146. *Some Derivatives of Diphenylguanidine.*

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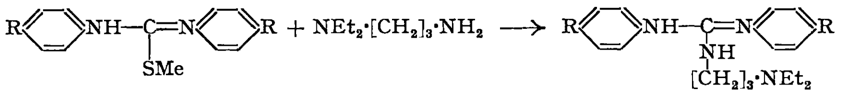
Certain diaryl-(γ-diethylaminopropyl)guanidines have been synthesised with a view to pharmacological tests.

Several lines of investigation suggested that diphenylguanidine derivatives containing a second basic centre in the molecule might have interesting pharmacological properties; three such compounds have therefore been synthesised by condensing an appropriate diphenylmethyl*iso*thiourea derivative (I) with γ-diethylaminopropylamine (II) to form a guanidine derivative (III) by loss of methylthiol. The necessary *iso*thioureas were prepared by the method of Deck and Dains (*J. Amer. Chem. Soc.*, 1933, **55**, 4986) from the corresponding thiourea and methyl sulphate. 4 : 4'-*Dichloro-* (I; R = Cl) and 4 : 4'-*dimethoxy-diphenyl*iso*thioureas* (I; R = OMe) have not previously been described. Condensation with (II) proceeded smoothly to give excellent yields of the guanidine (III; R = H, Cl or OMe), but only their *oxalates* could be obtained crystalline, except that diphenyl-(γ-diethylaminopropyl)guanidine (III; R = H) gave also a crystalline *picrolonate*. For pharmacological test the *hydrochlorides* were prepared; they were intractable gums which, however, gave satisfactory analyses.



(I.) (II.) (III.)

Experimental.

(All compounds were dried in a high vacuum at 60° for analysis.)

N'N''-*Diphenyl*-N-(*γ-diethylaminopropyl*)*guanidine*.—Diphenylmethyl*iso*thiourea (9·68 g.) (Deck and Dains, *loc. cit.*) and γ-diethylaminopropylamine (5·20 g.) were dissolved in xylene (30 c.c.) and boiled for 15 hours under reflux. The guanidine *oxalate*, precipitated in theoretical yield by addition of excess oxalic acid in ethyl acetate, crystallised from alcohol in colourless felted needles, m. p. 99° (Found: C, 55·1; H, 6·5; N, 10·9. $C_{20}H_{28}N_4,2C_2H_2O_4,H_2O$ requires C, 55·2; H, 6·5; N, 10·7%). The *picrolonate* crystallised from acetone after a month and was recrystallised with seeding from alcohol, forming orange rhombs, m. p. 111° with gas-evolution (Found: C. 55·2; H, 5·4; N, 19·1. $C_{20}H_{28}N_4,2C_{10}H_8O_5N_4,H_2O$ requires C, 55·2; H, 5·3; N, 19·3%). Other derivatives could not be obtained crystalline.

*Dianisylmethyl*iso*thiourea*.—Prepared in 88% yield by the method of Deck and Dains (*loc. cit.*), the iso*thiourea* crystallised from benzene–light petroleum in large polyhedra, m. p. 84—85° (Found: C, 63·1; H, 5·8; S, 10·1. $C_{16}H_{18}O_2N_2S$ requires C, 63·5; H, 6·0; S, 10·6%).

Bis-(p-*chlorophenyl*)*methyl*iso*thiourea*.—Prepared similarly in 89% yield, the iso*thiourea* crystallised from ether–light petroleum in colourless needles, m. p. 133° (Found: C, 53·8; H, 3·9. $C_{14}H_{12}N_2Cl_2S$ requires C, 54·0; H, 3·9%).

N'N''-*Dianisyl*-N-(*γ-diethylaminopropyl*)*guanidine*.—Prepared in the same way as the diphenylguanidine and in almost theoretical yield, this guanidine gave an *oxalate* which crystallised only with extreme difficulty and showed dimorphism; rounded rhombs, m. p. 100—105°, separated first from alcohol, and these gradually changed into pale yellow prisms, m. p. 150° with gas-evolution (Found: C, 50·6; H, 7·0; N, 9·3. $C_{22}H_{32}O_2N_4,2C_2H_2O_4,3H_2O$ requires C, 50·5; H, 6·8; N, 9·1%). No other derivative could be obtained crystalline; the *hydrochloride* was an extremely hygroscopic gum (Found: C, 56·9; H, 8·0; N, 12·2. $C_{22}H_{32}O_2N_4,2HCl,\frac{1}{2}H_2O$ requires C, 56·7; H, 7·5; N, 12·0%).

N'N''-*Bis*-(p-*chlorophenyl*)-N-(*γ-diethylaminopropyl*)*guanidine*.—Prepared similarly, the guanidine *oxalate* crystallised with great reluctance from alcohol in feathery, cream-coloured needles, m. p. 166—168° with gas-evolution (Found: C, 49·4; H, 5·7; N, 9·4. $C_{20}H_{26}N_4Cl_2,2C_2H_2O_4,\frac{1}{2}H_2O$ requires C, 49·5; H, 5·3; N, 9·6%). No other derivative could be obtained crystalline; the *hydrochloride* was an exceptionally hygroscopic gum (Found: C, 50·9; H, 6·6; N, 11·7. $C_{20}H_{26}N_4Cl_2,2HCl,\frac{1}{2}H_2O$ requires C, 51·0; H, 6·1; N, 11·9%).

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