results may therefore be misleading. The experiments show that the images of small light sources formed by the cat's eye may be very blurred when light enters through the whole of the dilated pupil. They give no information about the scattering which takes place when light enters only through a small area in the centre of the pupil; this is likely to be much less.

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A Neuronal Model for Conditioning

THE difficulty of explaining conditioning in terms of a simple neuronal model has been discussed by Burns[1]. The problem lies in the fact that the only relatively long-lasting type of facilitation that has so far been experimentally demonstrated involves presynaptic terminals so that activity of neurones in the unconditioned reflex pathway cannot be expected to facilitate synaptic connexions from neurones which converge on to them from another afferent pathway. Eccles has proposed a rather complex neuronal model to avoid this difficulty[2]. Even this is admitted to be inadequate since it requires that the conditioned and unconditioned stimuli be applied simultaneously, and even then could only provide a low-level bombardment of the synapses which must be facilitated unless additional reverberating circuits are included. There is evidence to suggest that reverberating circuits do play a part in the early stages of conditioning[3,4], but no complete model including them has been proposed.

The following simple scheme appears to fulfil many of the requirements: the neurones of the unconditioned reflex pathway are linked to the afferent neurones excited by the conditioning stimulus through a number of parallel reverberating circuits. Each unit (Fig. 1) is reciprocally linked through synapses with similar parallel units. The synaptic resistance must be such that impulses from *C.S.* alone result in the damped oscillation of only a few of the units. If impulses from *U.S.* impinge on the circuits while damped oscillations initiated by *C.S.* are still present, then spatial facilitation occurs and additional parallel circuits are recruited. Once a critical number of parallel units is activated the oscillations become self-maintaining because of reciprocal reinforcement. When the oscillations eventually die down the synapses linking *C.S.* to *E* through *A*, *B* and *C* remain facilitated.

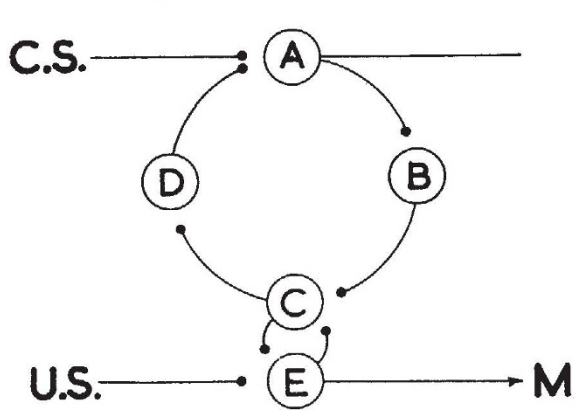

Fig. 1. *A*, *B*, *C*, *D* and *E* represent nerve cell bodies in a model unit. *C.S.* is the afferent pathway for conditioned stimuli and *U.S.* for the unconditioned stimulus. *M* represents the motor pathway for the unconditioned response

A difficulty arises. *E* is continuously bombarded with impulses during the initial stage of the conditioning process which may be expected to prolong the reflex greatly. It seems possible that activity in *E* may be cut off by negative feedback once the reflex has been fulfilled.

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Local Endotoxin Hypersensitivity and its Relation to the Shwartzman Phenomenon

ALTHOUGH there have been previous claims that lesions like the Shwartzman phenomenon can be produced by two large injections of endotoxin into the same site in the skin, in animals other than rabbits (for example, mice)[1], it has been stated that the classical Shwartzman phenomenon is immunologically non-specific in that it does not depend on antigen–antibody reaction[2,3], and it can be elicited only in rabbits[2–4]. Recently, however, I have succeeded in demonstrating that the first phase of the Shwartzman phenomenon, that is, preparation of the skin by endotoxin, is a specific reaction depending on a well-characterizable immunological mechanism, namely, the phenomenon of local endotoxin hypersensitivity, and that in appropriate circumstances (*a*–*e*) it may be elicited by endotoxins on the skin of guinea pigs and rats also.

These characteristics are:

(*a*) Guinea pigs and rats, 3–4 weeks previously sensitized with *S. typhosa* or *E. coli*, will produce hæmorrhagic skin lesions at sites prepared with 25–50 μgm. endotoxin, on intravenous injection of 50–100 μgm. endotoxin 24-hr. later. (The sensitization was carried out by the weekly subcutaneous injection of 0·5–1, 0–1, 0–2 × 10^{-9} bacilli. Typhoid and *coli* endotoxin prepared by the Boivin method were reprecipitated three times by a double volume of ethanol. Their Shwartzman-reactive unit was 3 μgm.) Animals not pretreated with the bacteria do not produce hæmorrhagic lesions. These experiments proved that the endotoxin must not be derived from the same bacterial species as was used for sensitization.

(*b*) 0·025–0·1 ml. rabbit antiserum, obtained by hyperimmunization with typhoid endotoxin, injected