

acid in the blood, but admits that it is the most rapid of all soporifics.

Dr. Jules Worms arrives at the following conclusions after conducting a series of experiments with the hydrate of chloral.

1. Chloral dissolved in ten parts of water can be drank without any inconvenience to the amount of ten grammes.

1. Its effect is felt with 1½ to 2 grammes, but there are some obstinate cases which require a dose of 2 to 3 grammes.

3. A calm sleep, often profound, during which there is no modification in the temperature, in the regularity of the pulse or of the respiration, ensues in ten or 15 minutes after the digestion of the chloral and continues for seven or eight hours. The waking is not accompanied by headache or nausea of any kind; there may be some dullness, but it is soon dissipated. It can be administered before or after meals, and exerts no influence upon digestion.

To sum up the experience of Dr. Worms, the hydrate of chloral appears to be an inoffensive agent in small doses, and may render important service as a hypnotic. In fact, the property which it possesses of determining sleep almost instantly is not possessed by any other agent that can be introduced internally. It possesses great advantages over opium and its derivatives in the rapidity of its action and the subsequent freedom from torpor and disagreeable sensations.

Trichloroacetic acid was discovered by Dumas, in 1830, and was prepared by the action of chlorine on acetic acid. It crystallizes in octahedra and deliquesces in the air. As this acid is decomposed by alkalis into carbonic acid and chloroform. Dr. Liebreich proposes to employ it is a substitute for chloral, but no account of his experiments is available to us at this present writing. If his reasoning were to hold good with this compound also it would go far to sustain his theory in reference to the splitting up of chloral and the local action of chloroform. The whole subject is of great interest to physiologists and chemists, and may be the occasion of important discoveries.

NOTE.—The principal literature may be found in the following original papers.

Liebig, Ann. Chem. Pharm.....	I,	189
Staedeler, Ann. Chem. Pharm....	LXI,	101
Dumas, Ann. de Chim. Phys. ..	LVI,	123
Rognault, Ann. de Chim. Phys. LXXI,		409
Wurtz, Ann. de Chim. Phys.....	XLIX,	58
Kolbe, Ann. Chem. Pharm.....	CVI,	144
Kopp, Ann. Chem. Pharm.....	XCIV,	257
Kopp, Ann. Chem. Pharm.....	XCV,	307

Medical Gazette, New York, Nov. 6th, 1850, page 261.

Liquor Hydriodatis Arsenici et Hydrargyri.\*

BY WILLIAM HUSKISSON, JUN., F.C.S.

Your Journal of the present month contains an interesting memoir by W. E. Heathfield, upon the preparation of Donovan's solution, with reference to its relative strength and colour, as prepared by the various processes adopted since its first introduction to pharmacy. It is unquestionably of great importance that the solution bearing Mr. Donovan's name should be prepared strictly in accordance with the results of his formula,

\*From the Pharmaceutical Journal, London.

so as to contain the exact amount of ingredients therein specified.

It is, however, admitted that the process is unnecessarily tedious, and the result has not always been successful, even when it has been manipulated by chemists of considerable reputation. In some cases failure has been attributed to the want of attention to details, and more particularly to the long continued incessant trituration until perfect union is affected of the double metallic iodides. Any abridgement of the time during which the trituration should be continued tends to leave the arsenic undissolved.

Mr. Draper "states that unless the greatest care be taken to ensure the effectual combination of the iodine on heating the mixture, instead of its becoming, as intended, nearly colourless, a great part of the arsenic remains undissolved; and any continuance of ebullition only vaporizes the free iodine, as may be seen from the application of starch-paper. Thus, not only is its preparation troublesome, but the strength of the product itself is liable to variation."

I am far from wishing, in any way, to disparage the efforts of the author in his desire to explain some of the causes of the failure, and obtain a perfect preparation; still, it is difficult to reconcile the diversity of opinion that exists amongst chemists.

First, as regards the exact colour the solution should have;

Secondly, as to whether Mr. Donovan's process is really the best for effecting the desired result with certainty and success; and

Thirdly, as to the relative strength of the solutions prepared by Mr. Donovan's and M. Soubeiran's process.

