Fig. 6.1: Force at hip joint

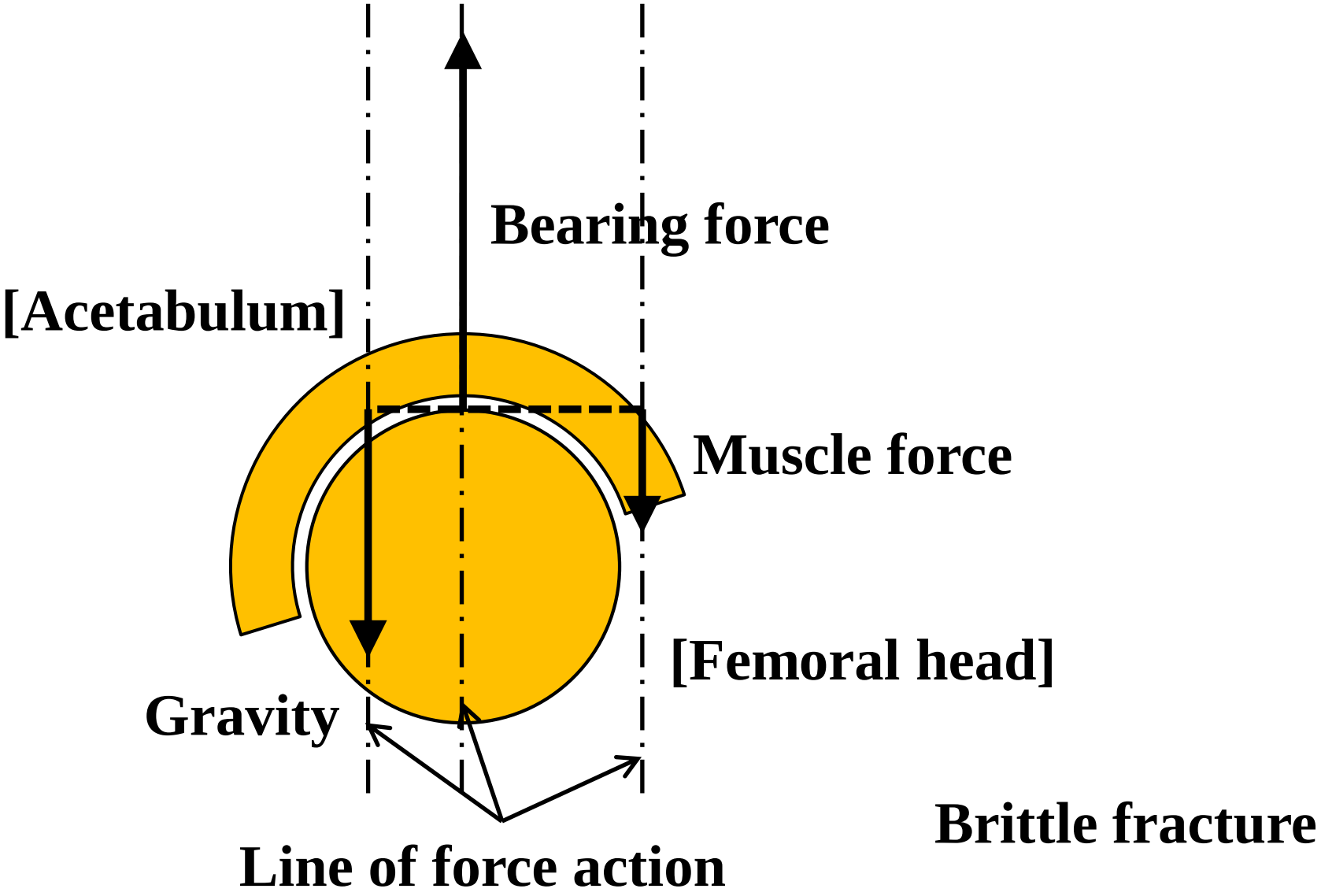
