by healthy persons presents striking variations in amount, color, and density. These variations are readily accounted for by the fact that the principal constituents of the urine, the water and the solids, are secreted in different parts of the kidneys—the Malpighian bodies and the uriniferous tubules. These two parts are not always equally active, and hence the normal variations in the composition and quantity of the urine.

The quantity of the water of the urine depends chiefly on the activity of the Malpighian bodies or glomeruli. They separate from the renal blood its surplus of water and those salts which it normally holds in solution, such as chloride of sodium, etc. From the glomeruli the water passes into the lumen of the uriniferous tubules, where it serves as a solvent or vehicle for any substance that may have been secreted by the epithelial cells of the tubules. The quantity of water yielded by the glomeruli is regulated, according to Ludwig, by the pressure of the blood in the capillaries of the glomeruli, but according to Heidenhain, by the velocity of the blood current. Ludwig holds that the passage of water through the walls of the capillaries and the simple layer of epithelial cells covering the tuft of capillaries, is merely a mechanical filtration. Accordingly, the greater the pressure in the capillaries, the more abundant the water that filters through them, and the more the pressure in the glomeruli exceeds the pressure in the tubules, the more rapid and extensive the process of filtration. Heidenhain, on the contrary, maintains that it is the velocity of the blood current that determines the quantity of water flowing from the glomeruli. The more rapid the blood current in the glomerular capillaries, the more copious the flow of water. When the blood current is very rapid, a larger quantity of water is brought into relation with the epithelial cells of the glomeruli in a given time, and hence their activity becomes augmented. Thus Heidenhain regards the removal of water from the blood of the glomerular capillaries to be a process of active secretion by the epithelial cells of the glomeruli.

Normally, blood pressure and rapidity of blood flow in the Malpighian bodies are simultaneously increased or diminished, but in some pathological states the pressure may be augmented while the flow is retarded.

As the quantity of water flowing from the glomeruli depends upon the abundance of blood in their capillaries, it is evident that the quantity of urine secreted must be controlled by the general arterial blood pressure. When the blood pressure is high, the urinary secretion is abundant; when it is low, the secretion is scanty. In the normal state of the organism the general blood pressure is such as to supply the kidneys with an abundance of blood, so that they can rapidly remove from it the urinable substances it may contain. Some of the ordinary changes in the quantity of urine are attributable to variations of the general blood pressure. Thus, when the surface of the body becomes cold the vessels of the skin contract, and the general blood pressure slightly increases; the urine then becomes more abundant, less dense, and light-colored. On the contrary, when the surface of the body is exposed to a very warm atmosphere, the superficial vessels dilate, and the blood pressure falls somewhat; as a consequence the urine becomes scanty, dense, and high-colored.

But the quantity of water flowing from the glomeruli depends also upon the concentration of the renal blood. When the renal blood contains a minimum of water, the glomerular epithelium can remove or secrete but little, and the urine becomes dense, scanty, and high-colored. On the contrary, when the renal blood contains a maximum of water, the renal epithelium removes the surplus rapidly, and the urine becomes copious and light-colored. This is well illustrated in health by the variations in the quantity of urine resulting from the amount of fluid ingested. Soon after imbibing large draughts of water, a copious flow of light-colored urine takes place.

The indirect diuretics have been defined as medicines that increase diuresis by augmenting the general arterial blood pressure. This results from their action on the heart, whose energy becomes increased. They do not, it is now held by most authorities, exert any direct action on the kidneys, since they are incapable of augmenting the flow of urine when they fail to increase the force of the heart's action. In the normal state of the organism, they do not markedly augment the quantity of urine, evidently because the blood pressure is generally at its maximum height. But when the blood pressure is abnormally low from inefficient heart action, and the secretion of urine has abated in consequence of scanty supply of arterial blood, they display great power over the secretion of urine, often in a short time producing a copious flow.

The quantity of the solids of the urine depends upon the activity of the epithelial cells of the uriniferous tubules. All authors accord to these cells an active secretory function. They take from the blood in the capillaries surrounding the tubules the urea, uric acid, kreatinin, and other products of metabolism, and probably foreign substances such as medicines and poisons, and discharge them into the channels of the tubules. The activity of the epithelium depends upon the quantity of such urinable substances contained in the renal blood, increasing when they are abundant and diminishing when they are scanty. It depends also upon the velocity of the blood current, since with an accelerated flow a