The fibre is truly giant, attaining up to 1 mm. in diameter, greatest in the thorax and anterior abdomen and tapering to about 100 μ in the posterior extremity. It thus compares favourably with the giant nerve fibres of the Cephalopods, *Sepia* and *Loligo*. It extends throughout the length of the ventral nerve cord, lying dorsally to the nerve cells and neuropil and constituting the major part of the cord (*of*). In spite of its large size, it appears as a single nerve fibre consisting of a uniform mass of axoplasm with faint longitudinal striations but no transverse or longitudinal subdivisions.

TRANSVERSE SECTION OF THE VENTRAL NERVE CORD OF *Myxcolia infundibulum* IN THE THORACIC REGION. *of*, GIANT FIBRE; *mf*, MOTOR BRANCH; *nc*, NERVE CELL BODY. $\times 33$

Anteriorly, in the first few thoracic segments, both the ventral nerve cord and its contained giant fibre bifurcate, forming two discrete cords with a giant fibre in each. Transverse commissures connect the two halves of the cord together, and anastomoses between the two giant fibres occur in each of these commissures. The two fibres unite again in the sub-oesophageal ganglion, and a branch passes up through each of the circum-oesophageal connectives into the supra-oesophageal ganglia. Here the branches from either side connect with one another in the lower part of the supra-oesophageal ganglia.

By employing buffered solutions of silver nitrate¹, it has been possible to impregnate the nerve cells and smaller fibres and reveal some of the connexions of the giant fibre. Numerous unipolar nerve cells (*nc*) send their processes into the giant fibre in each segment. Larger motor branches (*mf*) proceed peripherally in the segmental nerves to the strongly developed longitudinal musculature.

The sheath of the giant fibre is composed of a fine network of fibrils, forming a dense investing envelope distinct from the collagenous sheath of the nerve cord. The sheath does not blacken on treatment with osmium tetroxide, indicating the absence of any appreciable amount of myelin. Nuclei occur throughout the thickness of the sheath.

One of the most characteristic behavioural reactions of this animal is the sudden shortening which can be induced by mechanical stimulation of any part of the body. Following section of the cord, isolated ends of the animal still showed this quick contraction in specimens observed for sixteen days. Sections of the giant fibre either anterior or posterior to the injured region showed no histological signs of degeneration, corroborating the observation that the cell bodies of the giant fibre occur along the length of the cord. The giant fibre thus constitutes a unique example of a final common path produced by fusion of the processes of many nerve cells, so that afferent impulses from any part of the body are directed into a single effector unit and activate all the longitudinal muscle fibres of the body. The whole living nerve cord can be removed from the body, but it has not proved possible to obtain a stretch of giant fibre free from cord and investing sheath. Action potentials obtained from a dissected cord show that the giant fibre, like those of the squid, though a syncytium, yet acts as a single functional unit.

J. A. C. NICOL

Department of Zoology and Comparative Anatomy,
University Museum, Oxford.

J. Z. YOUNG

Department of Anatomy,
University College, London.
June 3.

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Origin of the First European Potatoes and their Reaction to Length of Day

MR. HAWKES¹ has stated, with reference to the first European potatoes, that "*S. andigenum*, although mainly short day in photoperiodic reaction, does possess certain day neutral and even long day clones. . . . If, by any chance, one of these was introduced into Europe, then there would be no reason at all why it should not have yielded well from the very first." Recently, he and Mr. Driver² stated in *Nature*: "There is no reason why the original short-day forms from the Andes could not maintain themselves under European conditions though giving a reduced yield. This is what happens when the recently collected Andean forms are grown under the longer days of Great Britain." In both quotations the underlying idea is that the first European potatoes would have been at a disadvantage as regards yield, if they had been short-day in reaction. This idea is substantially the same as that of Russian workers. It is not supported by the evidence, as I have already pointed out³, but it is very prevalent and further comment seems desirable.