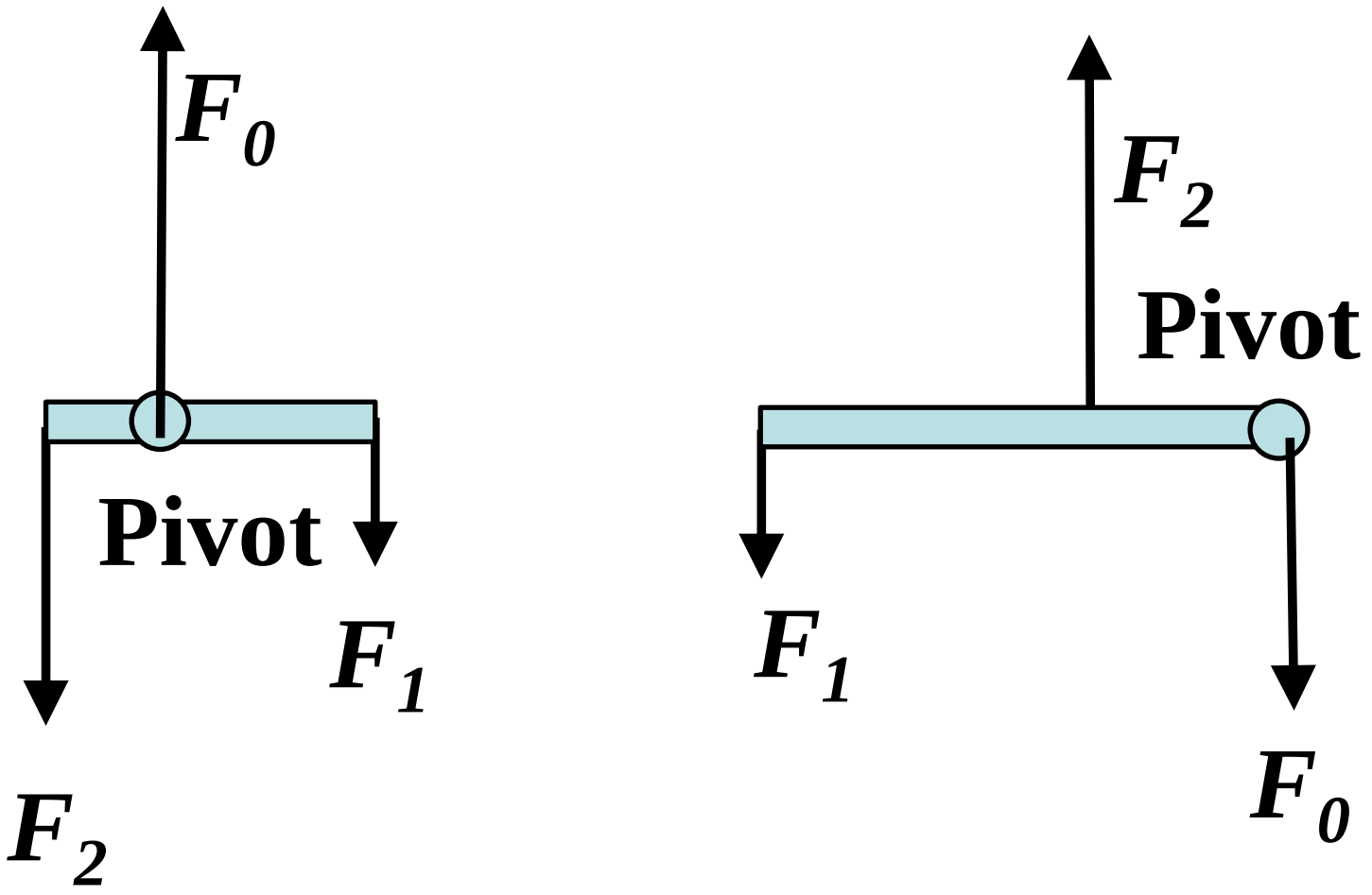


