avoided. He supposed that the formamide, contained in chloralamide, would effectually prevent the depressing action of chloral.

The experiments made upon animals yielded somewhat discordant results, not as to the influence of chloralamide on the brain, but as to its action on the organs of circulation and respiration. Von Mering, Zuntz, and Kny noticed no fall of blood pressure in rabbits under the influence of hypnotic doses of chloralamide. Langgaard, on the contrary, observed after moderate non-toxic doses decided lowering of blood pressure, although this effect supervened more slowly than after chloral. These contradictory results were probably due to variation in the rate of decomposition of the chloralamide in the different animals subjected to experiment.

Upon man chloralamide acts like chloral, except that it produces sleep less rapidly and less certainly. As a rule after doses of 2 to 3 gm. (gr. xxx.–xlv.) sleep ensues in half an hour and continues for from five to eight hours. During the sleep, the functions of circulation and respiration are performed as vigorously as in normal sleep. After awaking the patient presents no disagreeable effects.

Numerous deviations, however, from this ordinary action have been observed, depending chiefly upon the causes of the insomnia. Thus, in cases of intense excitement of the brain, of severe pain, of harassing cough, and of high fever, doses of 2 to 3 gm. have failed to produce sleep, and sometimes even 4 gm. (ʒ i.) have been ineffectual. Often, even when the causes of insomnia were not intense, sleep did not supervene before an hour, sometimes two hours, and in rare instances even three hours. In some cases of heart disease, especially in valvular disease with imperfect compensation, a very decided depression of the circulation has been observed. So, too, in typhoid fever a very unfavorable effect upon the pulse was noticed after 2 gm. (ʒ ss.) given in divided doses. The temperature was always found lowered from one-half to one and one-half degrees.

Generally, after-effects do not occur, or they are very trivial, consisting of headache, slight giddiness, a feeling of fatigue, and skin eruptions.

From the above, it is evident that chloralamide closely resembles chloral in action, but that it induces sleep more slowly and less certainly, and that it is less apt to depress the circulation. The differences seem to be due to slow and gradual liberation of chloral in the blood, although it is not improbable that the presence of the formate of ammonium may somewhat modify the action of the chloral on the organs of circulation and respiration. The variations in the rapidity of action doubtless result from differences in the rate of decomposition in the blood of different persons.

Chloralamide is a suitable hypnotic in insomnia not caused by intense excitement of the brain, very severe pain, or extreme dyspnœa. When severe pain causes insomnia, chloralamide alone is not very efficient, but it acts well if given together with a moderate quantity of morphine. In the insomnia associated with mild nervous excitement, with neurasthenia, and with somatic diseases in general, moderate doses, 2 to 3 gm. (ʒ ss.–gr. xlv.), are usually effectual. Such moderate doses having frequently failed in cases of intense mental excitement and severe pain, larger doses, as much as 4 gm. (ʒ i.), have been recommended; but it should be recollected that such large doses may cause dangerous depression. Even moderate doses should not be given in cases of heart disease, if the heart's action be very feeble, or if symptoms of inadequate compensation be present. In no case should the dose be larger than the corresponding dose of chloral, 3 gm. of chloralamide being equivalent in action to 2 gm. of chloral. The following are convenient formulæ: ℞ Chloral. formamide, 4 gm. (ʒ i.); aq. dest., 75 gm. (ℨ iiss.); acid. hydrochlor. dil., gtt. v.; syr. aurantii, 15 gm. (ℨ ss.). M. S.: One-half to be taken at bedtime, and, if necessary, a tablespoonful every hour till sleep ensues. ℞ Chloral. formamid., 4 gm. (ʒ i.); Spir. frumenti, syr. rubi idæi, āā 15 gm. (ℨ ss.). M. S.: One tablespoonful at bedtime.

