MEDICAL AND PHARMACEUTICAL NOTES, ON THE PRESERVATION OF HYPODERMIC SOLUTIONS

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NOTES.

ON THE PRESERVATION OF HYPODERMIC SOLUTIONS.

BY EDWARD H. SQUIBB.

ON ERGOT AND ITS PREPARATIONS.

ON RHUBARB.

ON PHYSICIANS' POCKET CASES.

ON BUYING ALCOHOL AND DISTILLED SPIRITS.

ON A GENERAL APPARATUS STAND,
UPRIGHT CONDENSER, PINCHCOCK, AND BURETTE
STAND.

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MEDICAL AND PHARMACEUTICAL NOTES.

PROTECTION OF HYPODERMIC SOLUTIONS FROM CHANGE BY KEEPING.

It is supposed to be established by the investigations of Dr. Bourdon, M. Delpech, M. Gubler, and M. C. Paul, that the growth of confervæ is the only cause of the changes which commonly occur in solutions of the organic alkaloids and their salts; and that these confervæ decompose the alkaloids and consume a portion of their constituents, so that the solutions become weaker as the growths increase. Various methods have been proposed and used to prevent these growths, but thus far none seem more simple or more effectual than the addition of one or other of the phenols; and the crystallized carbolic acid is perhaps the most convenient if not the best of these. This carbolic acid being an irritant in proportion to quantity, and it being very important that solutions for hypodermic use should be as unirritating as possible, it becomes of some consequence to know how little of the protecting agent can be used with average success. The experience of several years in this laboratory, has shown that one volume of a five per cent. solution of crystallized carbolic acid, in sixty-four volumes of a solution of sulphate of atropia of the strength of two grains in each fluid ounce, will generally, but not always, protect it from change. The carbolic acid here bears the proportion of about one-thirteenth of one per cent., and this proportion proves quite unobjectionable for the delicate purposes of eye surgery. But once or twice in an experience of about six years, it has proved ineffectual for protection.

In the endeavor to answer this query with accuracy, the first result reached was, that accidental circumstances from

unknown causes, sometimes prevent the growth of these confervæ in solutions not protected at all; and also admit of their presence in and absence from different bottles of the same solution, without discoverable relation to the proportion of the protecting agency. A series of solutions prepared with care in August, 1872, some unprotected, and others with various proportions of carbolic acid, stood until May, 1873, many of them remaining without growths of any kind, while those which produced confervæ did so without discoverable relation to the protecting agency. Supposing that the atmosphere of a laboratory might be the cause of these confusing results, fresh solutions of acetate of morphia and sulphate of atropia were made, the former salt having proved to be the most easily attacked and the most rapidly changed. The bottles containing these solutions were placed for one week with stoppers out, in a hospital where such solutions were very liable to change. The solutions were then distributed into small vials, some without protection, and others with various proportions of carbolic acid. These vials were observed every week during the months of May, June, and July, until they ceased to show any farther changes. One vial of the solution of sulphate of atropia which was entirely unprotected, failed, from first to last, to show any signs of change. Two vials of sulphate of atropia solution, and one vial of a pair of acetate of morphia solution, all protected with small quantities of carbolic acid, also failed to show distinct evidence of confervæ. But with these exceptions, the entire number of twelve pairs exhibited a diminution of confervoid growths, in proportion to the quantity of carbolic acid added, until the proportion of carbolic acid reached, in the solution of sulphate of atropia, about one-eighth of one per cent., and in the solution of acetate of morphia about one-seventh of one per cent., all with larger proportions remaining clear and unchanged. Hence it appears that solutions of some salts, though of the same strength, require more carbolic acid for protection; but the proportion which under ordinary circumstances will protect the most difficult ones of those tried, does not exceed about one-seventh of one per cent.

But these solutions were all made with distilled water, and with more than ordinary care, and were all filtered. When similar solutions were made with ordinary undistilled water, nearly double the quantity of carbolic acid was required to afford a doubtful protection. Hence these solutions should, under all circumstances, be made with distilled water, and be carefully filtered.

