

morphine, is a further indication that the ganglion cell with its axon has many properties in common with the motor end-plate and its muscle fibre.

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- <sup>1</sup> Schaumann, O., *Arch. exp. Path. Pharm.*, **196**, 109 (1940). Thorp, R. H., Walton, E., and Ofner, P., *Nature*, **160**, 605 (1947).  
<sup>2</sup> Brindley, C. O., *Fed. Proc.*, **3**, 5 (1944). Greig, M. E., and Howell, R. S., *Proc. Soc. Exp. Biol. Med.*, **68**, 352 (1948).  
<sup>3</sup> Kibjakow, A. W., *Pflügers Arch.*, **232**, 432 (1933).  
<sup>4</sup> Gruber, Ch. M., Hart, E. Ross, and Gruber, Ch. M., *J. Pharmacol.*, **73**, 319 (1941).

### Sympathin

MANY workers are now engaged in studies on the substance or substances liberated at the nerve endings when sympathetic nerve fibres are stimulated. In some cases it has been shown to be adrenaline, whereas in others results indicate that it may be *noradrenaline*. Recently, Bülbring and Burn<sup>1</sup> showed that even splanchnic nerve stimulation (after evisceration and ligation of the renal vessels in spinal cats) can result in the liberation of varying proportions of *levo-noradrenaline* with the adrenaline.

In cats under chloralose and cocaine, after double vagotomy, we have been able to show that in at least two cases the nature of sympathin (as shown by effects produced in distant parts of the animal) depends upon the length of time the nerve has been sectioned before being stimulated. Stimulation of the hepatic nerve immediately after sectioning, for example, produced contraction of the denervated nictitating membrane, relaxation of the non-pregnant uterus and a rise of blood pressure, effects well equated by slow intraportal infusions of equi-pressor doses of adrenaline (not *noradrenaline*). Two hours or more later, stimulation produced contraction of the nictitating membrane and a smaller rise of blood pressure but no action on the uterus, effects well equated by slow intraportal infusions of equi-pressor doses of *noradrenaline* (not adrenaline). A very small stimulus to the splanchnic nerve applied immediately after, and several hours after, sectioning produced similar results, although the matching was carried out, in this case, by slow intravenous infusions of equi-pressor doses of adrenaline or *noradrenaline*. Hypogastric nerve stimulation did not, however, give corresponding results, for the sympathin effects as recorded by relaxation of the non-pregnant uterus were always equated by slow intra-arterial infusions of adrenaline.

After dibenamine (15 mgm./kgm.), stimulation of the hepatic nerve immediately following sectioning produced slight relaxation of the non-pregnant uterus, and a fall of blood pressure preceded by a small rise. The rise could be produced by sham stimulation and was probably due to constriction of the hepatic artery. The fall was well equated by slow intraportal infusions of adrenaline. Later, stimulation produced no effect on the uterus, and a rise of blood pressure only, corresponding to the action of slow intraportal infusions of *noradrenaline*. Similar effects, however, could not be produced by normal adrenaline-reversal doses of ergotoxine.

It appears, therefore, that sectioning of some sympathetic nerves may be linked with the inhibition

of methylation of the primary amine, so that stimulation produces more *noradrenaline* and less adrenaline. In these cases, the normal adrenergic mediator may be a mixture of varying proportions of adrenaline and *noradrenaline*.

It is hoped to analyse the blood at various stages and so identify the substance or substances liberated.

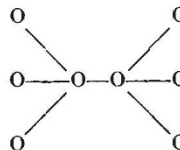
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- <sup>1</sup> Bülbring, E., and Burn, J. H., *Nature*, **163**, 363 (1949).

### Phloroglucitol Diammoniacate, $C_6H_8(OH)_3 \cdot 2NH_3$

THE determination of the crystal structure of phloroglucitol dihydrate, besides establishing the fact that the  $\alpha$ -phloroglucitol molecule has the configuration  $\alpha, \alpha, \alpha$ , shows that the water molecules are chiefly responsible for the cohesion of the organic molecules in the lattice<sup>1</sup>. The structure is rhombohedral, and in the (111) planes equilateral triangles of hydroxylic oxygens are formed, each of the three oxygen atoms belonging to a separate phloroglucitol molecule. On the line perpendicular to the plane of the triangles and joining the centres of two triangles, two water molecules are situated; and the distance from each water oxygen to the nearest three alcoholic oxygens and also the distance between the two water oxygen atoms is about 2.75 Å. It is obvious, therefore, that the bonds linking together the



group are hydrogen bonds.

We thought it possible that a structure based on this arrangement might be preserved, at least at low temperatures, when the two water molecules are replaced by molecules of ammonia. Anhydrous phloroglucitol was therefore dissolved in liquid ammonia free from traces of water, and the ammonia allowed to evaporate slowly. The crystals formed in this way showed a development very similar to that of the dihydrate. They are quite stable when kept in a closed vessel at 0°C., but at room temperature and in the open air the ammonia escapes, leaving a powder of anhydrous  $\alpha$ -phloroglucitol.

Taking special precautions it was possible, however, to obtain X-ray photographs of single crystals and to ascertain that the crystal structure corresponds to that of the dihydrate mentioned above. The lattice dimensions are, however, a little greater than those of the dihydrate. This is just what would be expected, because both the O—H—N and N—H—N bond distances must be somewhat larger than the corresponding O—H—O distances. The intensities of corresponding X-ray reflexions, although not identical, are very similar.