

a clean, dry vessel, is weighed, and then partially hydrated with a weighed quantity of water. Carbonate of lime and slacked lime are then added in the proportion of four ounces to each twenty pounds, and the mixture is again distilled from a clean apparatus. The result of the distillation now is partially hydrated chloral; it distils better partially hydrated than when hydrated entirely. The remainder of the water required by stoichiometrical calculation is now added, and the hot liquid poured on plates to crystallize, the plates being covered by a bell glass. In a few hours the crystallization is complete, and if well managed the contents of the plates is in a solid cake, which is rubbed into a coarse, damp powder in a clean mortar and filled into bottles.

Some accidents of an apparently trivial nature seemed to indicate that chloral is very liable to decomposition from contact with organic matter, but experiments have shown that it is not equally liable to this decomposition from all kinds of organic matter. Even the same kind of organic matter does not always produce the same effect with the same chloral. For example, where syrup of orange-peel is used as a vehicle, decomposition, with the production of hydrochloric acid, will sometimes commence in a day or two, and sometimes not for weeks, though the apparent conditions be the same. One observer will testify that with simple syrup it never spoils or decomposes, while another, equally trustworthy, will find the same chloral decompose with simple syrup very promptly. Under such circumstances, the only safe practice is to keep chloral as free as possible from all organic matter until we know more about it; and this particularly in view of the harm it does when given in even a partially decomposed solution. It appears to be by far the best practice to dispense it in simple watery solution in glass-stopped vials, since in this condition it keeps indefinitely, and can be added to any desired vehicle at the time of taking. And ice-water appears to be about as good a vehicle for this, as for all saline substances, as any yet devised. When given to patients who have been long fasting it is often found to disagree with them, or at best to affect them less favorably than when given near a meal, or when the gastric secretions are not in the condition of long fasting. Hence the syrup of orange-peel, or the mucilage, &c., with which it is common to give it, may not be without useful effect, and those physicians who have now abandoned these mixtures for the simple solution, often, if not generally, advise their patients to eat a cracker, or take some other light food in small quantity, before or immediately after an hypnotic dose. When the medicine affects persons unfavorably, it should always be examined for hydrochloric acid by smelling and testing, and by litmus paper. Nitrate of silver is too sensitive a test, for if the solution have been for some time made, and especially when water containing organic matter is used, a cloudiness may be produced with this test which it is quite safe to disregard.

If the chloral be given under favorable circumstances, only about eight to twelve minutes elapse before the patient is asleep. If the first dose, namely, the ordinary dose of twenty or thirty grains, is not effective, a second one may be given in fifteen minutes. For if the effect is not obtained in fifteen minutes it is not likely to be experienced at

