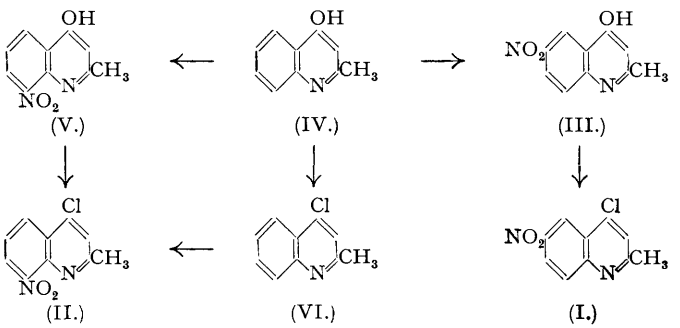
669. *Arylamino-(dialkylaminoalkylamino)-derivatives of Quinaldine and Lepidine.*

By A. Adams and D. H. Hey.

The synthesis of a number of arylamino-(dialkylaminoalkylamino)-derivatives of quinaldine and lepidine is described. Improved methods for the nitration of 4-hydroxyquinaldine, and for the conversion of 6-nitro-4-hydroxy- into 4-chloro-6-nitro-quinaldine are described. The formation of a third isomeride, assumed to be the hitherto unknown 2-chloro-5-nitrolepidine, in the nitration of 2-chlorolepidine, is also reported.

As part of a programme devoted to the search for new antimalarials, the synthesis of a number of arylamino-(dialkylaminoalkylamino)quinolines, in whcih the arylamino- and the dialkylamino-alkylamino-groups are attached to different rings in the quinoline system, has been described by Bennett, Crofts, and Hey (this vol., p. 227). The present communication describes the preparation of similar compounds, in which a *p*-chloroanilino- and a dialkylaminoalkylamino-group are attached to the pyridine and benzene rings, respectively, of quinaldine and of lepidine.

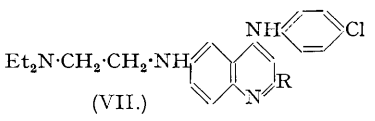
For the synthesis of arylamino-(dialkylaminoalkylamino)quinaldines, 4-chloro-6-nitro-quinaldine (I) and 4-chloro-8-nitroquinaldine (II) were used as intermediates. The former was obtained in good yield by the action of phosphorus oxychloride on 6-nitro-4-hydroxyquinaldine (III), the latter being prepared by the nitration of 4-hydroxyquinaldine (IV). Kermack and Weatherhead (*J.*, 1939, 564)) obtained 6-nitro-4-hydroxyquinaldine (III), in 63% yield, as the sole product of the nitration, but in our hands 8-nitro-4-hydroxyquinaldine (V) has also been isolated in 10% yield, and the yield of 6-nitro-4-hydroxyquinaldine (III) has been improved.



Further, Kermack and Weatherhead (*loc. cit.*) reported some difficulty in the conversion of 6-nitro-4-hydroxyquinaldine (III) into 4-chloro-6-nitroquinaldine (I) by boiling for one hour with phosphorus pentachloride and phosphorus oxychloride. These results were confirmed purple amorphous products being frequently obtained by this method, but it was found that excellent yields of pure 4-chloro-6-nitroquinaldine (I) could be obtained by warming 6-nitro-4-hydroxyquinaldine (III) with phosphorus oxychloride alone for a short period until dissolution was just complete. 4-Chloro-8-nitroquinaldine (II) was prepared in similar manner from 8-nitro-4-hydroxyquinaldine (V) as well as by the nitration of 4-chloroquinaldine (VI), as described by Halcrow and Kermack (*J.*, 1945, 415).