Sulphonal.—This remedy was recommended as an efficient hypnotic by Kast in 1888. He had tried it in numerous cases of insomnia, and nearly invariably quiet and deep sleep ensued and lasted for from five to eight hours. During the sleep the functions of circulation and respiration were somewhat slowed as in ordinary sleep, but no deviation from the normal could be observed. After awaking the patients presented no after-effects, except that in a few instances some fatigue and languor existed on the following day. After the publication of Kast's observations, sulphonal was very extensively used. It proved very effective in nervous sleeplessness and generally also when the insomnia was caused by disease of the brain, disordered circulation, and neuralgia. It was not so successful in delirium tremens and often failed when the sleeplessness was caused by severe cough, dyspnœa, or intense pain, though when given together with small doses of morphine, it also acted well in the latter conditions. Usually no disagreeable effects were observed during or after its action, or at most some languor and drowsiness on the following day. In a few instances, especially when the doses were large, and after repeated administration of moderate doses, there followed headache, vertigo, tinnitus aurium, and staggering.

Further experience with sulphonal caused its use to become much restricted, as it was found, in cases requiring its administration for a long time, frequently to produce severe toxic effects and in a few instances death. Bad effects were observed in some cases after doses of 1 to 2 gm. given daily for some weeks or months, though in most cases of prolonged administration no notable disorder resulted. In many cases the urine presented an intensely red color, from the presence of hæmatoporphyrin, and its quantity was notably lessened. Besides great general debility, there were observed anorexia, severe pain in the epigastrium and right hypochondrium, vomiting, obstinate constipation, sometimes diarrhœa, headache, drowsiness, disorders of sight, diminution of reflexes, staggering gait, ascending paralysis and coma.

The supervention of toxic effects is more apt to occur in weakly, anæmic, old patients, and those having notable disorder of the alimentary canal, such as gastric and intestinal catarrh and constipation.

The dose of sulphonal is 1 or 2 gm. dissolved in about six or eight ounces of hot liquid—water, milk, bouillon, soup, tea—and given a short time before retiring. In most cases of insomnia it is best to begin with 1 gm.; if this should not have the desired effect, the next dose may be 1.3 gm. (gr. xx.); and, if necessary, the subsequent doses may be gradually increased to 2 gm. (gr. xxx.). Should this dose not act, some other hypnotic should be resorted to. Under no circumstances should sulphonal be given every night for any length of time.

Trional is closely allied to sulphonal in chemical constitution, physical properties, and physiological action. It is somewhat more soluble, acts more rapidly and certainly, and is less frequently followed by disagreeable and toxic effects when continually used for months. Hence it is now very extensively used and in many asylums has entirely supplanted sulphonal. Like sulphonal it produces during the sleep no notable aberrations in the organic functions of respiration and circulation. The sleep is sound and refreshing, and as a rule is not followed by any obvious disorder, except in rare cases, generally feeble patients, who may be somewhat drowsy or complain of headache and giddiness. In some instances the long-continued use of trional has been followed by gastric disorder, vomiting, constipation, delayed hypnotic action, oliguria, and hæmatoporphyrinuria.

The dose of trional is from 1 to 2 gm. (gr. xv.–xxx.). If 1 gm. (gr. xv.) should fail to produce satisfactory sleep, the next dose should be 1.3 gm. (gr. xx.). It will rarely be necessary to give more than 1.5 gm. (gr. xxiiss.). The dose found necessary should be given in six or eight ounces of hot liquid just before retiring, and should be repeated not oftener than every other night. If a hypnotic be required in the intermediate nights, chloral, chloralamide, or amylene hydrate may be used.

It is not necessary to increase the dose of trional; on the contrary, often the dose may be somewhat diminished.

Paraldehyde.—Vincenz Cervello, in 1882, recommended this substance as an efficient and safe hypnotic, which might be substituted for chloral hydrate in all cases in which depression of the heart should be avoided. In numerous experiments on animals and human beings he had found that it induced quiet, prolonged sleep, without altering the functions of circulation and respiration, and without causing excitement or disagreeable after-effects.