all. If the second dose is inoperative, the physician may conclude that the medicine is inappropriate, since the heroic quantities that have been given have generally produced unpleasant effects. Unpleasant effects are, doubtless, often due to bad quality in the chloral. Of the various grades of it now in the market, it is, perhaps, not too much to say that a large proportion of it is unfit for use; none of it is as good as it should be, or as it will be when the makers get to know better how to make it, and when those who buy know better how to test it, and what to reject. Makers have generally followed the first usage, and placed it in the market in hard compact cakes, or, frequently, some made by sublimation, others by pressure, but this form of condition is by no means either a guarantee or indication of purity, but, on the contrary, is often a mask for impurities. There is no process of purification that, in my hands, has given such uniform good results as simple well managed crystallization. In results, I much prefer it to the common method by sublimation, as the natural impurities seem to be more easily and more perfectly separated. Besides it yields a softer cake, which should be broken up into a coarse powder before bottling. The present German practice of putting it up in hard compact cakes, necessitates its being thinned out and rubbed up before it can be weighed for dispensing, a proceeding which is not only troublesome, but renders the chloral liable to be spoiled by contact with metallic spatulas, dust, &c. The process by crystallization yields a chloral not quite so dry as sublimation, but the chloral is not the worse for this, since one of the very purest samples of chloral which I ever saw was of German make, and quite moist in ordinary weather, and almost liquid in hot weather. The drier it is the nicer it is, but not always better. By a little skill and management it may be obtained in quite large crystals, but these are no better, and have the same disadvantage as the cakes or plates, in requiring to be rubbed up before they can be dispensed. The small granular crystals, moderately dry, is, perhaps, practically, the best form for use. In all its forms it is very sensitive to a moist atmosphere, and deliquesces rapidly; but in a dry atmosphere it evaporates without liquefying or deliquescing at all. Damp chloral will, therefore, dry by exposure in a dry cool atmosphere, and I have seen the same specimen alternately become solid and liquid several times in succession by the natural changes of the hygrometric condition of the weather. Indeed, the result of a very successful crystallization may, if the cakes be rubbed up and bottled on a damp day, yield an unusually damp powder. But while dampness or dryness alone should not be accepted as conclusive evidence of bad or good quality, yet parcels which are so moist that the liquid settles out from the crystals should always be rejected. Freshly made solutions of chloral, especially if made from large crystals, are often more or less opalescent or milky, and this milkiness many continue for a few moments only or for many hours, but if the chloral be of good quality the solution will sooner or later become perfectly clear or will at once become clear on being warmed. Solution of nitrate of silver should give no reaction, or but the faintest cloudiness, with freshly made solutions of good chloral. But a little dust in the chloral, or a little organic matter in the water with which the solution may have been made,

will soon give a decomposition sufficient to produce slight cloudiness with this test. If the solution has been kept in a cork-stopped bottle it will always give a cloudiness.

The alcoholate of chloral, which is a very different salt, and much more easily made, has been largely sold for the hydrate, and is often not easily distinguished from it, is characterized by a higher melting and boiling point, and by yielding less chloroform upon volumetric decomposition. But as yet more simple and easy tests for the alcoholate are much needed—not so much to enable us to distinguish between them, when separate, for this is comparatively easy, but to detect the presence of the alcoholate either as an adulteration or an accidental impurity in the hydrate. Whilst so great a proportion of the chloral in the market is imperfect, or, impure and bad, there are several makers whose products are, perhaps, equally good. Therefore, so long as we know so little about it, and are so much in need of simple and easy tests of quality, the maker's name should always be required on the label, and no unknown make should be used, however contrary to common usage this may be now-a-days, when price and profit have become the prominent consideration in all things.

The recrystallization of chloral from very volatile liquids, in which it is very soluble, has not, in my experience, been either satisfactory or useful, although we have the high authority of Dr. Flückiger to the contrary.

Chloral appears to be a hypnotic and not an anesthetic; it produces sleep, but it will not often relieve pain when the pain arises from any organic disease. If it be inflammatory pain or pain from injury, it does not relieve it, although it sometimes forcibly superinduces sleep. A person may have suffered an injury and take a large dose and get six or seven hours' sleep, but on waking the sleep will be found to have been unrefreshing. The knowledge of how to use it is not complete, but experience is accumulating every day upon it. Our greatest interest in it, is to know how to select, keep, and dispense it; as it absorbs moisture and becomes moist in a damp day, and becomes the opposite in a dry northwest wind, and is so liable to decomposition under conditions not yet well known, it of course requires much care and attention. The dose is from ten to one hundred and twenty grains, according to the purpose with which it is given and the varying susceptibility of persons to its influence. I have only heard of a fatal effect from it in one case, and then an entire ounce was taken. I don't remember to have heard of a single case where ten, twelve, or fifteen grain doses produced any disagreeable effect, but they are not so likely to produce the hypnotic effect in most cases as doses of twenty to thirty grains.

#### BOOKS AND PAMPHLETS.

PROCEEDINGS OF THE AMERICAN PHARMACEUTICAL ASSOCIATION, at the Eighteenth Annual Meeting, September, 1870.

The present volume of the Proceedings is somewhat behind those which preceded it, both in regard to the value and number of its papers, and the completeness of its review of the progress of pharmacy during the year. In addition to the minutes of the annual meeting, the volume contains the following