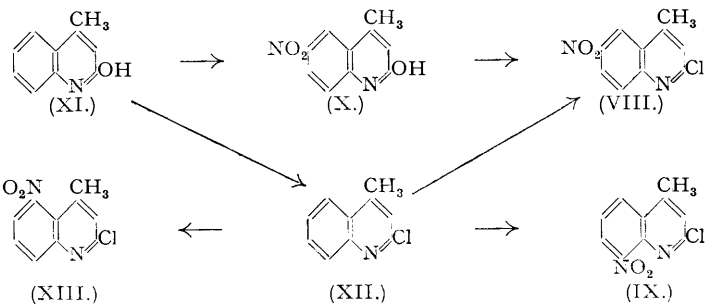
The two chloronitroquinaldines (I) and (II) were each heated with *p*-chloroaniline, without a solvent, reaction with 4-chloro-8-nitroquinaldine taking place much more readily than with

4-chloro-6-nitroquinaldine, and the resulting 6- and 8-*nitro*-4-p-*chloroanilinoquinaldines* were reduced with stannous chloride and hydrochloric acid to the corresponding 6- and 8-*amino*-4-p-*chloroanilinoquinaldines*. When 6-amino-4-*p*-chloroanilinoquinaldine was heated for 60 hours with 2-diethylaminoethyl chloride in xylene solution, 4 - p - *chloroanilino* - 6 - 2′ - *diethylaminoethylaminoquinaldine* (VII; R = CH_3) was obtained in small yield, but repeated attempts to introduce the basic side chain into 8-amino-4-*p*-chloroanilinoquinaldine failed.

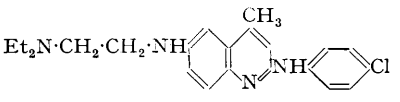


(VII.)

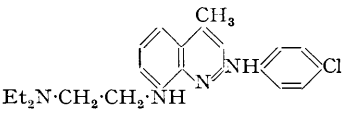
The intermediates used for the preparation of arylamino-(dialkylaminoalkylamino)lepidines were 2-chloro-6-nitrolepidine (VIII) and 2-chloro-8-nitrolepidine (IX). In order to obtain the former, an attempt was made to prepare 6-nitro-2-hydroxylepidine (X) from *p*-nitroacetoacetanilide by treatment with concentrated sulphuric acid, but only *p*-nitroaniline could be isolated from the reaction product. The same difficulty was experienced by Balaban (*J.*, 1930, 2347) although he reported the formation of the nitro-hydroxylepidine in small yield. 2-Chloro-6-nitrolepidine (VIII) was finally prepared by the action of phosphorus oxychloride on 6-nitro-2-hydroxylepidine (X) (Balaban, *ibid.*, p. 2349), prepared by the nitration of 2-hydroxylepidine (XI). The production of tars, which, according to Krahler and Burger (*J. Amer. Chem. Soc.*, 1941, **63**, 2367), are formed in Balaban's process, was avoided by warming the hydroxylepidine for one hour with phosphorus oxychloride only, instead of boiling it with a mixture of phosphorus oxychloride and pentachloride. 2-Chloro-8-nitrolepidine (IX) was prepared by nitration of 2-chlorolepidine (XII) (Krahler and Burger, *ibid.*, p. 2369; 1942, **64**, 2417). Krahler and Burger, as well as Johnson and Hamilton (*ibid.*, 1941, **63**, 2867), reported the formation of only 2-chloro-6-nitrolepidine (VIII) and 2-chloro-8-nitrolepidine (IX) in the nitration of 2-chlorolepidine (XII), but it is now shown that a third isomeride is also formed in small yield which, by analogy with the nitration of 4-chloroquinaldine (Halcrow and Kermack, *loc. cit.*), is regarded as the hitherto unknown 2-*chloro*-5-*nitrolepidine* (XIII).



2-Chloro-6- and -8-nitrolepidine (VIII and IX) were each heated with *p*-chloroaniline to give 6- and 8-*nitro*-2-p-*chloroanilinolepidine*, respectively, which were reduced with stannous chloride and hydrochloric acid to 6- and 8-*amino*-2-p-*chloroanilinolepidine*. The subsequent introduction of the 2-diethylaminoethyl group into these compounds proceeded with much greater readiness than in the cases of the corresponding derivatives of quinaldine, and heating with 2-diethylaminoethyl chloride in xylene solution gave 2-p-*chloroanilino*-6- (XIV) and -8-2′-*diethylaminoethylaminolepidine* (XV) respectively.



(XIV.)



(XV.)