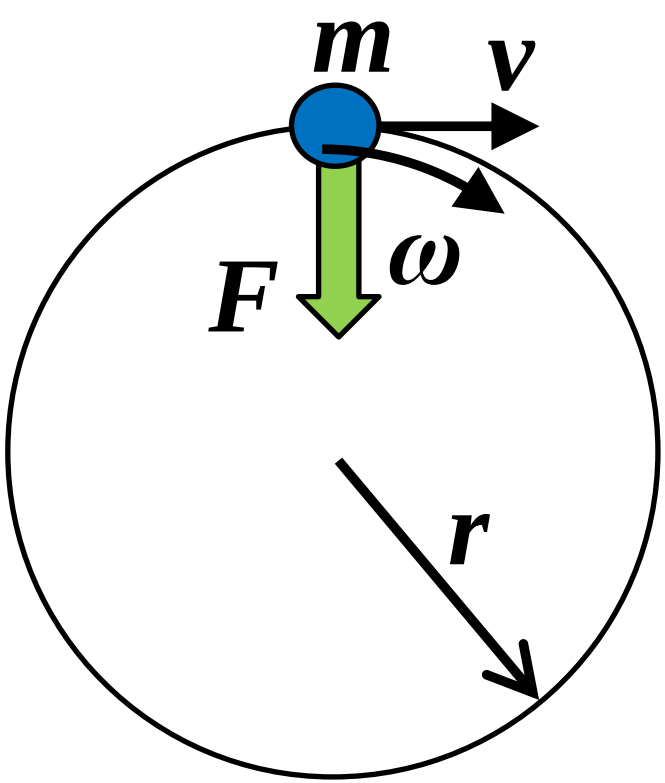
Fig. 6.2: Principle of leverage



Moment of force

Fig.6.3: Circular motion and Centrifugation

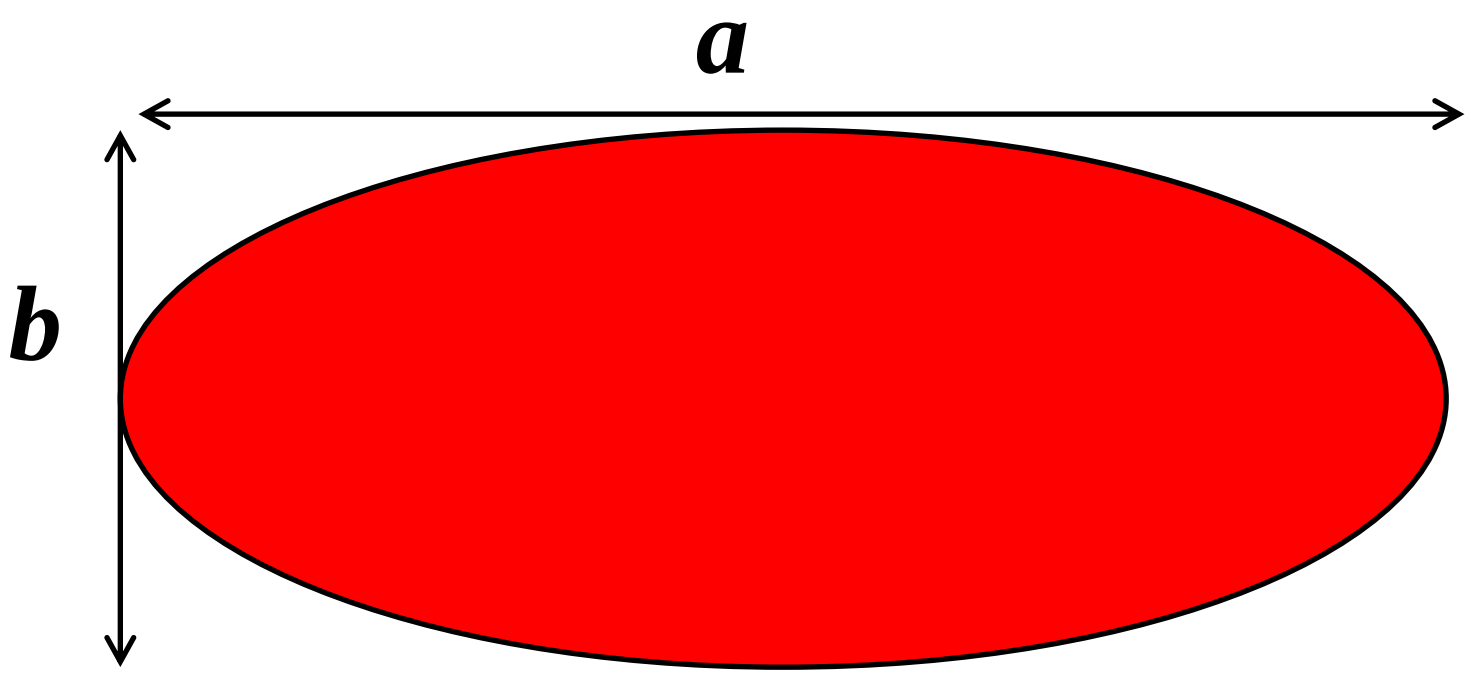
(a) Centripetal force



(b) Centrifuge

