

in the solution, which shows its characteristic band (ν_2) 16053 cm^{-1} arising out of the transition ${}^1A_{1g} - {}^1B_{3g}$.

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ADRENERGIC MECHANISM IN BORDETELLA PERTUSSIS TREATED ANIMALS

PARFENTJEV AND GOODLINE¹ demonstrated that mice treated with *Bordetella pertussis* vaccine became hypersensitive to histamine. Later it was seen that after such pretreatment both rats and mice developed hypersensitivity to histamine² 5-Hydroxytryptamine³ (5-HT) or to anaphylactic shock.⁴ The mode of action of the vaccine is not yet known. Recently it has been suggested⁵ that the vaccine produces blockade of β -adrenergic receptors. Histamine is known to cause liberation of adrenaline. In presence of β -action blockade, the other actions of adrenaline, (presumably α -actions), produce disproportionate results with deleterious effects on the organism. We have now tried to obtain direct evidence of β -adrenergic blockade by recording the actions of isoprenaline (which has predominantly β -actions) in *B. pertussis* treated animals.

Rats or mice received subcutaneously $200,000 \times 10^6$ organisms in 1 ml.; rabbits or

guinea-pigs were injected with 1 ml. of the same solution per Kg. body weight.

In guinea-pigs, 48 hours after inoculation, the usual depressor response to isoprenaline was changed to pressor and continued to be so for the entire duration of study of 21 days. In the rat, 1-17 days after injection, the depressor response was reduced or abolished and only on one occasion actual pressor response was obtained. It was also seen that dichloroisopropyl noradrenaline (DCI) which is supposed to be a selective β -adrenergic blocking agent produces similar changes in isoprenaline response.

In contrast to results in the guinea-pig and the rat, there was no change in the pattern of the response in the rabbit 1-23 days after inoculation. But when the injection of the vaccine or DCI was given intravenously in acute experiments, the depressor response to isoprenaline was changed to pressor within 10 minutes and continued to be so for one hour, at the end of which period, the experiment was terminated.

The relaxant effect of isoprenaline on rabbit ileum was abolished 3-10 days after inoculation. The antispasmodic action of isoprenaline was studied on isolated guinea-pig ileum after inducing spasm with histamine or acetylcholine. In such preparations, the antispasmodic action was seen to be absent 2-5 days after inoculation.

There was no alteration of the response to isoprenaline of the guinea-pig vas deferens or the isolated rabbit heart (Langendorff) at any time after pretreatment with *B. pertussis* vaccine.

A characteristic finding in the intact rabbit was the fact that adrenaline-induced hyperglycaemia was completely absent in animals pretreated with the vaccine 5 days before. This action of adrenaline is presumed to be of β type as this is produced by isoprenaline and is blocked by DCI.⁶

It was thus seen that there is some evidence to indicate a blockade of certain actions in the vaccinated animals, though universal blockade is not seen at all sites supposed to possess β -receptors.

The importance of β -adrenergic blockade as a possible mechanism in induction of anaphylactic hypersensitivity by the vaccine was also studied. Two types of experiments were performed. In *B. pertussis* treated animals sensitised to the antigen, attempts were made to block the supposed predominant α -actions by the use of specific blocking agents like phenoxybenzamine (dibenzylamine). In other experiments attempts were made to mimic the postulated

α -action predominance by using β -blocking agents like DCI or nethalide in animals sensitised to antigen alone a short time before challenge.

Fishel and others⁵ had found that dibenzylamine reduces histamine toxicity in *B. pertussis* treated mice. However, dibenzylamine, used in several dose levels was ineffective in reducing the intensity of anaphylactic shock in rats and mice sensitised to antigen with the aid of *B. pertussis* vaccine.

In the second group of experiments, nethalide or DCI in doses in which they completely blocked β -actions of adrenaline failed to increase the intensity of anaphylactic shock in animals sensitised to antigen alone. Thus it was seen that the postulated mechanism of β -adrenergic blockade cannot explain the increase in anaphylactic sensitivity produced by *B. pertussis* vaccine, as more potent blockade produced by DCI or nethalide does not produce a similar state of hypersensitivity.

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SPOT DETECTION OF MOLYBDENUM THROUGH ITS EXTRACTION AS 1, 10 PHENANTHROLINE COMPLEX

A MODIFICATION to the spot test procedure for molybdenum developed by Moss and co-workers is suggested in this paper.¹ This involves the extraction of molybdenum as its 1, 10-phenanthroline complex into benzyl alcohol. The spot test procedure based on extraction not only stabilises the colour but also eliminates the interference of several substances including coloured ions.

Procedure.—0.05 ml. of molybdenum (VI) solution is taken in a microtest-tube along with 0.1 ml. of 0.1% 1, 10-phenanthroline, 0.1 ml. of 5 M. sodium chloride, 0.08 ml. of concentrated hydrochloric acid and 0.12 ml. of water. 0.5 ml. of benzyl alcohol is added followed by 0.05 ml. of 1N stannous chloride in 2N hydrochloric acid. The contents are shaken for 30 seconds. A rose red colour in the organic phase indicates the presence of molybdenum.

The order of mixing the reagents is to be strictly followed. Particularly, the acid should not be added before the addition of 1, 10-phenanthroline, as otherwise no colour is developed.

Limit of Identification.—0.2 μ g. of molybdenum in 0.5 ml. Dilution limit: 1 : 2.5 $\times 10^6$.

Among various substances studied for their interference only Cu(II), W(VI) and Co(II) give coloured complexes under the experimental conditions.

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A NOTE ON THE 'PRESSURE SHADOWS' IN THE CALCAREOUS PHYLLITE OF THE BUXA SERIES IN THE NORTH-EASTERN PART OF DARJEELING HIMALAYAS

THE Buxa group of rocks, which represents the uppermost part of the Daling Series, is composed chiefly of dolomite with intercalations of quartzite and calcareous phyllite. Though these rocks are tightly folded and are sheared at places, they are characterised by various types of sedimentary structures and pencontemporeous deformation features. The calcareous phyllite occasionally contains small pyrite crystals, along the fringes of which 'pressure shadows', have developed. These pyrite crystals cut across the weakly preserved bedding (S_1) and the axial plane schistosity (S_2) which is normally sub-parallel to the former. Incidentally, 'pressure shadows', according to Pabst (1931),¹ is the name applied to the fringes or the halos that often accompany porphyroblasts in metamorphic rocks. The phyllite is composed