Since recommended by Cervello, paraldehyde has been tested by numerous careful observers. It was found, as a rule, to act satisfactorily in mania, delirium tremens, hysteria, hypochondriasis, and other ordinary diseases. In cases of cardiac disease, in which the heart's action was very weak, it caused no notable depression. The observations thus far made have confirmed the results obtained by Cervello, that paraldehyde is a powerful hypnotic which does not unduly act on the heart or respiratory centre, and that it should be preferred to chloral hydrate in all cases of decided cardiac weakness.

It cannot be substituted for morphine in cases of insomnia caused by pain, as it seems to possess no marked analgesic action.

The dose required for hypnotic purposes varies greatly with individual susceptibility. Cervello found that 1 gm. sometimes had a quieting effect in women, while 4 gm. often failed to induce sleep in strong men. From experiments on animals he supposed that the hypnotic dose might be three times as large as that of chloral hydrate, and from his trials on healthy men and patients he concluded that 10 gm., administered in divided doses, might be given to adults without causing any notable disorder.

Being very acrid, paraldehyde is contraindicated in irritable states of the throat and stomach.

If administered in a concentrated form, it produces a strong sensation of burning in the mouth. Cervello gave it in very dilute solution in sweetened water, and observed that solutions containing more than three per cent. have a disagreeably pungent taste.

As a rule, it is necessary to give at least fifty minims to induce sleep, and in most cases this quantity must be repeated once or twice at intervals of half an hour or an hour.

At the temperature of 59° F. paraldehyde is dissolved in eight parts of water, but it is less soluble at higher temperatures. It may be prescribed in concentrated solution; but each dose should be diluted with about two and a half ounces of water before ingestion. ℞ Paraldehyd., 10 gm. (ʒ iiss.); syr. aurantii, 15 gm. (ℨ ss.); aq. destill., 75 gm. (ℨ iiss.). M. Sig.: Two tablespoonfuls at bedtime; afterward, if necessary, one tablespoonful every half-hour until sleep ensues.

Hodgson recommends the following formula: ℞ Pulv. trag. co., 4 gm. (ʒ i.); syr. aurantii, 15 gm. (ℨ ss.); paraldehyd., 4 gm. (ʒ i.); sp. chloroform., ♏ xv.; aquæ, q.s. ad 90 gm. (ℨ iij.). M.

Amylene Hydrate was recommended as a hypnotic by von Mering in 1887. In experiments upon animals he had found that moderate doses act chiefly on the cerebrum, producing sleep for hours without notably modifying respiration or circulation, and that large doses affect also the spinal cord and the medulla oblongata, arresting the reflexes, breathing, and heart action.

Von Mering administered it to sixty patients afflicted with insomnia. After doses of 3 to 6 gm., sleep ensued within half an hour and continued for from six to eight hours. Only four times was the hypnotic action unsatisfactory. No disagreeable incidental effects occurred, and only one patient complained on the next morning of slight headache. When the sleeplessness was caused by pain, amylene hydrate did not act well; but the simultaneous administration of a small quantity of morphine rendered the action satisfactory. Von Mering considered 2 gm. of amylene hydrate equivalent to 1 gm. of chloral hydrate and to 3 gm. of paraldehyde.

Since von Mering's recommendation of amylene hydrate it has been frequently used especially in asylums and has been found safe and efficient; but owing to its disagreeable odor and taste and occasional untoward action, it can be used only to a limited extent in private practise. Some patients refuse to take it on account of its pungency; others complain, after taking it for some time, of discomfort after eating—a disturbance of digestion that may in part be due to irritation but more to interference with the action of the pepsin. In a few instances it has caused effects resembling alcoholic intoxication before sleep ensued, and after the sleep nausea, headache, and giddiness. In some cases it accelerates, in others slows, the heart's action and renders it somewhat irregular. In some instances its action is prolonged, the patient being drowsy on the next day. Sometimes also it fails to act efficiently after it has been given five or six times. But notwithstanding these defects, amylene hydrate is an excellent hypnotic adapted to occasional use in cases of insomnia requiring the prolonged use of hypnotics.

