

Preliminary Results

Our preliminary results are from muscle filaments isolated from rabbit (Fig. 1). We show also a segment of the myosin coiled coil from our 2.7Å reconstruction from *Lethocerus* (Fig. 2) and some results from the asymmetric reconstruction of crown-0 from *Lethocerus* flight muscle thick filaments. (Fig. 3),

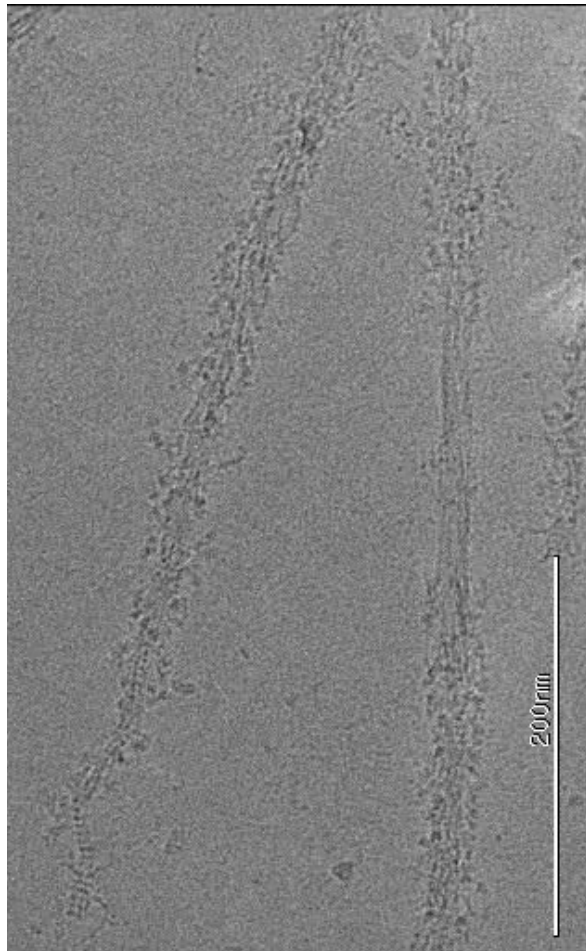


Figure 1. Electron micrograph of a frozen-hydrated *Oryctolagus cuniculus* (rabbit) skeletal muscle thick filament obtained from an NCCAT session. The filament on the left contains the tapered end. The filament on the right shows the bare zone. Heads are ordered against the filament backbone, but the crown periodicity is poorly visible. Axial periodicity is in general poorly visible on these filaments because the interacting heads motif is positioned against the backbone and not extending outward into shelves as it does in the large waterbug. The bare zone and the tapered end are the least understood parts of the vertebrate thick filament.

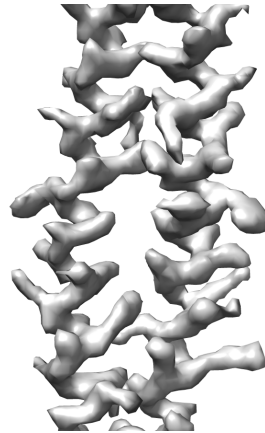


Figure 2. A portion of the 2.7 Å reconstruction from *Lethocerus indicus* showing well resolved side chains. This region from the myosin α -helical coiled-coil tail.

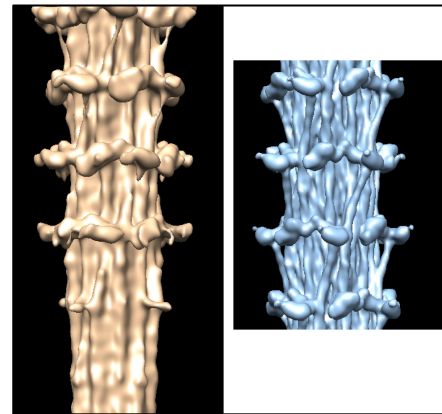


Figure 3. Comparison of *Lethocerus* thick filaments reconstructions. (left) The crown-0 reconstruction which imposed only rotational symmetry on 542 motifs (2,168 asymmetric units), reached a resolution of 16Å by FSC criteria. Images were recorded in integration mode on a DE-64 detector. (right) Previously published 6Å helical reconstruction from ~24,000 segments, low pass filtered to 16Å. Images recorded on a DE-20 direct electron detector operated in integration mode. The DE-20 detector is inferior to the current generation of counting detectors. Both reconstructions show ordered myosin heads projecting from the ..

Bibliography

1. Dutta, D.; Nguyen, V.; Campbell, K. S.; Padron, R.; Craig, R., Cryo-EM structure of the human cardiac myosin filament. *Nature* **2023**, 623, (7988), 853-862.
2. Hu, Z.; Taylor, D. W.; Reedy, M. K.; Edwards, R. J.; Taylor, K. A., Structure of myosin filaments from relaxed *Lethocerus* flight muscle by cryo-EM at 6 Å resolution. *Sci Adv* **2016**, 2, (9), e1600058.
3. Rahmani, H.; Ma, W.; Hu, Z.; Daneshparvar, N.; Taylor, D. W.; McCammon, J. A.; Irving, T. C.; Edwards, R. J.; Taylor, K. A., The myosin II coiled-coil domain atomic structure in its native environment. *Proc Natl Acad Sci U S A* **2021**, 118, (14), e202415111.
4. Daneshparvar, N.; Taylor, D. W.; O'Leary, T. S.; Rahmani, H.; Abbasiyeganeh, F.; Previs, M. J.; Taylor, K. A., CryoEM structure of *Drosophila* flight muscle thick filaments at 7 Å resolution. *Life Sci Alliance* **2020**, 3, (8), e202000823.
5. Abbasi Yeganeh, F.; Rastegarpouyani, H.; Li, J.; Taylor, K. A., Structure of the *Drosophila melanogaster* Flight Muscle Myosin Filament at 4.7 Å Resolution Reveals New Details of Non-Myosin Proteins. *Int J Mol Sci* **2023**, 24, (19), 14936.
6. Li, J.; Rahmani, H.; Abbasi Yeganeh, F.; Rastegarpouyani, H.; Taylor, D. W.; Wood, N. B.; Previs, M. J.; Iwamoto, H.; Taylor, K. A., Structure of the Flight Muscle Thick Filament from the Bumble Bee, *Bombus ignitus*, at 6 Å Resolution. *Int J Mol Sci* **2022**, 24, (1), 377.
7. Methawasin, M.; Farman, G. P.; Granzier-Nakajima, S.; Strom, J.; Kiss, B.; Smith, J. E., 3rd; Granzier, H., Shortening the thick filament by partial deletion of titin's C-zone alters cardiac function by reducing the operating sarcomere length range. *J Mol Cell Cardiol* **2022**, 165, 103-114.