One need consider only Spain and the British Isles, typical representatives of the countries where the potato was first widely grown as a crop. It was suggested⁴ that in Spain potatoes were grown as an autumn crop; and if they yielded badly, it was at least no fault of a short-day reaction. In the British Isles, the west in particular, potatoes could be, and were, grown deep into the autumn, November being a popular harvesting date. Here potatoes seemingly made good use of the conditions; haulms grew during summer, when conditions are optimal for haulm growth, and tubers probably grew mostly after the approach of autumn, when conditions are optimal for tuber growth. For it is fairly clear from experiments on photoperiodism that the rate of production of tubers by unit mass of haulm is greatest in short days, and the physiological efficiency of short days has often been pointed out before.

What has happened during the course of the centuries in Britain, and north-western Europe generally, is that there has been a shift from autumn tuber-growth to summer tuber-growth. (The shift, of course, is not complete.) The result may be more convenient to modern farmers, but there is no evidence of greater yields, at least in the absence of blight. One grants that the best yields should be given by varieties which use both the summer and the autumn, and admits that varieties like *Epicure* and *Arran Banner* make remarkable use of long days, but in view of the evidence of photoperiodism it would be rash to assume that breeders could not have made as good use of the short days of autumn. Any tendency towards satisfaction with modern achievements should be tempered by the reflexion that average potato yields have not risen in Britain during the last 100-150 years⁵, despite a vast amount of research in all directions. Although many early varieties existed at the beginning of last century, the impression one gets is that the shift from autumn to summer tuber-formation had not yet gone so far as it has now, and it would be interesting to know to what extent autumn growth has determined not only the early history and geography of the potato in Europe but also the yield. Unfortunately, there is little evidence about this. Even with the Andean potatoes no attempts to ascertain yields in Europe in autumn have been published. Research has centred around the determination of photoperiodic response. Hackbarth⁶ was so concerned with the difference between long and short days that he did not see fit to record the dates of planting and harvesting or whether the maturity was early or late, but one infers that the plants were mature before the autumn equinox. In the experiments at Cambridge the potatoes were planted early and all surviving plants harvested on September 30—most lines matured before then—to prevent the possibility of increased yield in short autumn days, a procedure which was necessary for the particular purpose of the experiment. No doubt many—perhaps most—of the Andean varieties are poorly bred and inherently weak yielders under any conditions of length of day; but it must be admitted that workers in Europe have made their adaptation seem worse than it is by growing them during a season to which they are least adapted and which differs from that in which the first European potatoes were grown.

To change the topic in conclusion, an explanation about the Basuto and potatoes seems called for. Readers of the recent communication by Mr. Hawkes and Mr. Driver might assume that I believe that all these potatoes have an extreme short-day response. This is not the case. Several varieties mature early; and if they, and other European early varieties of the first part of last century, were not discussed in my original communication³, it was because they are irrelevant to the point which was being argued.

J. E. VAN DER PLANK

Department of Agriculture, Pretoria.

¹ Bull. Imp. Bur. Plant Breed. and Genet. (1944), 109.

² *Nature*, **157**, 591 (1946).

³ *Nature*, **157**, 503 (1946).

⁴ See editorial comment, *Gardeners' Chronicle*, Jan. 12 (1946). Yields in Lincolnshire at the end of the eighteenth century are discussed by Wallace in Bull. 94, Min. Agric. Fish. England (1941).

⁵ *Züchter*, **7**, 95 (1935).

⁶ Driver, C. M., and Hawkes, J. G., Bull. Imp. Bur. Plant Breed. and Genet. (1943), 36.

THE point at issue between Dr. van der Plank and ourselves seems to be whether the Andean short-day potatoes were or were not at a disadvantage when brought to Europe in the late sixteenth century. We have stated that we consider they were at some disadvantage³, at any rate in Great Britain, where they would normally have been cut down by frost before maturity. Although occasionally we have been able to leave some of our *S. andigenum* varieties in the field so late as November 26, even then they were far from being mature, nor was the yield so high as was obtained from commercial varieties under similar conditions. Under such conditions the potato plants would have been subjected to short days for at least ten weeks, but possibly the temperature and light intensity at that time of the year were unsuitable for rapid tuber development. The experiment to which Dr. van der Plank makes reference⁶ was conducted under glass and hence is scarcely referable to the point at issue.