XLIV.—*On the Chinoline and Leukoline Series.*

By C. GREVILLE WILLIAMS, F.R.S.

IN a paper recently presented to the French Academy of Sciences, Dr. Hofmann has given the results of an elaborate investigation of iodide of pelamine, or chinoline blue, a substance discovered by me some years ago while making a comparative study of the isomeric bases of the chinoline and leukoline series. The publication of that paper renders it desirable that I should lay before the Society a brief account of the results which I have obtained, although they are, as yet, far from complete. I reserve the analytical details until the publication of the entire investigation.

My analysis of the prisms of iodide of pelamine gave results agreeing with Hofmann's formula. It is due to Dr. Hofmann to state that he was the first to arrive at the true formula of the iodide, as I had allowed my experiments to drift into other channels, and had more especially followed up the study of the other products of the reaction of iodide of amyl on chinoline and lepidine.

I have not accepted the term "cyanine," which has been given in France to the base contained in the blue substance, because such a name would lead to incorrect views as to its derivation.

There are some curious secondary reactions which take place in the preparation of the iodide of amyl-lepidyl-ammonium, which do not appear to have been noticed by other observers. On cohobating iodide of amyl with lepidine, a brown syrup-like fluid is obtained, which solidifies, on cooling, to a mass of crystals. On repeatedly boiling out this mass with water, the greater part dissolves, yielding a solution of the iodides of the ammonium bases, from which iodide of pelamine may be obtained by boiling with alkalis. A considerable portion, however, remains undissolved. This insoluble portion, on prolonged ebullition in a retort with caustic alkalis, decomposes, yielding a distillate consisting of water and an oil. The latter, on treatment with hydrochloric acid, for the most part dissolves, allowing a very small portion of iodide of amyl to separate. The hydrochloric solution, on evaporation to a moderate bulk, forms two layers; the upper, which appears like a colourless oil, solidifies on cooling to a mass resembling paraffin. The lower portion is merely a saturated aqueous solution of the same substance. The paraffin-like hydrochlorate, on treatment with alkalis and subsequent distillation, yields a remarkable

volatile base, which may be dried for analysis by digestion with sticks of hydrate of potassium. When perfectly dry it distils at about 275°C . By rectification it may be obtained nearly colourless. Its odour is fragrant, and recalls that of the higher monamines of the amyl class. I was at first inclined to regard it as triamylamine, and, in fact, a small portion of that base is present in the oil, and renders fractional distillation necessary.

On combustion of the least volatile portion, it yielded numbers agreeing perfectly with the formula

Further investigation has shown that this formula should be written:—

It is, therefore, biamylamine coupled with lepidine in the same manner that paraniline is aniline coupled with itself.

So singular a constitution requires to be supported by the strongest evidence, and I was consequently very desirous of ascertaining the density of the vapour. Unfortunately the quantity of substance in my possession was so small that I could not spare sufficient for an experiment, by the method of Dumas, on the usual scale, and the boiling point was far too high for the ordinary process of Gay Lussac. I, nevertheless, made, with the most extreme care, an experiment in a very small balloon. The resulting number was 10.40, being almost absolutely the value required by the formula, namely 10.38.

The hydrochlorate of this base, which I provisionally call lepamine, fuses below 100° , the analysis agreed sufficiently with the formula

It is but sparingly soluble in water, and requires to be rendered nearly dry *in vacuo*, before being exposed to the heat of the water-bath.

On adding a solution of bichloride of platinum to an aqueous solution of the hydrochlorate, a pitch-like mass is precipitated, and the solution gradually turns green, finally depositing an olive-green powder. On filtering, a clear yellow solution is obtained, but, on exposure *in vacuo* to a surface of sulphuric acid, the green substance is again deposited. If, however, an excess of strong hydrochloric acid be added to some of the base, so as to obtain

the hydrochlorate floating as an oil on the surface, and then considerable excess of a solution of bichloride of platinum be poured in, an adhesive mass of a yellow colour at once forms. It may be gathered to the side of the beaker so as to allow of the removal of the aqueous fluid by decantation. On stirring the product repeatedly with cold water, it may be effectually washed. It is then to be dried *in vacuo* over sulphuric acid for a day or two, after which the dessication may be finished in the water-bath without any signs of decomposition.

The platinum salt, as thus prepared, is almost entirely soluble in alcohol, showing the absence of lepidine, the platinum salt of which is insoluble in spirit.

In spite of its unpromising physical properties, the salt obtained from two distinct preparations gave, on ignition, almost exactly the theoretical numbers required by the formula—

On adding a solution of terchloride of gold to a solution of the hydrochlorate, a chocolate-coloured precipitate falls at first, but it turns directly to a bright green; it is soluble in alcohol, forming a green solution.

Dissolved in strong nitric acid, the base affords a red solution, which, on dilution with water, allows a red oil to separate; it appears to be a nitro-compound.

On treating the base with iodide of ethyl in a sealed tube, a syrupy fluid is obtained, which on distillation with potash yields a volatile oily base. It dissolves readily in hydrochloric acid, affording a salt which appears to crystallise with far greater difficulty than the hydrochlorate of the parent base. The gradual replacement of the basic hydrogen in such an alkaloid as that under consideration will probably give interesting results.

In conclusion I may state that the fact of the coal and cinchonine bases being essentially distinct renders it necessary to slightly modify their nomenclature.

The base from coal $\text{C}_{10}\text{H}_9''' \text{N}$, which is isomeric with lepidine, I propose to call "iridoline," and the cinchonine base, isomeric with cryptidine, I have termed "dispoline." The two series will, therefore, stand thus:—

Coal series.		Cinchonine series.	
Leukoline	.. $\text{C}_9\text{H}_7''' \text{N}$.	Chinoline	.. $\text{C}_9\text{H}_7''' \text{N}$.
Iridoline	.. $\text{C}_{10}\text{H}_9''' \text{N}$.	Lepidine	.. $\text{C}_{10}\text{H}_9''' \text{N}$.
Cryptidine	.. $\text{C}_{11}\text{H}_{11}''' \text{N}$.	Dispoline	.. $\text{C}_{11}\text{H}_{11}''' \text{N}$.

I have fully satisfied myself that the chinoline series by no means ends with dispoline. I have already attained the platinum salts of the bases $\text{C}_{13}\text{H}_{15}''' \text{N}$ and $\text{C}_{14}\text{H}_{17}''' \text{N}$. These bases, as well as dispoline, are now under examination.