$$F = m v^2 / r = m r \omega^2 \qquad (6.1)$$

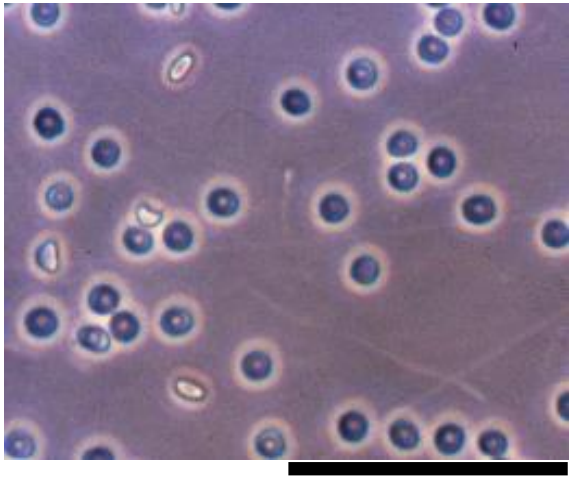
Fig. 6.4: Deformation ratio



$$y=(a-b)/(a+b) \qquad (6.2)$$

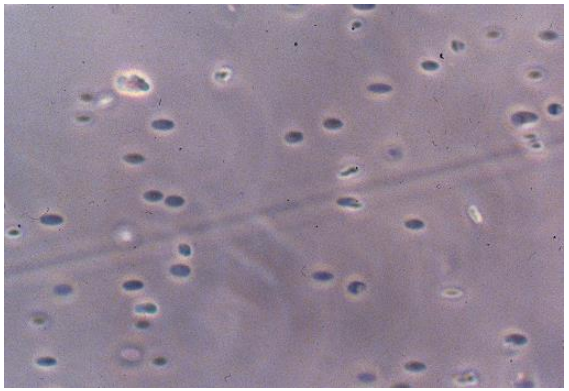
Fig. 6.5: Erythrocyte deformation in shear field

