1P142 筋原線維高次構造に与えるポリエチレングリコールの効果
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The effects of polyethyleneglycol to the myofibril lattice structure
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Polyethyleneglycol narrows the lattice spacing of skinned skeletal muscle sarcomere. Since the size of polyethyleneglycol (M.W.3350) seems around few nanometers, the lattice spacing of around 40 nanometers was seemed to be large enough for penetration of polyethyleneglycol. To reveal whether the polyethyleneglycol penetrates into the sarcomere or not, I measured the specific gravity of myofibril suspensions from rabbit psoas muscle in the presence or absence of polyethyleneglycol. If polyethyleneglycol dose not penetrate into the sarcomere, the specific gravity of the supernatant after centrifugation of myofibril suspension is larger than the specific gravity of myofibril suspension.

1P144 Ca²⁺活性骨格筋線維の伸長中に伸長速度を減少させたときの筋線維スティフネス
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Muscle fiber stiffness during stretch with velocities reduction in Ca²⁺ activated skeletal muscle fibers.
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To investigate the mechanism of force reduction during stretch with velocity reduction in activated skeletal muscle, Muscle fiber stiffness was measured by using an electronic circuit. Glycerinated single muscle fibers were isometrically mounted between force transducer and servo motor at 3mm of muscle fiber length, and sarcomere length was adjusted to 2.27μm by He-Ne laser. Stretch amount was 1.5%Lo at fast velocity stretch and 1.5%Lo at following slow velocity stretch. Fast stretch velocity was 0.15 Lo/s and it was slow down to 0.5, 0.2, 0.1 times after 1.5%Lo fast stretch. When stretch velocity of Ca²⁺ activated muscle fiber decreased during stretch, force decreased rapidly, then increased slightly, and after the completion of stretch it showed stress relaxation. On the other hand, muscle fiber stiffness decreased suddenly during initial fast stretch, while it did not change appreciably by the following slow stretch. After the completion of stretch it increased slightly and maintained at the constant level below that of isometric steady state. To further investigate force re-development at all the phases of stretch following velocity reduction, quick release experiments were made. The rate of isometric force re-development is reduced with increasing time between the onset of stretch and the application of quick release. It is suggested that, during stretch, considerable fraction of attached cross-bridges may slow down their cycling rate, so that the force generated by such cross-bridges may increase.

1P143 種によって異なる？昆虫飛翔筋 stretch activation のしくみ
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Different stretch activation mechanisms in different insects?
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Asynchronous flight muscle enables the insects to beat their wings at frequencies beyond the range manageable by the calcium release and reuptake by sarcoplasmic reticulum. Asynchronous flight muscles are believed to have occurred many times independently in the process of insect evolution. Nevertheless, many features are shared among the asynchronous flight muscles of insects which belong to phylogenetically distant groups, including the ability of stretch activation (SA). Recently, increasing evidence suggests that the regulatory proteins, troponin and tropomyosin (TM) are involved in the SA. Is this a common feature of asynchronous flight muscle, too? In the last annual meeting, we have presented evidence that the relative contribution of regulatory proteins to the SA may depend on insect groups. At saturating Ca²⁺, *Lethocerus* (giant waterbug) flight muscle fibers developed only a small isometric force, large SA and a large increase in the TM reflection during SA. On the other hand, *Bombus* (bumblebee) flight muscle fibers showed greater isometric force and a much smaller increase in the TM reflection. At the BL45XU beamline of SPring-8, we repeated experiments with very fresh specimens of *Lethocerus*, and also conducted experiments with *Ctenacroscelis* (cranefly) flight muscle fibers. The *Lethocerus* experiments confirmed the previous results, and the *Ctenacroscelis* results were similar to those of *Bombus*. Convergent evolution may not have created exact copies of asynchronous flight muscles in different groups.

1P145 骨格筋単一筋原線維アクトミオシンフィラメント構造に浸透圧に与える影響：AFM による計測
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Effects of osmotic compression on the actomyosin filament lattice in single skeletal myofibrils examined by atomic force microscopy
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Single skeletal myofibrils were osmotically compressed by Dextran under various physiological conditions and the changes of diameter and transverse stiffness examined by an atomic force microscope (AFM). Single myofibrils were prepared by homogenizing glycerinated muscle fibers of the rabbit psoas. AFM measurements were made as previously for myofibrils attached to cover slip. Modified AFM cantilevers having a glass micro-bead as the tip were used for measurements. The diameters and transverse stiffness of single myofibrils respectively decreased and increased by increasing the Dextran concentration up to 16 %. The diameter was 1.1 μm for relaxed myofibrils, and 1.0 μm for contracting and rigor myofibrils. The diameter linearly decreased by about 15% for relaxed, rigor and contracting myofibrils up to 2 % Dextran. By further increase of Dextran, the diameter for rigor myofibrils did not change and that for relaxed and contracting myofibrils decreased by about 20 %. The transverse stiffness was 0.5, 1.0 and 1.5 pN/nm for relaxed, contracting and rigor myofibrils. Up to 2 % Dextran, it linearly increased 3-4 times for rigor myofibrils, and 1.5-2 times for relaxed and contracting myofibrils. By further increase of Dextran, the transverse stiffness further increased and then leveled off at 6-7 pN/nm for all myofibrils. In the presence of BDM, the diameter and transverse stiffness showed distinct changes by increasing the Dextran concentration. The results obtained were related with changes in the actomyosin filament lattice in myofibrils.