The ease with which the basic side chain is introduced into an amino-group attached to the benzene nucleus in *p*-chloroanilino-derivatives of quinoline, quinaldine, and lepidine appears to depend to a marked extent on the position of the *p*-chloroanilino-group. Bennett, Crofts, and Hey (*loc. cit.*) were able to introduce the 2-diethylaminoethyl group easily into 5-, 6-, and 8-amino-2-*p*-chloroanilinoquinoline, but the reaction failed with 8-amino-4-*p*-chloroanilino-6-methoxyquinoline and with 6-amino-4-*p*-chloroanilinoquinoline. Further work has confirmed the resistance of these amino-4-*p*-chloroanilinoquinolines to the introduction of the basic

side chain, although it has been possible to prepare 4-p-*chloroanilino*-6-2′-*diethylaminoethylaminoquinoline* (VII; R = H) in very low yield from 6-amino-4-*p*-chloroanilinoquinoline.

Experimental.

4-Hydroxyquinaldine.—4-Hydroxyquinaldine was prepared by a modification of the original synthesis of Conrad and Limpach (*Ber.*, 1887, **20**, 944, 947) (cf. Leonard, Herbrandson, and Heyningen, *J. Amer. Chem. Soc.*, 1946, **68**, 1280; Price and Jackson, *ibid.*, p. 1282). A mixture of ethyl acetoacetate (52·0 g.), aniline (37·2 g.), and concentrated hydrochloric acid (one drop) was set aside for 24 hours. After separation of the aqueous layer, the residual oil was dried over anhydrous magnesium sulphate for 24 hours and added during 15 minutes to boiling diphenyl ether (500 c.c.). Heating was continued for a further 10 minutes, and after cooling overnight the precipitate was filtered off, washed twice with light petroleum (b. p. 60—80°), and dried. The product (37·0 g.; m. p. 220—225°) was dissolved in boiling water (600 c.c.), and the solution filtered and evaporated almost to dryness. The resulting 4-hydroxyquinaldine, after drying at 100°, was obtained as a pale yellow, crystalline powder (32·8 g.; m. p. 230—231°, uncorr.). During the distillation of the diphenyl ether filtrate a small quantity of diphenylurea (0·9 g.; m. p. 234—235°) was collected in the condenser and receiver.

Nitration of 4-Hydroxyquinaldine (cf. Kermack and Weatherhead, *loc. cit.*).—A mixture of nitric acid (*d* 1·42; 4·9 c.c.) and concentrated sulphuric acid (5·0 c.c.) was stirred into a solution of 4-hydroxyquinaldine (10·6 g.) in concentrated sulphuric acid (50 c.c.) at 0° After storage overnight the solution was poured on ice (500 g.), and crude 6-nitro-4-hydroxyquinaldine slowly separated as a yellow crystalline powder (9·8 g.). After recrystallisation from glacial acetic acid the product melted above 360°. The acidic aqueous filtrate was made almost neutral with aqueous sodium hydroxide, and a further precipitate (4·1 g., m. p. >300°) was obtained. Recrystallisation from glacial acetic acid gave pure 6-nitro-4-hydroxyquinaldine as a bright yellow crystalline powder (1·9 g.), m. p. >360°, and concentration of the mother-liquor to small bulk gave 8-nitro-4-hydroxyquinaldine (1·4 g.) in yellow plates, m. p. 224—227° (cf. Halcrow and Kermack, *J.*, 1945, 415). The latter compound (1·0 g.) was warmed with phosphorus oxychloride (5 c.c.) until dissolved, then cooled, and poured on ice (100 g.). The blue solution was made slightly alkaline by addition of aqueous sodium hydroxide; the blue colour disappeared and 4-chloro-8-nitroquinaldine (0·9 g.) separated as a white solid. Recrystallisation from ethyl alcohol gave the quinaldine in long colourless needles, m. p. and mixed m. p. with an authentic specimen (cf. Halcrow and Kermack, *loc. cit.*), 112—113°.

