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Introductory Remarks

Dorothy M. Needham

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IV. THE MECHANISM OF CONTRACTION

Introductory remarks

By Dorothy M. Needham, F.R.S.
Biochemical Laboratory, University of Cambridge

Our programme this afternoon is in two parts. We first welcome Professor Hamoir and Dr Kendrick-Jones to describe the several ways in which smooth muscle myosin differs from skeletal muscle myosin. It was in this biochemical field that my own work, with Dr Jennifer Williams, lay some twelve years ago. We were impressed at that time by the very low ATPase activity of the uterus actomyosin, and by the fact that on trypsin treatment meromyosins were obtained in some ways similar to those of skeletal muscle. Speakers this afternoon will have far more to tell us of the nature, behaviour and structure of the myosins concerned.

We were also interested in the properties and possible function of certain soluble proteins, including tropomyosin, which figure so largely in smooth muscle constitution. This subject also will come up today.

In the second part of our programme it is a question of the state of the myosin in the muscle cell. In the electron microscope actin filaments are easily identified, but myosin filaments have proved labile and elusive. Several workers in different laboratories have reported different results with regard to conditions under which thick filaments may be seen, and have drawn various conclusions concerning the contraction mechanism. It seemed worth while to gather together as many as possible interested in the ordered arrangement of the myosin to describe and discuss their results and we are very glad to see them here. Most of this work on ordered arrangement has been done in the electron microscope, but other ways have also been used – notably X-ray diffraction.

It is perhaps interesting to mention here the puzzling results of Seidel & Weber (1967). More than fifty years ago von Ebner (1916) knew of the birefringence of the whole length of the smooth muscle cell, and its increase on stretching. Noll & Weber (1935) brought evidence for the dependence of the intrinsic and rod birefringence of skeletal muscle on the myosin of the A bands. Recently, Seidel & Weber determined the intrinsic and rod birefringence of taenia coli, only to find that the rod birefringence was far greater than could be accounted for by the myosin present, and that the intrinsic birefringence remained unchanged when all the myosin was extracted. Parallel experiments on skeletal muscle showed that there all birefringence was lost on extraction of the myosin. This aspect of smooth muscle make-up remains obscure.

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