(a) $y=0$



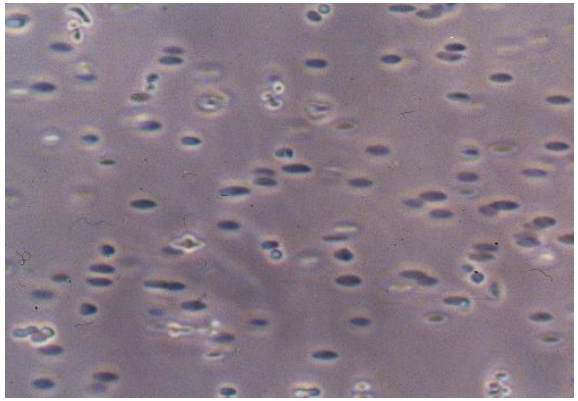
0.1 mm

(b) $y=0.2$



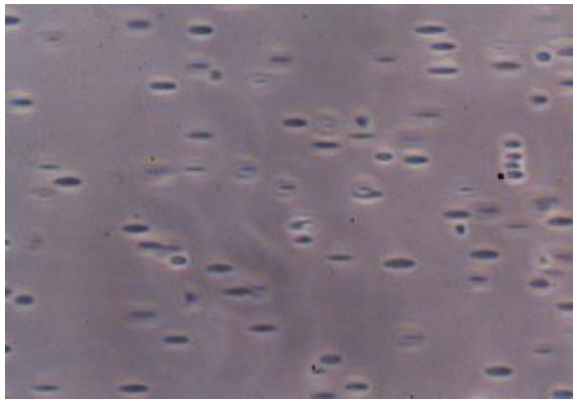
0.1 mm

(c) $y=0.3$



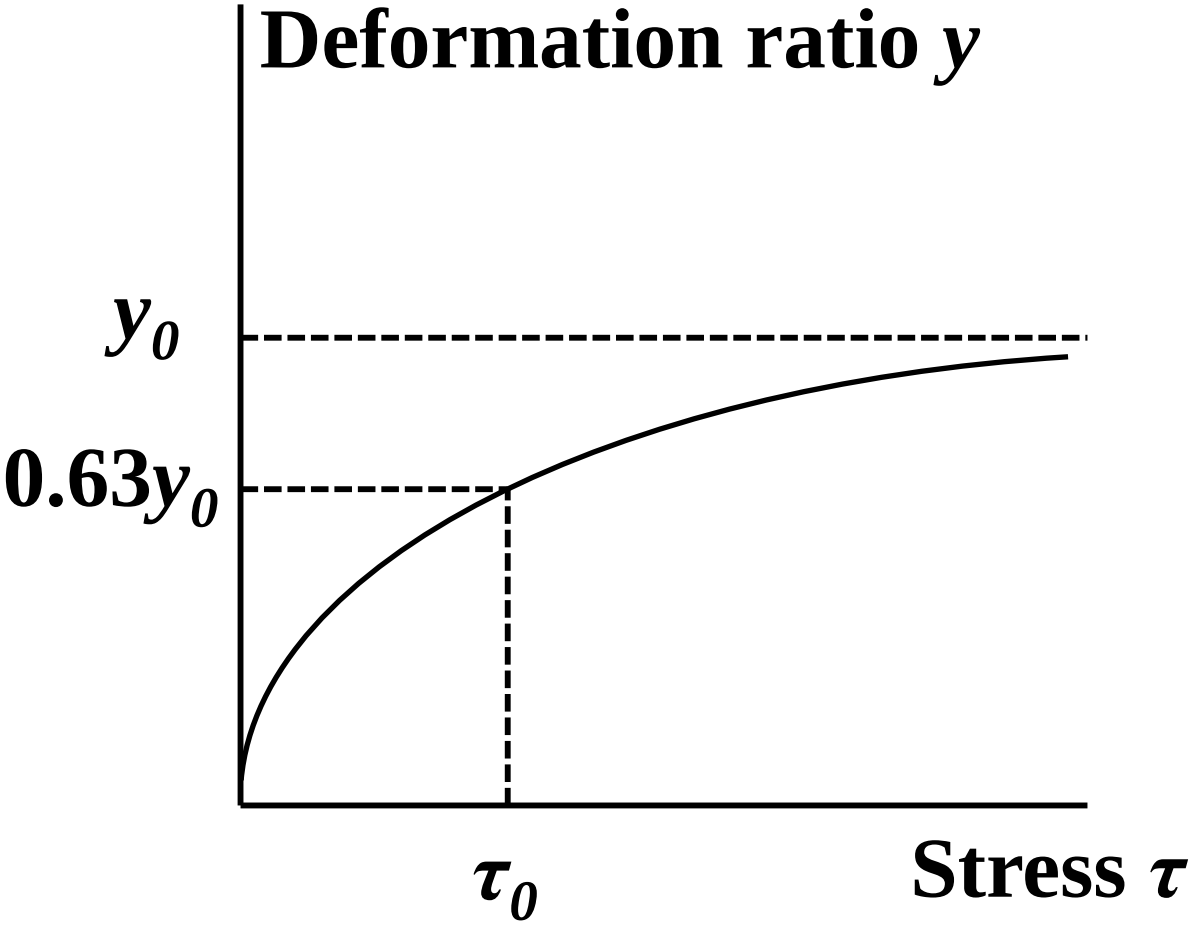
0.1 mm

(d) $y=0.4$



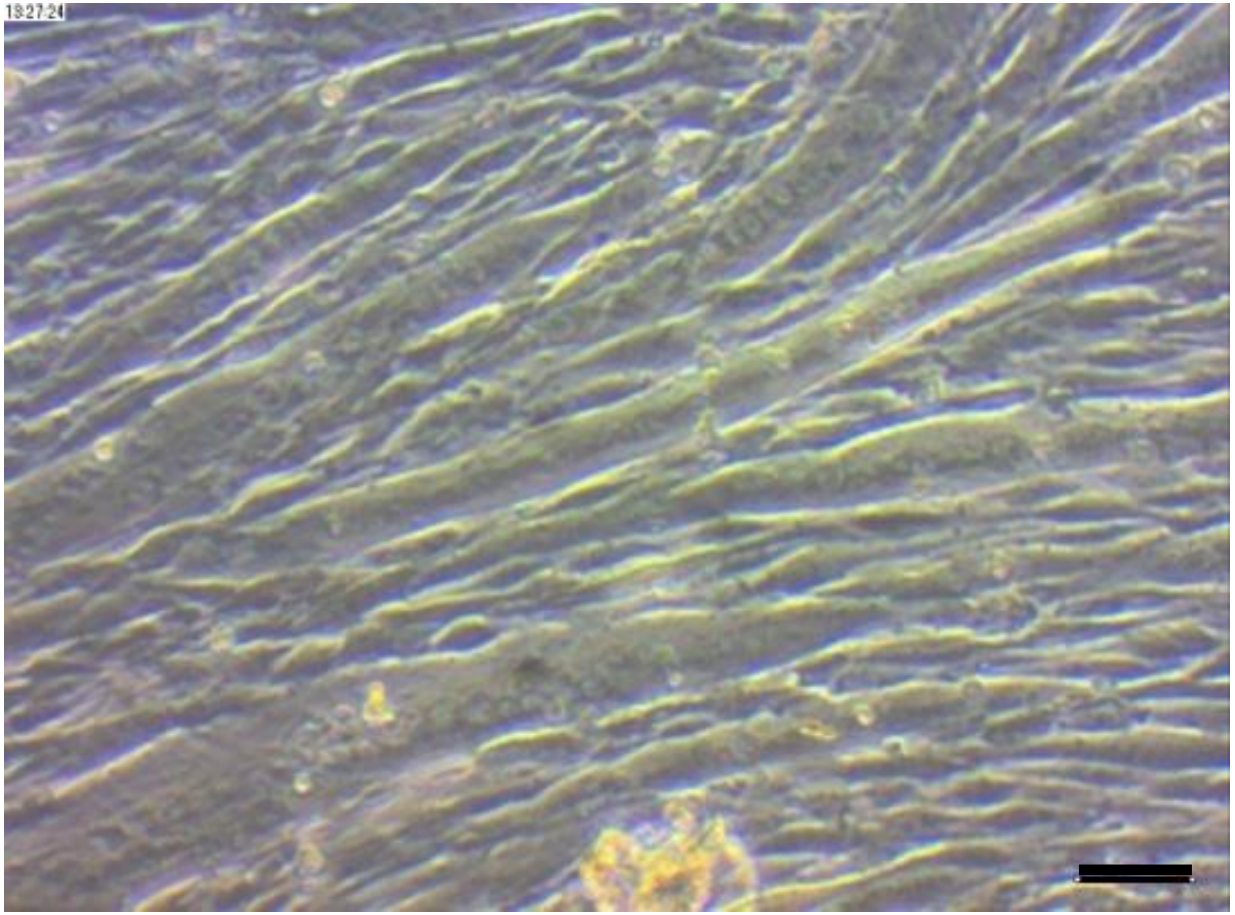
0.1 mm

Fig. 6.6: Deformability of erythrocyte



$$y = y_0 \left(1 - \exp\left(-\tau / \tau_0\right)\right) \qquad (6.3)$$

Fig. 6.7: Myoblasts differentiate to myotubes



0.05 mm

Fig. 6.8: Degree of freedom (Translation, Rotation)

