of paralysed insects (dosage per insect, 0·15 c.c. 1 per cent solution in phosphate buffer, *p*H 7·4). Succinate induced complete, and glucose partial, recovery; lactate and pyruvate were ineffective. The uptakes of oxygen after injection were: succinate, 17·8; glucose, 11·2; pyruvate, 7·2; and lactate, 6·9 c.mm./gm./min.

Narcosis produced by injection of 0·4 per cent chloroform, 1·0 per cent ether, or 0·6 per cent amyl alcohol (0·15 c.c. aqueous solution) into the blood of mature larvæ was also antagonized by simultaneous injection of 1 per cent succinate; but not by glucose, lactate, or pyruvate. After succinate injection, adult blowflies became considerably more resistant to the narcotic action of these fat solvents applied internally by injection, or externally in vapour form. Flies treated externally with alumina and internally with succinate remained active in the presence of crystalline D.D.T. for several hours, showing clearly the combined influence of permeability and metabolic factors on D.D.T. activity.

These results show that the cuticle lipids play an important part in influencing the selective action of D.D.T. at the peripheral nervous system; but the action is primarily reversible and analogous to the narcotic actions of fat solvents, involving an interference with the utilization of succinate, an essential metabolite in oxidative metabolism. Succinate antagonism has also been observed with analogues of D.D.T., and with the structurally unrelated 'Gammexane' (γ-hexachloro*cyclo*hexane).

A full account of this work will appear elsewhere.

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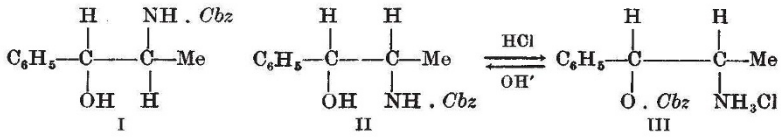
[1] Hurst, Discussions of the Faraday Society, No. 3, 193 (1948).
[2] Martin and Wain, *Nature*, **154**, 512 (1944).
[3] Hurst, *Nature*, **145**, 462 (1940).
[4] Keilin, *Proc. Roy. Soc.*, B, **104**, 206 (1929).
[5] Crisp and Thorpe, *J. Exp. Biol.*, **24**, 304 (1947).

Separation of Diastereoisomeric Amino-Alcohols

The separation of diastereoisomeric amino-alcohols is of importance as they have very different pharmacological properties. Hitherto fractional crystallization has been used as the only suitable method for this purpose; however, sometimes, for example, in separating *nor*-ephedrine from *nor*-ψ-ephedrine[1], it proved to be unsatisfactory.

We have devised a new method of separation based on the different behaviour of diastereoisomeric N-acyl-amino alcohols towards alcoholic hydrogen chloride[2,3]. When a mixture of N-benzoyl-*dl-nor*-ephedrine and of N-benzoyl-*dl-nor*-ψ-ephedrine was treated with nearly the equimolar amount of this reactant, the former amide could be recovered unchanged, whereas the latter was quantitatively converted—due to an acyl shift N → O—into O-benzoyl-*dl-nor*-ψ-ephedrine hydrochloride. This water-soluble salt was easily separated from the insoluble amide in good yield. The same method also proved useful in separating amino-alcohols of other type; for example, N-benzoyl ephedrine and N-acetyl-1.2-diphenyl-amino-ethanol from their stereoisomers.



Cbz = $C_6H_5 . CH_2OOC—$

However, the conversion of the separated acyl derivatives into the appropriate amino-alcohols by acid hydrolysis may sometimes effect Walden inversion[4]; on the other hand, alkaline deacylation could result in a cleavage to aldehydes[5]. To avoid this difficulty, we attempted the separation of N-carbobenzoxy derivatives of diastereoisomeric amino-alcohols with subsequent removal of the protecting group by hydrogenolysis, that is, under very mild conditions. We succeeded in separating N-carbobenzoxy-*dl-nor*-ephedrine (I, m.p. 103°) from N-carbobenzoxy-*dl-nor*-ψ-ephedrine (II, m.p. 83°) on converting the latter by acyl migration N → O into the water-soluble hydrochloride of O-carbobenzoxy-*dl-nor*-ψ-ephedrine (III, m.p. 229°); this furnished on alkalinization (owing to a reverse acyl migration O → N) the N-carbobenzoxy derivative (II, m.p. 83°). As expected, hydrogenolysis afforded from the separated carbobenzoxy derivative I the amino-alcohol *nor-dl*-ephedrine, from II *dl-nor*-ψ-ephedrine, with very good yields. This new method will be investigated with further types of amino-alcohols, and details will be published later.

This separation was made possible by the fact that in the molecule of the type of pseudo-ephedrine, more suitable steric conditions are available for acyl migration than in that of ephedrine. Obviously, the hypothesis of free rotation around the simple C—C linkage in this series of compounds[6] appears to be invalid[7].

This theoretical problem will be treated in detail elsewhere[8].

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[1] Hoover, F. W., and Hass, H. B., *J. Org. Chem.*, **12**, 506 (1947).
[2] Bruckner, V., Fodor, G., *et al.*, *J. Chem. Soc.*, 865 (1948).
[3] Welsh, L. H., *J. Amer. Chem. Soc.*, **69**, 128 (1947) reported differences concerning acetyl migration reaction-rates of N-acetyl ephedrine and pseudo-ephedrine by the action of hydrochloric acid in acetone.
[4] Fodor, G., *Ber.*, **76**, 1216 (1943).
[5] Bruckner, V., *J. prakt. Chem.*, N.F., **142**, 301 (1935).
[6] Freudenberg, K., *et al.*, *J. Amer. Chem. Soc.*, **54**, 234 (1932).
[7] Bier, G., *Experientia*, 2, 82 (1946).
[8] Fodor, G., *et al.*, *J. Org. Chem.* (in the press).

Reaction of Bromine with Silver (+)-α-Phenylpropionate: an Electrophilic Bimolecular Substitution

In a review of the literature of the reactions of the silver salts of carboxylic acids with bromine, Kleinberg[1] has concluded that when one equivalent of salt reacts with two of bromine, an intermediate compound *R*.COOBr is formed,