The dose of amylene hydrate is 2 to 4 gm. (ʒ ss.–ʒ i.) mixed with water and syrup or liquorice. ℞ Amyleni hydrat., 6 gm. (ʒ iss.); Aq. dest., 60 gm. (ℨ ij.); Extr. glycyrrh., 10 gm. (ʒ iiss.). M. S.: One-half to be taken before retiring. ℞ Amyleni hydrat., 6 gm. (ʒ iss.); Aq. aurantii florum, 45 gm. (ℨ iss.); Syr. aurantii, 30 gm. (ℨ i.). M. S.: One-half to be taken at bedtime.

Bromides.—The bromides of potassium, sodium, lithium, and calcium, and hydrobromic acid, are efficient hypnotics in some kinds of insomnia, although in the normal state of the organism, administered during the daytime, they do not induce sleep except in very large doses. Their hypnotic action is not attended or followed by disagreeable effects, unless they are given in a too concentrated form or their use is continued very long. Administered when the stomach is empty, they quickly produce disorder of digestion, unless diluted with a large quantity of water. When used continuously they often cause eruptions on the skin, catarrh of the air passages, fetor of the breath, pallor of the face, emaciation, debility, depression of the sexual function, and dulness of the intellect with weakness of memory. But these effects speedily subside when their use is discontinued.

The bromide of potassium in large doses diminishes the frequency and force of the pulse and lowers the temperature. In healthy persons Krosz found the pulse diminished in frequency from eleven to twenty-two beats in the minute after doses of 10 gm., and as much as thirty beats after 15 gm. The pulse was weak and sometimes irregular. The temperature fell from 0.5° to 0.8° C. after doses of 10 gm., and 1.2° C. after 15 gm. The maximum effect on the pulse and temperature occurred between the second and third hour after the ingestion of the salt. Bromide of sodium in large doses did not lessen the frequency of the pulse nor lower the temperature.

The bromides are preferable to other hypnotics in the wakefulness depending on abnormal excitability of the brain. They are usually efficacious in the early stage of delirium tremens, in hysteria, insanity, hypochondriasis, and the night terrors of children. As they are harmless, they should be preferred in the insomnia caused by severe mental strain, intense emotions, and worry.

Bromide of potassium frequently induces sleep in febrile affections. As long as the temperature is abnormally elevated, and the pulse strong, it is more suitable than other bromides. But in the latter stages, when the heart's action is notably weakened, bromide of sodium is the more eligible salt. In all cases of chronic sleeplessness in which depression should be avoided, bromide of sodium should be preferred to the bromide of potassium.

The bromides are usually given in doses of from twenty to forty grains, shortly before bedtime, and repeated at intervals of two hours if necessary. In many cases of chronic wakefulness it is better to give fifteen or twenty grains soon after each meal, and before retiring. Each dose should be diluted with several ounces of water. ℞ Potassii brom., 8 to 12 gm. (ʒ ij.–iij.); Sacch. albi, 4

gm. (ʒ i.). M. Div. in part. æq. No. vi. Sig.: One powder in a wineglassful of water at bedtime. ℞ Sodii brom., 15 gm. (ʒ ss.); Aq. menth. pip., 45 gm. (ʒ iss.). M. Sig.: One teaspoonful at bedtime in a wineglassful of water; repeat the dose every two hours if necessary.

Hyoscyamus.—The preparations of hyoscyamus, in large doses, sometimes induce sleep; but on account of the uncertainty of their action and the disagreeable incidental effects, they are rarely employed to relieve insomnia in adults. They are frequently used to quiet the restlessness incident to the diseases of children, who tolerate larger doses proportionally than adults. Recently the alkaloids obtained from hyoscyamus have been recommended as powerful hypnotics in some forms of insomnia.