4-Chloro-6-nitroquinaldine.—6-Nitro-4-hydroxyquinaldine (1·2 g.) was warmed gently with phosphorus oxychloride (6 c.c.) until the solid was dissolved. When cold, the solution was poured on ice. After filtration of the ice-cold solution, the filtrate was made just alkaline by addition of aqueous sodium hydroxide. The white precipitate was collected, washed with water, and dried (1·2 g.; m. p. 140—142°). Recrystallisation from ethyl alcohol gave 4-chloro-6-nitroquinaldine in long, fine, colourless needles, m. p. 142°.

4-Chloro-8-nitroquinaldine.—4-Chloroquinaldine was prepared from 4-hydroxyquinaldine as described by Conrad and Limpach (*Ber.*, 1887, **20**, 952) and purified by steam-distillation and subsequent extraction with ether. Nitration, as described by Halcrow and Kermack (*loc. cit.*), gave 4-chloro-8-nitroquinaldine, m. p. 112—113°.

6-Nitro-4-p-chloroanilinoquinaldine.—A mixture of 4-chloro-6-nitroquinaldine (1·5 g.) and *p*-chloroaniline (0·9 g.) was heated at 240°. Hydrogen chloride was evolved, and the temperature rose to 270—280°. After 5 minutes at this temperature the mixture was cooled, and boiled for 15 minutes with glacial acetic acid (50 c.c.). The cooled solution was diluted with water (200 c.c.) and filtered. The filtrate was made alkaline with aqueous sodium hydroxide, and the resulting precipitate collected, washed with water, and dried. Recrystallisation from toluene (250 c.c.) gave 6-*nitro*-4-p-*chloroanilinoquinaldine* (1·0 g.) in red needles, m. p. 273—274° (uncorr.) (Found: C, 61·6; H, 4·0. $C_{16}H_{12}O_2N_3Cl$ requires C, 61·3; H, 3·8%).

8-Nitro-4-p-chloroanilinoquinaldine.—A mixture of 4-chloro-8-nitroquinaldine (1·0 g.) and *p*-chloroaniline (0·6 g.) was heated to 65°, at which temperature reaction began and the temperature quickly rose to 130—140°. After 5 minutes at this temperature, the mixture was cooled, powdered, and boiled with aqueous sodium carbonate. The free base was filtered off, washed with water, and dried. Recrystallisation from toluene gave 8-*nitro*-4-p-*chloroanilinoquinaldine* (1·1 g.) in bright yellow needles, m. p. 173—174° (Found: C, 61·3; H, 4·0. $C_{16}H_{12}O_2N_3Cl$ requires C, 61·3; H, 3·8%). The *acetate* separated from glacial acetic acid in orange needles, m. p. >300° (Found: C, 54·5; H, 4·0. $C_{16}H_{12}O_2N_3Cl,2C_2H_4O_2$ requires C, 55·3; H, 4·6%).

6-Amino-4-p-chloroanilinoquinaldine.—A solution of stannous chloride (11·5 g.) in concentrated hydrochloric acid (11·5 c.c.) was added to a solution of 6-nitro-4-*p*-chloroanilinoquinaldine (2·3 g.) in glacial acetic acid (23 c.c.). The mixture was heated for one hour on a boiling water-bath, and then kept at room temperature for 48 hours. The solid stannichloride was collected and warmed with 30% aqueous sodium hydroxide (100 c.c.). The liberated free base was filtered off, washed with water, and dried. Recrystallisation from toluene gave 6-*amino*-4-p-*chloroanilinoquinaldine* (1·5 g.) in yellow-brown needles which lost water at 90—100° and melted at 174—176° (Found: C, 65·6; H, 5·2. $C_{16}H_{14}N_3Cl,\frac{1}{2}H_2O$ requires C, 65·6; H, 5·1%). The base dissolved in alcohol and in toluene to give yellow solutions with a violet fluorescence. The *picrate* separated from alcohol in clusters of yellow needles, m. p. 191—193° (Found: C, 51·2; H, 3·7. $C_{16}H_{14}N_3Cl,C_6H_3O_7N_3$ requires C, 51·5; H, 3·3%).