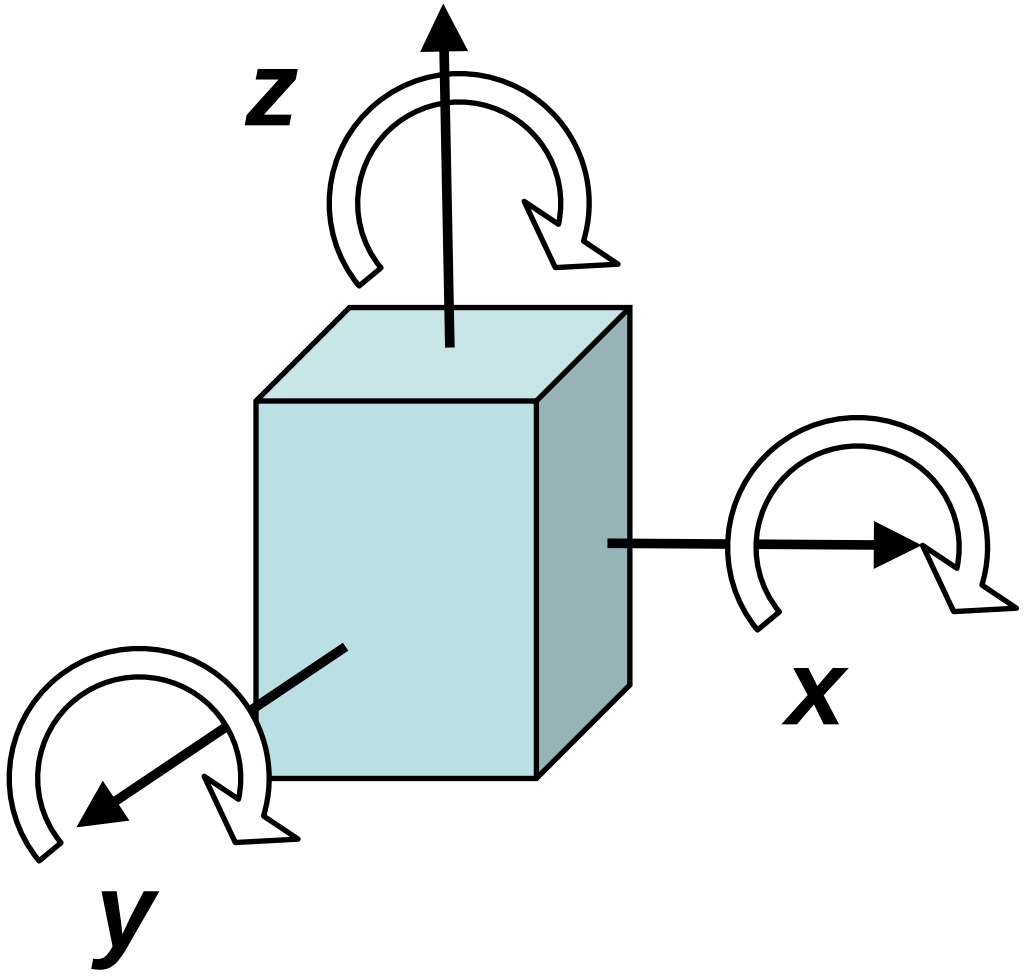


Fig. 6.9: Motion direction

