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Concluding Remarks

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Concluding remarks

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I do not think I have been given a very easy task in being asked to sum up this session, especially as I have a feeling that it was hoped that I would be able to point to some firm conclusions about the matter most in dispute, namely whether the myosin in vertebrate smooth muscles is organized into rods or ribbons. However, I think it is apparent that conflicting points of view, which cannot be resolved on present experimental evidence, are held by different workers in the field, and that no amount of reasoning or expressions of opinion will settle the question. More evidence is needed.

However, I think we should not lose sight of the fact that a very large measure of agreement does exist now on several very important basic facts about the structure of smooth muscles.

First, vertebrate smooth muscle contains actin filaments virtually indistinguishable from those in striated muscles, together with a very similar troponin–tropomyosin system giving calcium sensitivity to the contractile system.

Secondly, a myosin component is present, which differs in some aspects of its solubility from striated muscle myosin but which is otherwise a very similar molecule. Under certain conditions, this myosin can form either filaments or ribbons, the latter at least showing a remarkably well-organized fine structure.

Thirdly, in the intact muscle under physiological conditions, enough of the myosin is present in an aggregated form to give a characteristic meridional 14.3 nm reflexion, which must come from organized arrangements of the myosin of relatively large size.

I do not think the evidence really proves that tension is actually generated by these large aggregates rather than by some other form of myosin, but it would be very surprising to me if this ability to form large aggregates were an accidental property of the myosin.

Accordingly, it seems to me that very strong evidence exists that the contraction mechanism in vertebrate smooth muscle must be closely analogous to the sliding filament system of vertebrate striated muscle.

An understanding of the differences between the two systems must await a clearer and more scientific understanding of the way various factors may influence the structure of the muscle, and especially of the ways in which fixation can be carried out with minimum structural disturbance.