ABSTRACT OF A SUPPLEMENTARY NOTE ON THE ASSAY OF OPIUM.

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Read before the Bristol Pharmaceutical Conference at Plymouth.

SINCE the publication of my former note on this subject, I have recorded two or three small matters which I now offer for your consideration.

The process as described at our last meeting was devised with the object of being at once accurate and speedy. With the view of further expediting the extraction, I have modified the mode of operating thus:—

Rub the lump opium with its own weight of water, to as smooth a pulp as possible, if necessary with the aid of a gentle heat; add spirit equal to about three times its weight and transfer to a percolator tube which is furnished with a loosely fitting inner tube closed at both ends for increasing the hydrostatic pressure.

A phial filled with water and corked answers well for the inner tube, a string being tied round the neck, by which it may be let down gently till the bottom of the phial just touches the surface of the opium liquor.

Its position may then be fixed by pressing the string between the side of the tube and a cork wedge. When thus arranged, more spirit may be added, till a column of 6 or 8 inches is obtained without disturbing the marc or mixing to any appreciable degree with the opium liquor, and without using more spirit than is required for the exhaustion of the opium.

In one experiment with 200 grains of a soft sample of Turkey opium treated thus, a head of 8 inches pressure was obtained. In four hours, four ounces of percolate had passed through, which contained 98 per cent. of the morphia present; another ounce was considered to have effected practically a perfect exhaustion. Other trials gave similar results.

I have occasionally met with specimens, which deposited along with the morphia, a white amorphous substance which could be washed out only by long continued washing with spirit, strong or dilute.

These specimens I have assayed by the lime process, and by the acetate of lead process (in conjunction with the above mode of extracting), but without quite satisfactory results.

Upon the whole, I find it most advantageous to cut the washing short when I find such impurity present, dry the precipitate, wash out the narcotine with benzine as usual, and then re-dissolve with hydrochloric acid and spirit, and reprecipitate with ammonia, which treatment I have never found fail to give me well-crystallized, and nearly white morphia of almost absolute purity. If the quantity of spirit and water used for solution be limited to two drachms of each, (the quantity I find desirable for an operation upon 100 grains of opium), and the washing be not unnecessarily prolonged, one-quarter-grain may be allowed for the loss in purification. I find the solution by spirit and acid followed by reprecipitation is both more convenient and less wasteful than crystallization from boiling alcohol, which has been recommended by some analysts; and I find the loss of time is not necessarily great, for the morphia goes down with more promptness and certainty from this approximately pure solution than when deposited from a liquor containing the soluble extractive matters of the opium. Three to four hours are sufficient in the former case, while eighteen to twenty are desirable in the latter.

I have found in sundry cases that the precipitation of the morphia from solution in *strong* spirit and acid is advantageous, inasmuch as the crystals are whiter, larger, and sooner washed clean, but my experience is too limited yet, to say whether the strong spirit is generally preferable. When rectified spirit is used without water, for the solution from which the morphia is to be precipitated, a larger correction must be made for the quantity of morphia retained in the mother liquor.

Mr. Cleaver, regarded the washing water as a saturated solution of morphia, and quoted evidence in support of the supposition. I think it is safe after sundry experiments to assume that the loss of morphia in the mother liquor and washings when the process is performed as I have described, amounts to 0.2 to 0.25 grain.

Some analysts recommend the washing of the precipitated morphia with a small quantity of chloroform as well as with ether, benzine, or spirit. I have found the loss involved by its use to be very trifling, but I have limited its quantity to a fluid drachm or two, and in those cases where the washing with spirit and benzine did not readily remove the impurities, the chloroform also failed to do so unless used freely, and as its solvent action upon morphia is much greater than that of ether or benzine, the estimation of morphia washed away by its use becomes more important, at the same time that it is more troublesome. 11.2 is the highest percentage of morphia I have found in Turkey opium in its fresh moist condition.

The percentage of water in moist opium I have found to vary from 19 per cent. to 27 per cent. Mr. Dott's table agrees closely with my observations in this particular, if we omit one anomalous sample which he found to contain 31.2 per cent. of water and yield only 20.1 per cent. of aqueous extract.