The query may then be answered as follows: When such solutions are properly made, the smallest proportion of carbolic acid which will protect them from change, is about one-seventh of one per cent.; but that a proportion of one-sixth of one per cent. is practically better and safer in ordinary practice; and that this latter proportion is unobjectionable in all known respects. To make these solutions with this proportion, the following formulas are suggested. First, to make a five per cent. solution of carbolic acid, which is useful for this and many other purposes:

Take of crystallized carbolic acid 10 parts, or 10 grammes, or 154 grains; distilled water 200 parts, or 200 grammes, or 3086 grains. Weigh the distilled water in a glass-stoppered bottle, capable of holding one-fourth more than the sum of the quantities. Melt the crystallized carbolic acid in the stock-bottle by setting this in water warmed to about 50° C. — 122° F., and weigh the quantity by pouring it carefully into the bottle containing the water, as its sits upon the scale. Then shake the whole together until the carbolic acid is dissolved, and filter the solution through paper. Label it, "Solution of Carbolic Acid, five per cent."

Of this solution, about fifteen minims in each fluid ounce gives a proportion of one-sixth of one per cent.

For solution of sulphate of morphia, of the strength called "Magendie's Solution:"*

* The original "Magendie's Solution," as given in "L'Officine de Dorvault," p. 242, is, 1 part acetate of morphia in 40 parts water, or about 16 grains in 640 grains of water. As used in the United States, however, it is made from either acetate, muriate, or sulphate of morphia, and in the proportion of 1 part in about 28½ parts water, or 16 grains in a fluid ounce (of 455 grains) of water.

Take of sulphate of morphia, solution of carbolic acid, 5 per cent., of each 2 parts, or 2 grammes, or 31 grains; distilled water, a sufficient quantity. Dissolve the sulphate of morphia in about 50 parts, or 50 grammes, or 775 grains, of distilled water; add the solution of carbolic acid, filter through paper, and pass distilled water through the filter, until the filtrate weighs 57 parts, or 57 grammes, or 883 grains. Label, "Solution of Sulphate of Morphia; Magendie's; about 3.51 per cent., or 16 grains in the fluid ounce."

BROOKLYN, August, 1873.

NOTE ON ERGOT AND ITS PREPARATIONS.

THERE is, perhaps, no better example of the unity of pharmacy with practical medicine than is seen in a review of the career of ergot in the Materia Medica. The relation is a closer one than that of interdependence, and the support of a common interest from different bases of support. It is rather the relation of a single cause to a single effect. If knowledge and progress in medicine may be represented by light, then the correlation of electricity, magnetism, and heat in lighting up the universe may not unfairly represent the correlation of pathological research, chemistry, and pharmacy in therapeutics.

From 1807, when Dr. Stearns, of Saratoga County, recalled professional attention to its use in medicine, its history in the Materia Medica is most varied and interesting; and, from a simple parturient and supposed example of a specific effect upon a single organ, it has come to be applied upon a broad general principle, and is already sufficiently studied to extend its utility beyond anything that could have been foreseen. If the influence of pharmacy could be subtracted from this beneficent result, as it cannot be, it is highly probable that the remainder would be comparatively small. The ergot in substance, or by infusion, or by tincture, could have advanced

slowly, if at all, to the present state of knowledge in its application. Professor Procter, in a paper published first in the Proceedings of this Association in 1857, p. 127, was the first to give uniformity and permanence to any preparation of ergot, thus rendering its systematic and accurate administration practicable by so simple a proceeding as the addition of an acid to preserve it from those changes and uncertainties which, for half a century, had stood in the way of any very accurate investigation of its nicer therapeutic effects. Various investigations, chemical and pharmaceutical, had gradually led to this, but the various extracts, fluid and solid, and the various preparations under the name of ergotin, had all seemed to partake of the perishable nature of the drug in substance, so that the administration could be neither accurate nor uniform. And without this factor of tolerably fixed and known quantities in dosing, effects must always be liable to such confusion and uncertainty as to render the difficulties of accurate investigation almost insurmountable.

Although it may be quite true that when the life of one, or the lives of two human beings depend upon the parturient effects of a dose of ergot, there is no better practice, nor any that is so safe, as the use of fresh ergot in freshly made powder, yet experience has abundantly shown that it is upon the age and condition of the ergot, rather than upon its being ergot, that the safety depends, and that this age and condition can rarely be known with that certainty which is necessary when human life depends upon it. Hence it is that the elements of greatest importance in the use of ergot, as indeed of the whole Materia Medica, are to get the drug in good condition, and then to preserve its activity from change, so that its quantities may be uniform; and this is pharmacy.

Modern investigation and experience have shown that the principal and prominent effect of the administration of ergot to human beings, in adequate quantity, is to cause contraction of the involuntary or unstriped muscular fibre wherever this is found. The gravid uterus being constituted principally of this variety of muscular tissue, this was the organ upon which its effects were first observed, and it was long