the corrected value for the axon diameter would theoretically be 6·7μ and the ratio of the axonal to the external diameter, 0·6 : 1. However, experiments in which nerve fibres were immersed in fluids of different refractive indices suggest that the refractive index of myelin considered in relation to a radial optic axis is rather higher than that of lecithin, and therefore the corrected ratio would be even lower.

This low ratio, at variance with that obtained for fibres of similar size in fixed preparations, receives confirmation from the work of one of us (P. L. W.). Measurements of axonal and external diameter have been made using thin transverse sections of fresh, unfixed peripheral nerve. In such preparations, using orthodox forms of illumination, fibres in the range 10–12μ show a ratio of axonal to external diameter of 0·45–0·60 : 1 (mean 0·51 : 1). However, preliminary observations using interference and polarizing techniques indicate that even this ratio may need further reduction. Details of the technique used and full results will be published elsewhere.

The problem thus far has been simplified; it is in fact much more complex. The ultra-structure of myelin, and thus its optical properties, vary[5]. In addition one must consider the possible effects of the immersion medium on the properties of myelin[5,6]. The thickness of the myelin sheath varies not only with fibre diameter[2,3,7] but also in different regions of the same fibre. Differences in thickness and curvature are most obvious in the paranodal region[8].

It is hoped to evolve a correction factor of more general application.

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Apparatus for Stimulation of Insect Sense-Organs by Air Puffs

During work on the relation of acetylcholine to nervous activity in insects[1,2] an apparatus was devised for the stimulation of the sensillæ of the cerci of *Periplaneta americana* L. by puffs of air. Since the apparatus allows separate control of strength, duration and frequency of the puffs of air, it is felt that it might find applications in other problems. The apparatus consists of an electronic switch controlling a solenoid valve through which compressed air is led to the point of application. A pressure regulator in the air line determines the strength of the puffs of air, while the duration and frequency are determined by the electronic switch. The operation

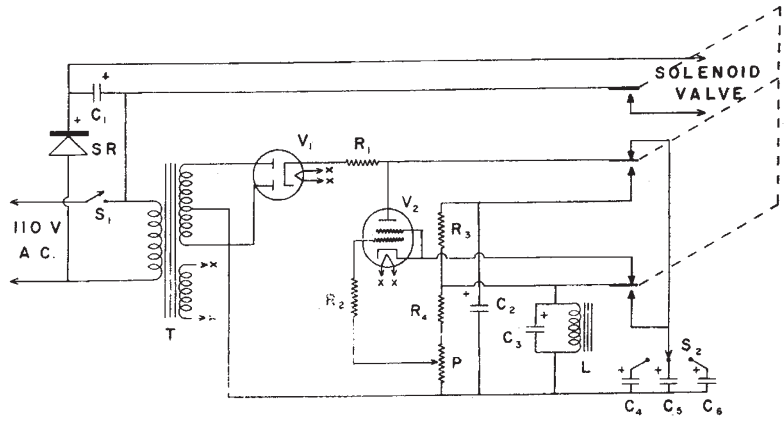

Fig. 1. Electronic time-switch for solenoid valve

C_1	80 mfd. electrolytic 150 w.v.	*SR*	Selenium rectifier 250 m.amp.	130 V.	
C_2	20 mfd. electrolytic 250 w.v.	*XX*	6·3 V.		
C_3	2 mfd. electrolytic 250 w.v.	R_1	250 ohms	5	watts
C_4	10 mfd. electrolytic 250 w.v.	R_2, R_3	100 K.ohms	½	watt
C_5	20 mfd. electrolytic 250 w.v.	R_4	33 K.ohms	½	watt
C_6	40 mfd. electrolytic 250 w.v.	*P*	100 K.ohms	potentiometer	
T	'Hammond 269*B*', 150–0–150 V.	V_1	6*X*5		
L	'Guardian' relay, 5,000 ohms, 4 PDT	V_2	2*D*21		

of the electronic switch (Fig. 1) is as follows. Firing of the thyratron V_2 causes a surge of current through the relay *L*, depressing the three contacts. This activates the solenoid valve, charges condenser C_2, cuts out V_2 and allows C_5 (or C_4 or C_6, according to the setting of S_2) to discharge through *L*. The relay armature remains in this position for a period determined by the LC_5 time-constant and then returns to its normal or upper position, closing the solenoid valve, recharging C_5 and reconnecting V_2. The voltage on C_2 now leaks off through R_3, R_4, *P* and *L*, producing a slowly decaying bias on V_2 (which may be altered by the setting on *P*) until V_2 again fires, repeating the cycle. Thus the setting on *P* determines the time during which the solenoid valve is closed, while the capacity of the condenser selected by S_2 determines how long it is open. The potentiometer *P* provides intervals from 0·45–8·0 sec., the calibrated scale being slightly expanded in the lower range, while with S_2 times of 0·13, 0·25 and 0·56 sec. were obtained. Other time-intervals are possible by altering the capacity of condensers C_2 to C_6.

Smoother and quieter operation of the Skinner electric solenoid valve (supplied by Minneapolis-Honeywell Regulator Co., Philadelphia 4, Pennsylvania) results from the use of direct current supplied by the selenium rectifier *SR*. Noise from valve operation, which in itself causes sensory stimulation, is eliminated by encasing the valve assembly in a rubber-mounted wooden box lined with two inches of fibre glass.

In a typical experiment puffs of air were led by a plastic tube to a glass tip mounted behind the roach cerci. Nerve activity was recorded with a 'Tektronix' Type 512 oscilloscope and a 'Fairchild' camera. The control unit for the camera was activated through a fourth contact on relay *L*, thereby synchronizing the camera operation with a puff of air.

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