V.—*Note on the Action of Zinc Chloride on Codeine.*

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It is stated by Matthiessen and Burnside (*Proc. Roy. Soc.*, xix, 71) that when codeine hydrochloride is heated with zinc chloride to 170°—180° for 15 minutes, the following reaction occurs (the empirical formulæ of the original and resulting substances being used):—

accordingly the term “apocodeine” was applied by them to the product.

On attempting to prepare for the market, “apocodeine,” according to the process described by Matthiessen and Burnside, Mr. D. Brown (Messrs. Macfarlane and Co., Edinburgh), obtained a product which exhibited most of the properties ascribed to “apocodeine” hydrochloride, but which, when analysed by the writer, gave entirely different numbers: the same result occurred in several instances when the process was somewhat varied; if the action be carried on at a low temperature, and for a short time, as suggested by Matthiessen and Burnside, the chief product is a loose compound of zinc chloride and the hydrochloride of a base isomeric with codeine, yielding amorphous salts, soluble in ether, and itself amorphous; *i.e.*, of a base exactly corresponding with *tricodeine* (*Proc. Roy. Soc.*, xx, 278); if a longer time of heating be adopted, or a higher temperature, there is also formed a good deal of a base insoluble in ether, probably *tetracodeine*.

The following numbers were obtained:—

Specimen A. Prepared by D. Brown in strict accordance with Matthiessen and Burnside's directions: the substance thrown down by addition of water to the product of the action, is a loose double chloride of zinc and tricodeine, from which the zinc cannot be wholly separated by successive solutions in water and precipitations by hydrochloric acid: dissolved in water and precipitated by sodium carbonate; precipitate dissolved in ether and ethereal solution agitated with a few drops of hydrochloric acid—

0.2205 gram gave 0.521 CO₂ and 0.129 H₂O.

B. Prepared by D. Brown. Similar product obtained in the same way, the precipitation with sodium carbonate and treatment with ether being performed twice—

0.3480 gram gave 0.821 CO₂ and 0.202 H₂O,

0.1940 ,, 0.0845 AgCl.

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C. Prepared by C. R. A. Wright. Product from action of zinc chloride on strongly acid solution of codeine hydrochloride, kept at 170°—180° for 30 minutes; treated as before; much base insoluble in ether formed—

0.2985 gram gave 0.707 CO₂ and 0.173 H₂O,
0.1720 „ 0.075 AgCl.

	Calculated.		Found.		
	For apocodeine hydrochloride.	For tricodeine hydrochloride.	A.	B.	C.
Carbon	68.03	64.38	64.44	64.34	64.59
Hydrogen ..	6.30	6.26	6.50	6.45	6.44
Chlorine	11.18	10.60	—	10.78	10.78

Tricodeine hydrochloride, when perfectly pure, gives no immediate coloration with ferric chloride, but develops a red-purple tint on standing a short time; “apocodeine,” on the other hand, gives the reactions of apomorphine (M. and B.), *i.e.*, an immediate coloration with ferric chloride. Each of the three samples above mentioned yielded a pale red-purple tint immediately with ferric chloride, the colour deepening much on standing. From these results it is evident that the base soluble in ether produced by the action of zinc chloride on codeine, has not the composition of “apocodeine,” but consists almost wholly of tricodeine along with minute quantities of other bodies.

It has already been shown (*Proc. Roy. Soc.*, xx, 282) that when tricodeine is acted on by hydrochloric acid, it readily undergoes the reaction—

(the empirical formulæ of the original and resulting substances being employed), and it has been pointed out also that the resulting product agrees in all its characters with the “apocodeine” of Matthiessen and Burnside. It hence appears probable that the substance examined by Matthiessen and Burnside was not produced solely by the action of zinc chloride on codeine, but was an alteration-product of the tricodeine first formed; not improbably a large excess of hydrochloric acid was used to agitate with the ethereal solution of the base, and the acid liquor obtained evaporated, either spontaneously or on the water-bath; removal of the elements of water then ensued through the action of the excess of acid on the tricodeine, the greater part of which must have been converted into “apocodeine” in this way, unsuspected by the operators.