8-Amino-4-p-chloroanilinoquinaldine.—A mixture of 8-nitro-4-*p*-chloroanilinoquinaldine (2·2 g.) in glacial acetic acid (22 c.c.) and stannous chloride (11 g.) in concentrated hydrochloric acid (11 c.c.) was heated for one hour on the water-bath and then left overnight at room temperature. The mixture was made strongly alkaline with aqueous sodium hydroxide, heated on the water-bath for one hour, cooled, and filtered. Crystallisation of the washed and dried residue from toluene gave 8-*amino*-4-p-*chloroanilinoquinaldine* (1·3 g.) in white needles, m. p. 262·5—263·5° (uncorr.) after softening at 100° (Found:

C, 63·5; H, 5·3. $C_{16}H_{14}N_3Cl,H_2O$ requires C, 63·7; H, 5·3%). The amine dissolved in toluene and in alcohol to give yellow solutions with a violet fluorescence. The *picrate* separated from alcohol in yellow microcrystals, m. p. 245—247° (uncorr.) (Found: C, 52·3; H, 3·5. $C_{16}H_{14}N_3Cl,C_6H_3O_7N_3$ requires C, 51·5; H, 3·3%).

4-p-*Chloroanilino*-6-2′-*diethylaminoethylaminoquinaldine*.—A solution of 6-amino-4-*p*-chloroanilinoquinaldine (1·0 g.) and 2-diethylaminoethyl chloride (0·5 g.) in xylene (50 c.c.) was boiled under reflux for 30 minutes and then heated in a water-bath for 60 hours. When cold, unchanged 6-amino-4-*p*-chloroanilinoquinaldine (0·9 g.) separated and was filtered off. The xylene filtrate was extracted with two portions (each 50 c.c.) of 12% hydrochloric acid, and the aqueous extract was made alkaline with solid sodium hydroxide, and extracted with ether. Evaporation of the ether from the dried (potassium hydroxide) extract left a residue which was dissolved in alcohol and treated with a saturated alcoholic solution of picric acid. The yellow picrate which separated was washed and dried (0·4 g.; m. p. 70—100°). Fractional crystallisation from alcohol gave first the picrate of 2-diethylaminoethyl chloride, m. p. 115—117°, which did not depress the m. p. of an authentic specimen, and secondly, the *dipicrate* of 4-p-*chloroanilino*-6-2′-*diethylaminoethylaminoquinaldine* (0·1 g.), m. p. 205—210° (decomp.) (Found: C, 47·8; H, 4·1. $C_{22}H_{27}N_4Cl,2C_6H_3O_7N_3$ requires C, 48·5; H, 3·9%).

2-*Hydroxylepidine*.—Acetoacetanilide, prepared from ethyl acetoacetate and aniline by the modification described by Ewins and King (*J.*, 1913, **103**, 105) of Knorr's original method (*Annalen*, 1886, **236**, 75), was converted into 2-hydroxylepidine with concentrated sulphuric acid as described by Mikhailov (*J. Gen. Chem. Russia*, 1936, **6**, 511; *Chem. Abstr.*, 1936, **30**, 6372).

2-*Chloro*-6-*nitrolepidine*.—6-Nitro-2-hydroxylepidine (7·2 g.), prepared by nitration of 2-hydroxylepidine (Balaban, *loc. cit.*), was warmed with phosphorus oxychloride (20 c.c.) at 100° for one hour. When cold, the mixture was poured on ice (500 g.), and the solid which separated was collected, dried, and crystallised from benzene. 2-Chloro-6-nitrolepidine (6·7 g.) separated in cream-coloured needles, m. p. 211—212° (cf. Krahler and Burger, *loc. cit.*).

Nitration of 2-*Chlorolepidine*.—2-Chlorolepidine, m. p. 57—58° (17·9 g.), prepared from 2-hydroxylepidine in 86% yield by the method of Krahler and Burger (*loc. cit.*), was nitrated as described by these workers (cf. Johnson and Hamilton, *loc. cit.*). The crude dried nitration product (18·9 g.) thus obtained was dissolved in boiling ethyl alcohol (600 c.c.), and the solution cooled to 55° and filtered. The precipitated 2-chloro-6-nitrolepidine (1·1 g.), after drying, melted at 195—200°. Recrystallisation from benzene gave straw-coloured needles, m. p. 211—213°. The alcoholic filtrate was cooled at 0°, and the precipitated 2-chloro-8-nitrolepidine, m. p. 132—134° (10·6 g.), was collected. Concentration of the mother-liquor gave a third isomeride (1·2 g.) in colourless needles, m. p. 140—142°. Recrystallisation from alcohol gave 2-*chloro*-5-*nitrolepidine* in needles, m. p. 143° (Found: C, 53·8; H, 3·3. $C_{10}H_7O_2N_2Cl$ requires C, 53·9; H, 3·2%).

