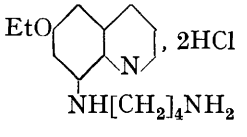
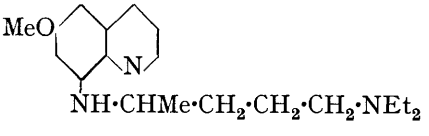
## 275. *Attempts to find New Antimalarials. Part IX.* 8-δ-*Aminobutylamino*-6-*ethoxyquinoline.*

By W. Meisel and Robert Robinson.

Gabriel and Maass (*Ber.*, 1899, **32**, 1269) obtained δ-bromobutylphthalimide by a series of operations from γ-phenoxypropyl bromide, and the substance has now been condensed with 8-amino-6-ethoxyquinoline. On hydrolysis of the product, the *hydrochloride* (I) of the base named in the title was obtained.

(I.) 

(II.)

On comparison with plasmoquine (II), it will be seen that a four-carbon chain separates the nitrogen atoms in the aminoalkylamino-group in both cases. The evidence at our

disposal indicates that this is an optimum length for the series of bases with a terminal amino-group. The salt (I) is stated in a preliminary report from Professor Keilin's laboratory to be a good curative agent in bird malaria, having a therapeutic ratio of 1 : 30 or less.

## Experimental.

8-δ-*Phthalimidobutylamino*-6-*ethoxyquinoline*.—A mixture of 8-amino-6-ethoxyquinoline (1·9 g.) and δ-bromobutylphthalimide (2·8 g.) was heated on the steam-bath for 24 hours with shaking until crystallisation occurred. The solid product was powdered, extracted with toluene, and the residue crystallised from methyl alcohol; it formed golden-yellow needles, m. p. 143·5—144·5° after sintering at 142°, a behaviour unaltered after 8 recrystallisations.

This hydrobromide was decomposed by means of aqueous sodium carbonate (10%) at 40°, and the *base* crystallised from alcohol in pale greenish-yellow needles, m. p. 114·5—115·5° (Found : C, 70·9; H, 6·0; N, 10·8. $C_{23}H_{23}O_3N_3$ requires C, 70·8; H, 6·0; N, 10·8%).

8-δ-*Aminobutylamino*-6-*ethoxyquinoline* (I).—The phthalimide (1·9 g.) was hydrolysed by means of hydrazine hydrate (0·3 g. of 90%) in alcoholic solution (20 c.c.) by heating for 3 hours on the steam-bath (reflux). Hydrochloric acid (excess of 10%) was added, the heating continued for 1½ hours, the alcohol evaporated, and the mixture diluted and filtered. The base was set free by means of an excess of sodium hydroxide, collected (1·3 g.), and purified by re-dissolution and reprecipitation (m. p. *ca.* 54°). The dry base was dissolved in chloroform, and the *hydrochloride* precipitated by passage of hydrogen chloride; the salt then crystallised from 95% alcohol (1·2 g., recrystallised 0·9 g.) in orange-red prisms, m. p. 196—197° (Found : C, 51·2; H, 7·1; N, 11·7; Cl, 20·1. $C_{15}H_{21}ON_3,2HCl,H_2O$ requires C, 51·5; H, 7·2; N, 12·0; Cl, 20·2%).

It was thought that it might be possible to obtain members of the δ-aminobutylamino-series from related succinimides by electrolytic reduction. The condensation of 8-amino-6-methoxyquinoline with succinic anhydride furnished a succinamic acid, namely, 8-β-*carboxypropionamido*-6-*methoxyquinoline*, m. p. 143—144° (Found : N, 10·0. $C_{14}H_{14}O_4N_2$ requires N, 10·2%), but the yield was unsatisfactory and other products were obtained by slight variation of the conditions.

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