fluoride and 2 ml. of antimony trichloride to give 5.2 g. of trifluorotrichloropropene, b.p. 85–86°. The trifluoride was ozonized in the same way except that the trifluoroacetic acid was not recovered. Results of two fluorinations are given in Table I.

Assays.—These were done by the wet combustion-vibrating reed electrometer method of Neville.[11] It was found that difficulties in operation of the combustion apparatus caused by chlorine attacking the mercury were conveniently overcome by placing in the system a $SnCl_2 \cdot 2H_2O$ absorption tube.

Acknowledgment.—The authors would like to express their appreciation to the United States Atomic Energy Commission and the University of South Carolina Research Fund for financial assistance.

(11) O. K. Neville, *ibid.*, **70**, 350 (1948).

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Homopiperazines Related to Chlorocyclizine

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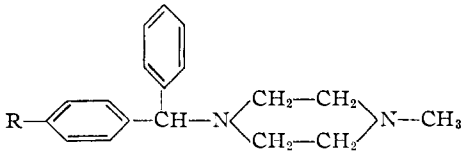
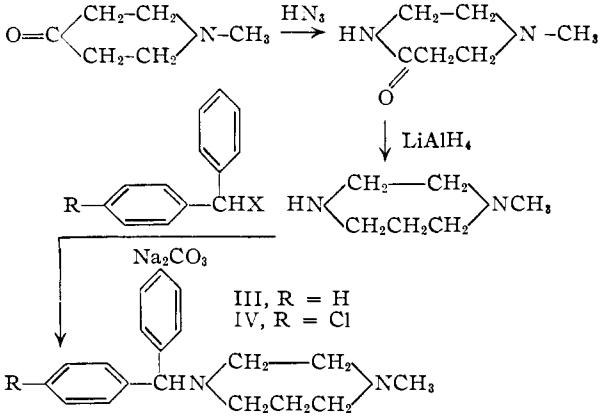
Cyclizine (I) and chlorocyclizine (II) are substituted piperazines[1] which exhibit good antihistaminic activity.[2]



I, R = H
II, R = Cl

To determine the effect of ring enlargement on this property we have synthesized the analogous homopiperazines III and IV by the scheme



III, R = H
IV, R = Cl

In preliminary animal experiments each of these seven-membered ring compounds showed antihistaminic action greater than that of the corresponding piperazine.[3]

Acknowledgment.—We are grateful to Mr. E. F. Shelberg and members of the Microanalytical Department for the analytical results reported.

Experimental

1-Methylhomopiperazine.—A solution of 10.2 g. (0.08 mole) of 1-methyl-5-homopiperazinone[4] in 400 ml. of dry ether was added with stirring under nitrogen to 7.6 g. (0.2 mole) of lithium aluminum hydride in 200 ml. of dry ether during two hours. The mixture was stirred overnight, hydrolyzed by the cautious addition of 25 ml. of water and filtered. The filtrate was dried over potassium carbonate and distilled, yielding 4.5 g. (49%) of product, b.p. 74–75° at 35 mm., $n^{25}D$ 1.4750.

The dihydrochloride salt, prepared in dry ether and crystallized from an ethanol–isopropyl alcohol mixture, melted at 133–136°.

Anal. Calcd. for $C_6H_{16}Cl_2N_2$: C, 38.51; H, 8.62. Found: C, 38.31; H, 8.60.

1-Benzhydryl-4-methylhomopiperazine (III).—To a stirred refluxing mixture of 1.8 g. (0.016 mole) of 1-methylhomopiperazine, 2.1 g. (0.016 mole) of sodium carbonate and 0.1 g. of sodium iodide in 65 ml. of dry toluene there was added, during two hours, 4.5 g. (0.018 mole) of benzhydryl bromide. After two more hours the mixture was cooled and twice extracted with 65 ml. of 2 *N* hydrochloric acid. The combined extracts after washing with ether were made basic with sodium hydroxide, and the oil which separated was extracted by ether. Distillation gave 1.8 g. (41%) of product, a viscous oil which boiled at 155° at 0.3 mm.

Anal. Calcd. for $C_{19}H_{24}N_2$: C, 81.38; H, 8.63. Found: C, 81.12; H, 8.59.

The dihydrochloride salt, m.p. 235°, was prepared and recrystallized in isopropyl alcohol.

Anal. Calcd. for $C_{19}H_{26}Cl_2N_2$: C, 64.58; H, 7.42. Found: C, 65.03; H, 7.19.

1-(*p*-Chlorobenzhydryl)-4-methylhomopiperazine (IV).—The method described by Hamlin and co-workers[1] for the corresponding substituted piperazine was used. This afforded a 56% yield of product, an oil boiling at 177° at 0.8 mm., $n^{25}D$ 1.5804.

Anal. Calcd. for $C_{19}H_{23}ClN_2$: N, 8.90. Found: N, 8.82.

The dihydrochloride salt prepared in isopropyl alcohol and recrystallized from ethanol melted at 227–228°.

Anal. Calcd. for $C_{19}H_{25}Cl_3N_2$: C, 58.85; H, 6.50. Found: C, 59.10; H, 6.35.

(1) K. E. Hamlin, A. W. Weston, F. E. Fischer and R. J. Michaels, Jr., THIS JOURNAL **71**, 2731 (1949); R. Baltzly, S. DuBreuil, W. S. Ide and E. Lorz, *J. Org. Chem.*, **14**, 775 (1949).

(2) J. C. Castillo, E. J. De Beer and S. H. Jaros, *J. Pharmacol. Exptl. Therap.*, **96**, 388 (1949); L. W. Roth, R. K. Richards and I. M. Shepperd, *Arch. intern. pharmacodynamie*, **80**, 378 (1949); cyclizine is available under the trade name Marezine, and chlorocyclizine under the names Di-Paralene and Perazil.

(3) Private communication from Dr. L. W. Roth of these laboratories.

(4) S. C. Dickerman and H. G. Lindwall, *J. Org. Chem.*, **14**, 530 (1949).

ABBOTT LABORATORIES
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A New Method for α-Bromination of Carboxylic Acids

BY EDWARD E. SMISSMAN

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An investigation of α-bromination of aliphatic carboxylic acid anhydrides to give α,α′-dibromoanhydrides was conducted in this Laboratory. It was found that acetic anhydride when treated with bromine in the presence of aluminum chloride yielded α,α′-dibromoacetic anhydride. As a preparative method for obtaining α-bromo acids of high molecular weight this method would involve the preparation of anhydrides which are not readily available.