charide is removed by papain, the residual chondromucoprotein could well be sufficient to give protection to the graft.

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- ¹ Thomas, L., *J. Exp. Med.*, **104**, 245 (1956).
- ² Spicer, S. S., and Bryant, J. H., *Amer. J. Path.*, **33**, 1237 (1957).
- ³ Spicer, S. S., and Bryant, J. H., *Amer. J. Path.*, **34**, 61 (1958).
- ⁴ McLuskey, R. T., and Thomas, L., *J. Exp. Med.*, **108**, 371 (1958).
- ⁵ Tsaltas, T. T., *J. Exp. Med.*, **108**, 507 (1958).
- ⁶ Bryant, J. H., Leder, I. G., and Stetten, D., *Arch. Biochem. Biophys.*, **76**, 122 (1958).
- ⁷ Bacsich, P., and Wyburn, G. M., *Proc. Roy. Soc. Edinb.*, **B**, **62**, 321 (1947).
- ⁸ Bacsich, P., and Wyburn, G. M., *Transpl. Bull.*, **2**, 4 (1955).
- ⁹ Billingham, R. E., Brent, L., and Medawar, P. B., *Brit. Med. J.*, **i**, 1157 (1951).
- ¹⁰ Billingham, R. E., Brent, L., and Medawar, P. B., *Brit. Med. J.*, **ii**, 1049 (1951).
- ¹¹ Scothorne, R. J., *J. Anat., Lond.*, **90**, 417 (1956).
- ¹² Ingram, P., and Krohn, P. L., *J. Endocrinol.*, **10**, 5 (1954).
- ¹³ Woodruff, M. F. A., *Proc. Univ. Otago. Med. Sch.*, **31**, 9 (1953).

Electrical Activity in the Muscle Cells of *Ascaris lumbricoides*

If a fresh specimen of *Ascaris* is opened by a longitudinal incision and pinned out under 30 per cent sea water at 37°C., fluctuating intracellular potentials can be recorded, using relatively large 3 μ potassium chloride microelectrodes inserted into the swollen bodies of the large muscle cells.

Superimposed on the resting potential is a sequence of simple or complex depolarizing spikes normally of magnitude less than that of the resting potential.

If concurrent recordings are made of the potentials in two muscle cells, one of which is in the dorsal field and the other in the ventral, no correlation is found in the timing of the two sets of pulses (Fig. 1): if recordings are taken from two cells, a few mm. apart, in the same field, a definite correlation between the two records can be seen (Fig. 2). Each pulse in one record has its counterpart in the other. If the muscle cells concerned are at the same antero-posterior level, but at different distances from the nerve cord, the cell nearer the nerve cord gives the first pulse. If the cells are on a line parallel to the nerve cord, the anterior cell gives the first pulse.

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Experiments involving transverse cuts made between an anterior and a posterior muscle cell have demonstrated two significant features.

(a) A transverse cut between the two cells, through the muscle column, hypodermis and cuticle of the worm, provided it does not sever the nerve cord, does not destroy the correlation between the pulses (Fig. 3).

(b) Cutting the nerve cord between the two cells, with or without an extension of the cut through the muscle column, abolishes the correlation, and independent sequences of impulses are then recorded from the two cells (Fig. 4).

Correlated pulses are therefore obtained so long as the nerve cord between the two cells is intact.

The origin of these depolarizing pulses and their relations to the membrane potential and tension in the muscle fibre are being investigated, but the results outlined above indicate the interesting possibilities of this material for neuro-physiological work.

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Distribution in the Mouse of Lethal and Sub-lethal Doses of Cottonmouth Moccasin Venom labelled with Iodine-131

THOUGH disease and death from the bite of the poisonous snake is considered not unusual, and treatment has become more or less standardized, little is actually known about the site of action of snake venom *in vivo*. The value of a radioactive tag for studies of this sort is evident, and therefore, an attempt was made to label the whole dried venom of the cottonmouth moccasin (*Ancistrodon p. piscivorus*) with iodine-131, evaluate its toxicity relative to the original venom preparation, and chart its distribution in the mouse after injection of lethal or sublethal doses.

50 μ gm. of whole dried venom, dissolved in physiological saline and buffered to a pH of 9, was labelled by alkaline extraction of cold carbon tetrachloride to which sodium iodide carrier and 3 mc. of iodine-131 had been added^{1,2}. The extraction mixture was relieved of excess uncombined iodide and buffer by dialysis against dibasic potassium phosphate ($10^{-3}M$) at 34°C. for 48 hr. The resultant radioactivity of the labelled protein preparation was 117 c./m./ μ gm. (thin window Geiger-Müller counter).

Although the iodinated dialyzed venom was somewhat less toxic than whole venom, it was equally as toxic as whole venom which had been dialyzed but not iodinated (Fig. 1). This loss of toxicity of snake venom during dialysis has already been described by Gonçalves³, and is attributable to the loss of small molecules of toxic materials. A comparison between the toxic effects produced by the dialyzed venom and those caused by the non-haemolytic toxins which are separable from the whole by ammonium sulphate precipitation indicates that enough of the hemorrhage-producing material is present in the dialyzed venom for it to contribute appreciably to the total effect.

DOSE (μ g/gm MOUSE)		13	12	11	10	9	8	7	6	5	4	3	2	1
I ¹³¹ -LABELLED VENOM														
DIALYZED VENOM														
WHOLE DRIED VENOM														

Fig. 1. The toxicity of *Ancistrodon p. piscivorus* venom labelled with iodine-131 compared with dialyzed venom and dried whole venom from the same sample. Black, complete lethal dose (100); hatched, minimum lethal dose; white, sub-lethal dose (0).