

XVIII. "Chemical and Physiological Experiments on living Cinchona." By J. BROUGHTON, B.Sc., F.C.S., Chemist to the Cinchona-Plantations of the Madras Government. Communicated by Dr. EDWARD FRANKLAND. Received May 16, 1870.

(Abstract.)

The memoir describes the principal scientific results which have been obtained during the last three years, in the course of chemical work on the Neilgherry Cinchona-plantations.

The chemical characteristics of the various parts of the Cinchona plant are described. The condition in which the alkaloids are met with in the living bark is shown to be that of a slightly soluble tannate existing in the parenchymatous cells.

The order of formation of the alkaloids is shown to be, 1st, uncrystallizable quinine; 2nd, crystallizable quinine; 3rd, cinchonidine and cinchonine. Reasons are adduced for thinking that the alkaloids are really formed in the tissues in which they are found.

The effect of the solar rays falling on the bark, either while living on the tree or when separated, is shown to be prejudicial to its contained alkaloids. The effects of shielding the bark artificially, and the influence of elevation of the site of growth, are detailed.

The question as to whether the alkaloids are substitutes for the mineral bases is discussed, and a series of experiments is described, which combine to show either that such substitution does not take place, or does so only in a very partial degree.

XIX. "Researches on the Hydrocarbons of the Series $C_n H_{2n+2}$."—VI.

By C. SCHORLEMMER. Communicated by Prof. STOKES, Sec.R.S. Received June 14, 1870.

In my last communication* I stated that, from the results of my experiments, I came to the conclusion that, by acting on these hydrocarbons with chlorine, a mixture of *primary* and *secondary* chlorides was formed, as the alcohols derived from these chlorides yielded on oxidation, besides an *acid containing the same number of carbon atoms* as the alcohol, also *acetones*, or the characteristic oxidation products of secondary alcohols.

The correctness of this conclusion has been fully proved by further experiments, and I am at present engaged in investigating the conditions under which the one or the other of these chlorides is formed.

In order to obtain decisive results, it was first of all required to work on considerable quantities of a hydrocarbon; and I selected for this research *hexyl-hydride*, $C_6 H_{14}$, from petroleum, as this body can be obtained the most easily in a sufficient quantity.

The derivatives of hexyl-hydride have been fully investigated by Cahours

* Proc. Roy. Soc. vol. xviii, p. 25.

and Pelouze*, but the results which I have so far obtained differ in several important points from those of these eminent chemists.

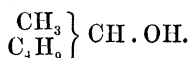
By acting on this hydrocarbon with chlorine in the cold and in presence of iodine, I prepared hexyl-chloride, $C_6 H_{13} Cl$, already described by Cahours and Pelouze, which boils at 125° – 126° C.; but besides this compound there was also formed a pretty large quantity of a product which distilled between 126° and 135° C., and from which no substance having a constant boiling-point could be isolated. This higher boiling portion can be separated only with difficulty from the chloride boiling at 125° – 126° , for even after repeated distillations a residue of the former is always left behind.

On heating the lower boiling chloride with glacial acetic acid and potassium acetate a hexyl-acetate was obtained, of which the larger portion distilled between 158° and 162° , the boiling-point rising up at last to 170° . Besides the acetate a pretty large quantity of *hexylene*, $C_6 H_{12}$, had also been formed by the decomposition of the chloride.

The chloride boiling between 126° and 135° , treated in the same way, yielded also *hexylene*, besides a hexyl-acetate distilling between 160° and 170° . According to Cahours and Pelouze, this ether boils at 145° .

I did not try to isolate definite compounds from these acetates, as I found that by converting them into the alcohols and subjecting these to fractional distillation, they easily split up into two distinct compounds,—one, which forms the greater part of the mixture, boiling constantly at 140° – 141° , and the other and smaller portion distilling between 150° and 155° ; the quantity of liquid coming over between these two limits being quite insignificant.

The liquid boiling at 140° is a *secondary hexyl-alcohol*; on oxidation it yields first an *acetone*, which, by further oxidation, splits up into *acetic acid* and *butyric acid*. It is therefore *methyl-butylcarbinol*,—



Whether this compound is identical or not with the secondary hexyl-alcohol, which Erlenmeyer and Wanklyn obtained from mannite, I am not yet able to decide.

The body which distilled between 150° and 155° is a *primary hexyl-alcohol*, $C_6 H_{13} OH$; on oxidizing it an oily acid was formed, which, as the analysis of its silver-salt showed, has the composition of *caproic acid*, $C_6 H_{12} O_2$. Cahours and Pelouze mention in their memoir only the latter alcohol; they do not state, however, under what conditions they acted upon the hydride with chlorine.

I have found that, by treating this hydrocarbon with chlorine alone in the cold as well as at the boiling-point, chlorides are obtained which boil between 125° and 135° , and which appear to be identical with those described above. I intend not only to study these chlorides more fully, but also to

* Annal. Chim. Phys. (4) i. 5.

compare the alcohols obtained from them with the secondary alcohol from mannite and from hexylene, and with the primary hexyl-alcohol which is found in fusel-oil.

XX. "Formation of Cetyl-alcohol by a singular reaction." By C. SCHORLEMMER. Communicated by Prof. STOKES, Sec. R.S. Received June 14, 1870.

On heating a mixture of sebacic acid, $C_{10}H_{18}O_4$, and caustic baryta, besides the hydrocarbon C_8H_{18} , which I have described in a former communication*, other products are formed, amongst which there is a solid body, which, by several crystallizations from alcohol, was obtained in small white crystals.

On analyzing it, Mr. Dearden obtained results which led to the formula $C_{16}H_{34}O$, which is that of *cetyl-alcohol* :—

	Calculated.		Found.	
			I.	II.
C_{16}	192	79·34	79·3	78·9
H_{34}	34	14·05	13·8	13·9
O	16	6·61	—	—
	242	100·00		

This body has not only the composition but also the characteristic properties of cetyl-alcohol; it melts at 49° , and solidifies again at the same temperature.

The formation of this compound is certainly very singular, and perhaps the more so as cetyl-alcohol is so easily oxidized to sebacic acid by the action of nitric acid. I intend to obtain larger quantities of it by the above reaction and to investigate it.

XXI. "Researches in Animal Electricity." By C. B. RADCLIFFE, M.D. Communicated by CHARLES BROOKE, M.A. Received May 19, 1870.

(Abstract.)

PART I.

The subjects of the present inquiry are three in number :—1. The electrical phenomena belonging to living nerve and muscle during rest; 2. The electrical phenomena which mark the passing of nerve and muscle from the state of rest into that of action; and 3. The workings of voltaic electricity, and of electricity generally, upon nerve and muscle.

1. *The electrical phenomena belonging to living nerve and muscle during the state of rest.*

Argument.—Living nerve and muscle have an electricity of their own, which fails by degrees as life dies out, and is wanting altogether after

* Proc. Roy. Soc. vol. xvi. p. 376.