

NOTE ON OPIUM POISONING.

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DURING the last three years stomachs, with their contents, of fifty-three persons have been examined in this laboratory, in which the history of symptoms and other evidence obtained by the police indicated that opium was the cause of death.

The results of analysis were as follows: In one case no opium was detected, but opium was found in the viscera of another person who had been poisoned at the same time; in four cases the results of analysis were consistent with the presence of traces of opium; in twenty cases traces only of opium were detected; in nine cases opium was detected in small quantity; in ten cases opium was detected in medium quantity; in nine cases opium was detected in quantity.

By the term "small quantity" we mean that the residue obtained from a Stas-Otto extract gave colour reactions about as strongly as would the Stas-Otto extract of 7 mgrms. of Indian opium of 2 per cent. morphine content. The term "medium quantity" similarly corresponds to about 15 mgrms., and "detected in quantity" corresponds to 20 or more mgrms.

Thus there was a clearly negative result in one case. Out of the remaining fifty-two cases, in twenty-four opium was either detected in traces or the tests were responded to so faintly that no definite statement could be made as to the absence or presence of the poison. That in such a large proportion of the cases opium should only be detected in traces appears to be in accord with results obtained by other observers (see Witthaus, *Manual of Toxicology*, second edition, p. 980).

The only tests we have found to be of use in testing for opium in viscera are the following:

(1) *The Porphyroxin Test*.—We have carried out this test on several thousand extracts of viscera and other substances without ever getting a well-marked reaction, except in cases in which it was probable, on other grounds, that opium was present. On the other hand, a faint pinkish colour occurs not infrequently in the absence of opium.

(2) *The Husemann Reaction*.

(3) *The Urotropin or Formaldehyde Reaction*.

The last-mentioned test has been used as a colorimetric test for morphine in viscera (ANALYST, 1917, 42, 227). But, in our experience, there are grounds for doubting whether either this test or any other known to us can be depended on to give a reliable colorimetric result. The viscera are always sent to us preserved in alcohol. In the hot Indian climate it often happens that much decomposition has set in before the viscera are placed in alcohol. With such viscera we find that if an extract responds strongly to one of the above three tests there is no certainty that it will respond strongly to the others. The extent of this discrepancy is shown by the following table. It refers to analyses of thirty-one stomachs, three specimens of vomit, one of liver, and one of urine, a total of thirty-six specimens. In each case the history of symptoms, etc., had pointed to opium poisoning:

Reaction given by the— Urotropin Test.		Reactions given in the same cases by—	
		Porphyroxin Test.	Husemann Test.
Strong in eight cases ...	Strong	2	7
	Medium	5	0
	Negative or doubtful	1	1
Medium in sixteen cases	Strong	4	3
	Medium	12	13
	Negative or doubtful	0	0
Doubtful in six cases ...	Strong	0	1
	Medium	5	4
	Negative or doubtful	1	1
Negative in six cases ...	Strong	0	0
	Medium	6	6
	Negative or doubtful	0	0

Thus, in eight cases in which the urotropin reaction was strong, the porphyroxin reaction was only given strongly in two. In six cases the urotropin test gave a negative result, and in each of these the extract reacted with medium strength to the porphyroxin and Husemann tests. There can be little doubt that the cause of the occasional failure of the urotropin test is the inevitable presence of impurities in the extracts. It appears to be particularly difficult to get a pure extract in cases of opium poisoning. If an extract has a yellowish colour there is a presumption, in our experience, that it is going to respond strongly to the tests for opium.

When dealing with highly decomposed viscera preserved for a fortnight or more in alcohol, no amount of washing with ether or with ether and chloroform will so purify the acid solution that it will not allow impurities to pass into the solvent when made alkaline. Repeated washing of the acid solution with ether is likely to result in the porphyroxin test yielding a negative result, and a valuable piece of evidence will thus be lost. Hence, in carrying out the Stas-Otto process, we wash the acid solution once only with ether. The solution is then made alkaline and extracted with ether and chloroform. It is advisable to add these solvents separately. One part of chloroform is first added, then about three parts of ether, then a piece of litmus paper and, lastly, a few drops of ammonia. The mixture is then immediately shaken. We find that chloroform and ether thus used yield a purer extract than either an ethyl acetate-ether mixture or amyl alcohol.

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