Hyoscyamine has been used chiefly in excited conditions of the brain, such as delirium tremens and mania. Generally, doses of one-sixteenth to one-eighth of a grain suffice to induce sleep of several hours' duration; but frequently larger doses are necessary—from one-sixth to one grain. Sleep follows very rapidly after the largest dose, often in fifteen minutes; it becomes very deep, may continue ten or twelve hours, and is sometimes attended by marked prostration.

The incidental effects consist chiefly of hallucinations, delirium, dryness of the mouth and throat, marked acceleration of the pulse and respirations, and great dilatation of the pupils.

Ringer found small doses of hyoscyamine inefficient in delirium tremens; larger doses produced many hours' sleep, but without improving the delirium and general condition of the patients.

Hyoscine Hydrobromate (Scopolamine hydrobromate).—This salt has lately been recommended as a very efficient hypnotic. In doses ranging from gr. $\frac{1}{150}$ to $\frac{1}{70}$ it promptly induces sleep, which lasts from one to four hours if the medicine is given in the daytime, and from six to ten hours if given at night. Wetherill found that even smaller doses, gr. $\frac{1}{250}$, frequently produced prolonged rest in cases of insomnia. It is rarely necessary to repeat the dose, or rapidly to increase it.

The following incidental effects have been observed: slowing of the pulse and respiration, slight elevation of temperature, hoarseness, suffusion of the face, sweating, dilatation of the pupils, relaxation of the muscles, impaired co-ordination, and a sense of fulness in the head and of wretchedness.

Occasionally moderate doses are followed by nausea, vomiting, anorexia, dysuria, syncope, with small, rapid, irregular pulse, and with symptoms of partial paralysis of the pneumogastrics (Wetherill).

Hyoscine has been used in the insomnia of acute delirious mania, of agitated melancholia, neurasthenia, chronic mental disorder, the morphine habit, alcoholism, and in confirmed cases of insomnia from unascertained causes. As a rule, it promptly induced quiet and prolonged sleep.

For internal use the following formula is convenient: ℞ Hyoscin. hydrobr., 0.01 gm. (gr. $\frac{1}{6}$); Aq. dest., 80 gm. (ʒ xx.); Syr. aurantii, 20 gm. (ʒ v.). M. S.: One teaspoonful once or twice daily.

Cannabis Indica.—Cannabis indica has been used as a substitute for opiates when the latter do not agree with the patient, and in cases of acute and chronic mental derangement. The susceptibility of different individuals to its hypnotic action varies greatly. Fronmüller, who administered it in 1,000 cases, found that it succeeded completely in 530, incompletely in 215, and had little or no effect in 255. In careful experiments Preisendörfer found that doses of one grain and a half of an alcoholic extract sometimes acted well, but in other cases had no effect. Larger doses, in no case exceeding five grains, usually produced more or less deep sleep.

Generally, hypnotic doses of cannabis indica produce decided incidental effects, such as giddiness, headache, hallucinations, delirium, slight redness of the face and conjunctiva, dilatation of the pupils, and brilliancy of the eyes. Very large doses often cause intense headache, nausea, and vomiting. In the experiments of Preisendörfer marked alterations of the circulation were observed. Two or three hours after the medicine had been given there occurred palpitation of the heart, with general relaxation of the arterial tension and increase of pulse rate from eleven to twenty-two, sometimes even forty, beats per minute. Sleep usually ensued at the time when the changes in the circulation began.

The hypnotic action of cannabis indica seems to be increased by bromide of potassium. As a result of experiments Clousten found that forty-five minims of the tincture of cannabis indica, with forty-five grains of bromide of potassium, were fully equivalent to a drachm of laudanum as a means of allaying maniacal excitement.

Hedonal, according to recent reports, seems to be a useful hypnotic in light forms of sleeplessness. In appropriate doses it usually induces sleep in about half an hour, though sometimes its action is delayed for one or two hours. The sleep may continue for from two to eight or nine hours, depending upon the size of the dose and the condition of the patient. After some time, several days or weeks, the dose must be somewhat increased to obtain the hypnotic effect. Usually no incidental effects are observed either during or after the sleep—the pulse, the breathing, and the temperature not deviating from the normal. In a few instances, on the day following the sleep, complaint is made of headache and giddiness.