6-*Nitro*-2-p-*chloroanilinolepidine*.—A mixture of *p*-chloroaniline (4·7 g.) and 2-chloro-6-nitrolepidine (7·7 g.) was heated in a metal-bath. Reaction commenced at 150°, and the mixture became solid. After 5 minutes at this temperature the product was cooled, powdered, and boiled with aqueous sodium carbonate and filtered off. The residue was dissolved in hot glacial acetic acid (200 c.c.), and the filtered solution was poured into water (600 c.c.). The precipitate was collected, washed with water, and dried, and recrystallisation from toluene gave 6-*nitro*-2-p-*chloroanilinolepidine* (8·1 g.) in orange-red needles, m. p. 208° (Found: C, 60·9; H, 3·8. $C_{16}H_{12}O_2N_3Cl$ requires C, 61·3; H, 3·8%).

8-*Nitro*-2-p-*chloroanilinolepidine*.—2-Chloro-8-nitrolepidine (7·5 g.) and *p*-chloroaniline (4·5 g.) in similar manner gave 8-*nitro*-2-p-*chloroanilinolepidine* (6·4 g.), which crystallised from toluene in a mixture of red needles, m. p. 194—196°, and orange plates, m. p. 196°, admixture of the two forms showing no depression in m. p. (Found: C, 61·4; H, 3·6. $C_{16}H_{12}O_2N_3Cl$ requires C, 61·3; H, 3·8%).

6-*Amino*-2-p-*chloroanilinolepidine*.—A solution of stannous chloride (40·5 g.) in concentrated hydrochloric acid (40·5 c.c.) was added to a suspension of 6-nitro-2-*p*-chloroanilinolepidine (8·1 g.) in glacial acetic acid (81 c.c.). The mixture was heated on a water-bath for one hour, and then kept at room temperature for 48 hours. The clear solution was made alkaline, and the stannichloride filtered off and boiled for 15 minutes with 50% aqueous sodium hydroxide. The residue was collected and dried, and crystallisation from toluene gave 6-*amino*-2-p-*chloroanilinolepidine* (4·2 g.) in fawn prisms, m. p. 169° (Found: C, 67·9; H, 4·8. $C_{16}H_{14}N_3Cl$ requires C, 67·7; H, 4·9%). The amine dissolved in alcohol and in toluene to give yellow solutions with a violet fluorescence. The *dipicrate* separated from alcohol in clusters of yellow needles, m. p. 216—218° (uncorr.) (Found: C, 45·5; H, 2·8. $C_{16}H_{14}N_3Cl,2C_6H_3O_7N_3$ requires C, 45·3; H, 2·7%).

8-*Amino*-2-p-*chloroanilinolepidine*.—A mixture of stannous chloride (30 g.) in concentrated hydrochloric acid (30 c.c.) and 8-nitro-2-*p*-chloroanilinolepidine (4·5 g.) in glacial acetic acid (45 c.c.) was heated on the water-bath for one hour, and then left for 48 hours at room temperature. The product, worked up as in the previous example, was crystallised first from xylene (200 c.c.) and then from toluene. 8-*Amino*-2-p-*chloroanilinolepidine* (3·1 g.) was obtained in pale brown plates, m. p. 187—188° (Found: C, 67·1; H, 4·7. $C_{16}H_{14}N_3Cl$ requires C, 67·7; H, 4·9%). The amine dissolved in alcohol and in toluene to give yellow solutions with a violet fluorescence. The *picrate* separated from alcohol in dark red needles, m. p. 205—208° (Found: C, 51·5; H, 3·7. $C_{16}H_{14}N_3Cl,C_6H_3O_7N_3$ requires C, 51·5; H, 3·3%). The *diacetyl* derivative crystallised from aqueous acetic acid in white plates, m. p. 297—298° (uncorr.) (Found: C, 65·7; H, 4·6. $C_{20}H_{18}O_2N_3Cl$ requires C, 65·3; H, 4·9%).