Mr. Heathfield states, "When Mr. Donovan first made the solution, he found that it generally proved to be of a very pale yellow, and then only when seen in large quantities, sometimes being as pale as water." In referring to Mr. Donovan's original memoir, I find he states, "It is scarcely worth while to observe on the color of the liquor of hydriodate of arsenic and mercury. I have described it as yellow; Dr. Kane says it is colorless, and that it soon becomes yellow by the decomposition of hydriodic acid. During an extensive manufacture of it, I have never procured it colorless, except when the process failed. With me, it has always been of a light yellow hue from the first; and, so far from its becoming yellow, when its color was purposely deepened by dissolving in it an excess of iodine, a short exposure to light was sufficient to restore its original pale yellow tint. The liquid is also yellow when made by Soubeiran's process.\* Dr. Pereira states that the solution is a pale yellow color with a green tinge."

With regard to the difference in the strength of Donovan's and Soubeiran's solutions, Mr. Donovan states thus: "The quantities of the respective ingredients employed by me were—

Arsenic....6.08 + Iodine 30.24 Plisson.  
Mercury.15 38 + Iodine 19.38 Gay-Lussac.

Total Iodine..... 49.62

I employ 50 grains, for the sake of round numbers. M. Soubeiran, in preference to

\* I should infer that on the addition of a few grains of iodine to the solution when exposed to light, the water becomes decomposed, its hydrogen uniting with the iodine, forming hydriodic acid. I believe it is a well-known fact that a solution of chlorine exposed to light becomes converted into hydrochloric acid.

my method, recommends iodide of arsenic and biniodide of mercury to be dissolved in boiling water. He finds them dissolved perfectly. Yet between his method and mine there is no difference in the ratio of materials used; for, calculating from the data contained in his memoir, the quantity of iodine necessary for the above quantities of arsenic and mercury would be as follows:—

Arsenic.....	6.08	+	Iodine....	31.70
Mercury... 15 38		+	Iodine....	19.12

Total iodine..... 50.82

Which is, within a grain and one-fifth, the same as I employ; and the only difference is, that he uses the two iodides ready fused, while I form the same extemporaneously. If his method succeeds, so must mine."

Of the five processes referred to by Mr. Heathfield, there is one well deserving of especial attention, viz., that of M. Soubeiran, in which he proposes to unite the biniodide of mercury with the teriodide of arsenic,—two definite chemical combinations,—and thus form the solution.

Mr. Heathfield, in commenting upon M. Soubeiran's process, states that it is open to this objection, that the biniodide of mercury and the teriodide of arsenic vary in the proportion of moisture they contain. This difficulty, however, can be easily overcome; if the biniodide of mercury has been prepared by precipitation, and has been imperfectly dried, the moisture can readily be removed by sublimation; but in the case of the sublimation of the iodide of arsenic, much care is required to prevent the formation of arsenious acid in the sublimate. But if dry sublimed iodine be fused with finely-divided metallic arsenic, and the mass afterwards be finely levigated and then re-fused, any doubt as to the presence of moisture would at once be removed. Having prepared large quantities of the solution by both processes, and after carefully reviewing the two methods, and forming a comparison between them both, I should decidedly give the preference to M. Soubeiran's, on the grounds of its easy manipulation and absolute certainty of success, the two metallic iodides being perfectly soluble in boiling water, and the two sometimes differing from each other by one grain and one-fifth of iodine in eight ounces of the solution, the proportion of arsenic and mercury remaining exactly the same. I would, therefore, venture to recommend for practical adoption the following proportions:—  
Sublimed Biniodide of Mercury.....172½ grs.  
Teriodide of Arsenic.....188½ "  
Distilled Water..... 40 oz.

The solution should measure exactly forty ounces, and should not give a blue colour when starch-paper is immersed in it.

Mr. Donovan expressly states that the solution prepared by his method should be of a pale yellow colour. Mr. Heathfield following Dr. Kane, states that it should be colourless. Now I think this discrepancy may be easily explained, for I find if the yellow solution, prepared either by Mr. Donovan's or M. Soubeiran's process, be agitated, without the assistance of heat, with a few grains of finely-levigated metallic arsenic, they become at once permanently as pale and colourless as water; hence it is quite possible that both these chemists may have had a slight excess of arsenic present. That the yellow colour is not due to the presence of free iodine may be readily proved by its not-giving a blue colour with starch-paper.