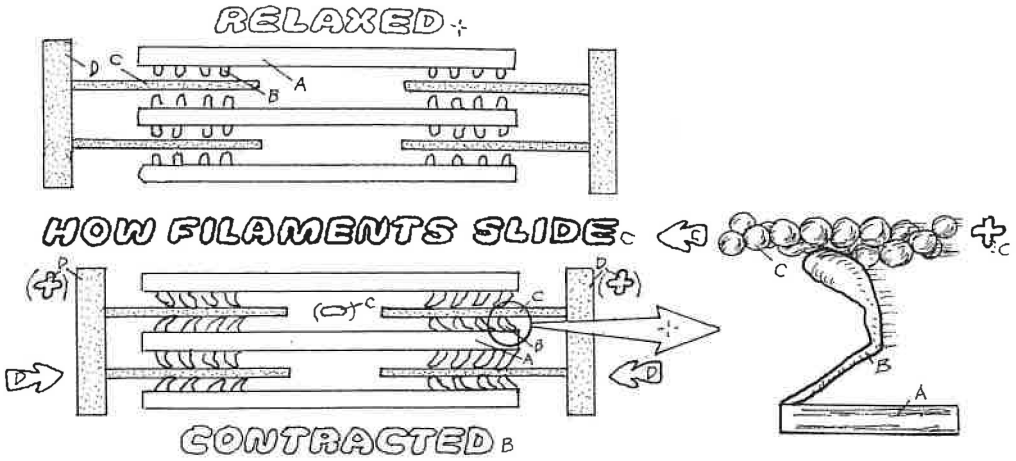
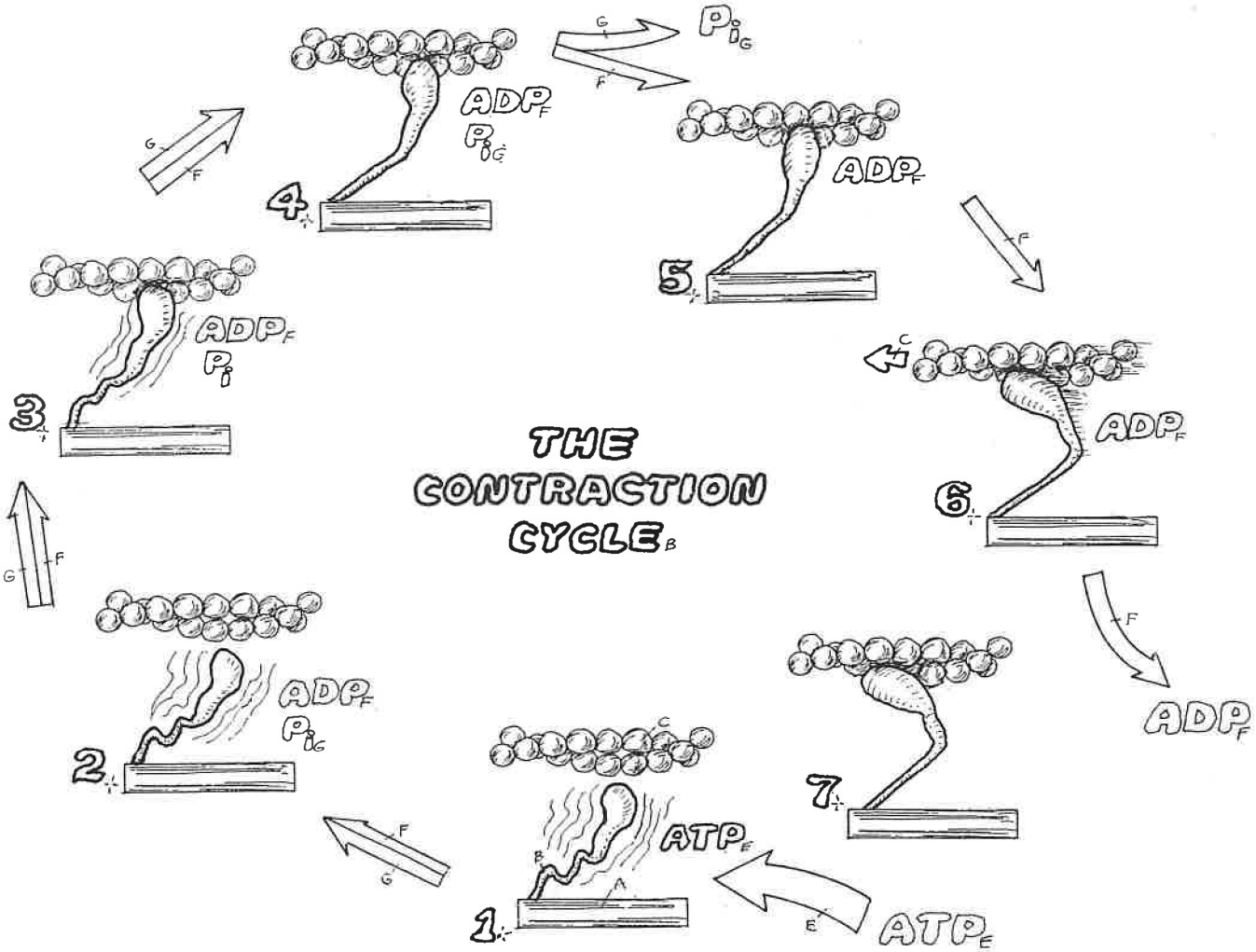


MYOSIN (THICK FILAMENT) A
MYOSIN HEADS B
ACTIN (THIN FILAMENT) C
Z LINE D
ATP E ADP F
PHOSPHATE G

In the relaxed muscle the cross bridges are detached from actin filaments. During contraction they attach and provide contractile force. Thick filaments are made of myosin molecules; each molecule consists of a long rod shaped tail, a shorter rod shaped neck and and 2 globular heads which form the cross bridge (only one is shown). During contraction the heads attach to actin, tilt, release and then attach to the next position as though they were walking on the filament. But, the actin filaments are anchored with their (+) ends in the Z line and myosin heads can only "walk" toward the (+) end. The myosin heads on the right "walk" toward the Z line on the right, while heads on the left walk toward the left Z line. As a result the thick myosin filaments do not move, but the actin filaments are pulled in.



1-2 Relaxed: Following a contractile movement, the myosin binds an ATP allowing it to enter a relaxed state where it is detached from actin and has some degrees of freedom to wiggle about. The bound ATP is short lived because myosin, itself, is an ATPase (ATP splitting enzyme) Myosin splits the ATP and (2) the products ADP and P_i remain bound to the myosin. There is still freedom to wiggle. **3-4 Attachment:** Myosin makes contact with the actin. At first it is weak (3), but as the attachment gets stronger (4)the mobility of myosin diminishes. **4-5 Force Generation:** With the release of P_i, the affinity of actin and myosin increases. The binding becomes stronger and the myosin becomes more rigid, as stress is applied to the neck region. The power stroke is intiated. **5-6 Sliding Filament:** The myosin head tilts propelling the associated actin forward. **6-7 Rigor:** Following the sliding motion, ADP is released and the myosin is stuck to the actin - but only momentarily. **7- 1 Release:** ATP binds to the myosin head releasing it from actin and making the muscle pliable. If no ATP is available, myosin heads remain stuck to actin and the muscle becomes stiff. This is the rigidity of rigor mortis which follows death.