The dose of hedonal is from 2 to 3 gm. (gr. xxx.–xlv.) given as a powder, which may be placed upon the tongue and swallowed with some cold water. It is supposed that 2 gm. act as efficiently as 1 gm. of trional and 2 gm. of chloralamide.

Dormiol has been found to produce sleep in about half an hour, which may continue for from one to ten hours, but on the average continues five hours. No notable depression of the functions of circulation and respiration occurred. Usually the doses given varied from 1 to 4 gm. of a ten-per-cent. solution. It was better to give one large dose than several small doses at intervals. Dormiol is held by some observers to be quick, safe, and sure in action.

Chloretone causes sleep in about half an hour, and this effect may continue for from one to twelve hours, the average being about four and a half hours. After large doses the pulse becomes depressed both in volume and in frequency. The breathing also becomes lessened in depth and volume, and the temperature lowered.

In experiments on warm-blooded animals it was found that chloretone in hypnotic doses diminishes the frequency and volume of the inspirations; depresses the vaso-motor centres and dilates the blood-vessels, thus lowering blood pressure, and also depresses the heart and lowers temperature.

Some recent writers, however, state that they have obtained good results from the employment of this remedy in the persistent insomnia of the aged, and in cardiac disease with renal complication and high arterial tension. In some cases sleep ensued after doses of 1.3 to 1.6 gm., but in most cases it was necessary to repeat this dose once or twice.

Chloralose acts as a hypnotic in smaller doses than chloral, but seems also to be more toxic and less certain. In a child the small dose of 0.2 gm. caused trembling of the hands and arms, and severe dyspnœa. Very grave symptoms have followed 0.3 gm.—coma, oscillatory movements of the head and the arms, and Cheyne-Stokes breathing.

It is given in doses of 0.2 to 0.3 gm. in capsule.

Samuel Nickles.

HYPODERMATIC MEDICATION.—The hypodermatic method of administering drugs, now so commonly employed, was first introduced by Dr. Alexander Wood, of Edinburgh, in 1843. It was gradually evolved, by the patient labors of numerous observers, from the endermic or endermatic mode of using certain soluble remedies formerly much in vogue, and, as the term clearly indicates, consists in the injection of solutions of suitable

medicaments under the skin by means of a small syringe specially adapted to this purpose.

To insure success, care should be taken in the choice of the syringe. The essential qualities are, uniformity of calibre of the barrel, a properly fitting piston, and a sharp needle attached to the nozzle by means of a water-tight joint. These instruments are now made of glass, celluloid, hard rubber, and metal.

Since the earlier days in the history of this subject, important improvements have been wrought in the construction of hypodermatic syringes, so that of late years they have been offered in great variety; and manufacturers have displayed much enterprise and ingenuity in bringing them to the present state of completeness. Excellent instruments may now be readily obtained at very moderate cost.

The original syringes, and those of inferior quality still made, consist of a glass barrel with a metal or hard-rubber cap at each end.

This kind of instrument is not to be recommended. It is frail; the mountings, of metal or hard rubber, are liable to be separated from the barrel by very slight force; it is apt to become leaky, and the diameter of the glass tubing is rarely uniform throughout its length; but even in this class of instruments, some superior workmanship is now shown in the best specimens offered by dealers.

A decided improvement upon this make is illustrated by Fig. 2772. The glass barrel is enclosed in a fenestrated, sometimes a double fenestrated, metal sheath, which reveals the contents of the syringe when charged, and renders an otherwise weak instrument sufficiently

Fig. 2772.

strong for ordinary use. It is easily taken apart for cleaning, and to those who prefer the glass barrel it is recommended. Nevertheless, it is open to other objections urged against glass syringes. Unequal diameter of the cylinder and likelihood of leakage are the principal defects.

Neither the celluloid nor the hard-rubber syringes have given entire satisfaction, and the specimens usually found in the market cannot be indorsed as trustworthy or desirable instruments.