2-p-*Chloroanilino*-6-2′-*diethylaminoethylaminolepidine*.—A mixture of 6-amino-*p*-chloroanilinolepidine (1·0 g.) in toluene (100 c.c.) and 2-diethylaminoethyl chloride (0·5 g.) in xylene (3 c.c.) was boiled under reflux for 24 hours. When cold, the solution was extracted with two 50-c.c. portions of 12% hydrochloric acid. The combined extracts were made alkaline with solid sodium hydroxide, and the liberated bases extracted with ether. Evaporation of the ethereal extract, dried over solid potassium hydroxide, left a brown oil which was dissolved in alcohol (20 c.c.) and treated with a saturated alcoholic solution of picric acid. The precipitated mixture of picrates was collected and washed with cold alcohol. After extraction with boiling ethyl alcohol (two 25-c.c. portions), the relatively insoluble picrate of 2-diethylaminoethyl chloride (m. p. 115—117°) remained. The combined alcoholic extracts were

evaporated to dryness, and subsequent crystallisation from alcohol–acetone gave 2-p-*chloroanilino*-6-2′-*diethylaminoethylaminolepidine dipicrate* (0·4 g.) in orange-yellow prisms, m. p. 158—162° (Found: C, 48·4; H, 4·2. $C_{22}H_{27}N_4Cl,2C_6H_3O_7N_3$ requires C, 48·5; H, 3·9%).

2-p-*Chloroanilino*-8-2′-*diethylaminoethylaminolepidine*.—A mixture of 2-diethylaminoethyl chloride (0·5 g.) in xylene (3 c.c.) and 8-amino-2-*p*-chloroanilinolepidine (1·0 g.) in toluene was boiled under reflux for 24 hours. The product was isolated as described in the previous example. Extraction of the liberated bases with ether left an insoluble residue (0·5 g.) of 8-amino-2-*p*-chloroanilinolepidine, m. p. 181—183° after recrystallisation. Evaporation of the dried (KOH) ethereal extract left a yellow oil, which was dissolved in ethyl alcohol (20 c.c.) and treated with alcoholic picric acid. The resulting picrate (0·5 g.) was collected, washed with alcohol, and dried. Recrystallisation from ethyl alcohol gave 2-p-*chloroanilino*-8-2′-*diethylaminoethylaminolepidine dipicrate* in yellow prisms, m. p. 175—180° (Found: C, 48·6; H, 4·1. $C_{22}H_{27}N_4Cl,2C_6H_3O_7N_3$ requires C, 48·5; H, 3·9%).

4-p-*Chloroanilino*-6-2′-*diethylaminoethylaminoquinoline*.—A solution of 6-amino-4-*p*-chloroanilinoquinoline (0·8 g.) and 2-diethylaminoethyl chloride (0·4 g.) in xylene (30 c.c.) was heated in a water-bath for 96 hours. The product was then extracted with two 50-c.c. portions of 10% hydrochloric acid, and the extracts were made alkaline with solid potassium hydroxide. The liberated bases were extracted with ether (100 c.c.), and the extract dried over solid potassium hydroxide. After removal of solvent the residue was dissolved in alcohol (5 c.c.) and treated with saturated alcoholic picric acid. Extraction of the insoluble picrates with boiling alcohol left the less soluble picrate of 2-diethylaminoethyl chloride, m. p. 110—115°, and evaporation of the extract deposited 4-p-*chloroanilino*-6-2′-*diethylaminoethylaminoquinoline dipicrate* (0·2 g.) in yellow crystals, m. p. 212—214° (uncorr.) (Found: C, 47·8; H, 3·8. $C_{21}H_{25}N_4Cl,2C_6H_3O_7N_3$ requires C, 47·9; H, 3·8%).

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[*Received, August 3rd*, 1949.]