The metal syringes are to be preferred to all others on account of their superior strength and durability, the even diameter of the bored cylinders, freedom from leaks, and compactness of construction. The metals used in their manufacture are German silver or brass—plated inside and outside with nickel—pure silver, and gold.

Fig. 2773 illustrates an instrument which meets fully the demands for a first-rate hypodermatic syringe. It

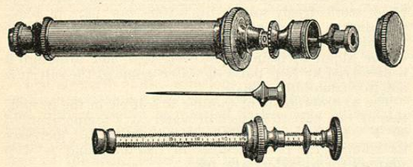

Fig. 2773.

has a nickel-plated German silver barrel, which is not corroded or injuriously affected by any solution which it is proper to inject into the tissues.

The minim scale, in this instrument, is placed upon the semi-cylindrical piston rod, which is made hollow to receive the needle, and is provided with a screw-thread and traverse nut, designated to regulate, when set, the extent of downward movement of the piston. A cap should be screwed upon the nozzle when the needle is removed. If desired, a drop or two of water may be put in the cap to prevent inconvenient drying of the packing.

These syringes require no case for their protection, but may simply be slipped into a chamois-skin pouch and carried, without injury, in the pocket. More recently the leather-packed piston has been superseded by a solid metal plunger, which is so accurately adjusted to the barrel that no packing is required. Thus the annoyance

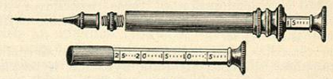

Fig. 2774.

of a dry and consequently an insufficient packing is obviated and a thoroughly aseptic instrument may be insured (see Fig. 2774).

It is prudent to be provided always with an extra needle, which may be enclosed and held by a screw-thread, in a small metal sheath, furnished by instrument-makers for this purpose.

The gold and silver syringes are not superior in practical utility to the instrument above described, and are unnecessarily expensive. The syringes provided for diphtheria antitoxin are similar in construction to the ordinary instrument, but are considerably larger. The packing of the piston is made of rubber and by a simple but ingenious mechanical device may be tightened at will. The syringes used for subarachnoid injections are substantially the same as the antitoxin syringes.

The needles for hypodermatic syringes are usually made of steel, plated with gold or nickel. Some advantages are claimed for gold or platinum needles. The needles are attached to the nozzle of the syringe by a screw or slide joint. The former is the more convenient style. A fine wire should be passed through the needle when it is not in use, to prevent occlusion of the calibre, either by the deposit of crystals from any solution that may have been employed, or by the accumulation of rust. The needles ought to be of small size, with large relative calibre, and it is desirable to have the tips strengthened at the junction with the sockets. The points should be lancet-shaped and free from any groove, depression, or shoulder-like projection.

The use of these instruments requires no special skill, though the dextrous performance of the little operation materially diminishes the discomfort of the procedure to the patient. The skin may be pinched up between the thumb and forefinger of the left hand, while the needle, held perpendicularly to the surface, is thrust rapidly through it. After penetration, the point of the needle should be passed obliquely to the desired depth into the areolar tissue, and the contents of the syringe slowly discharged. The operator, before making the puncture, must be careful to expel all air from the syringe by inverting the instrument, and at the same time depressing the piston sufficiently to cause a drop of the contained solution to appear at the point of the needle. It is scarcely necessary to urge the importance of rinsing out the barrel and of thoroughly cleansing the needle, immediately after using the instrument.

The injection may be made under the skin in almost any portion of the body; but the neighborhood of large vessels and nerves, bony prominences, and specially sensitive or inflamed regions should be avoided. The places ordinarily selected are the arm, near the insertion of the deltoid muscle, and the outer surface of the thigh. The rapidity with which absorption takes place is regulated somewhat by the vascularity of the part into which the injection is made. It is stated by some writers that a prompter effect may be expected from injections into the inner aspect of the limbs, or into the pectoral region, than from similar injections into the outside of the limbs or into the back. If this difference really exists, it must