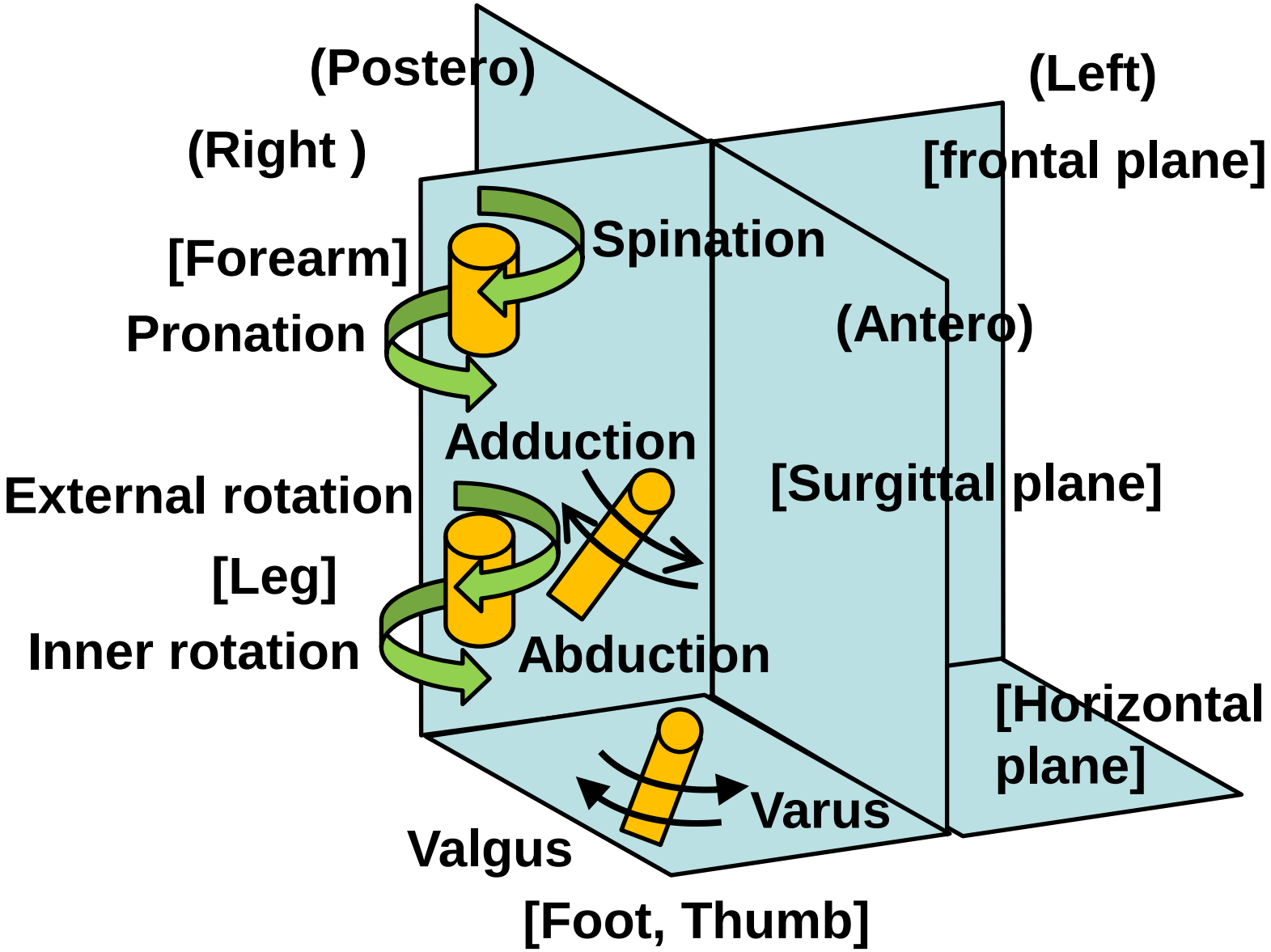


Fig. 6.10: Cylindrical cam

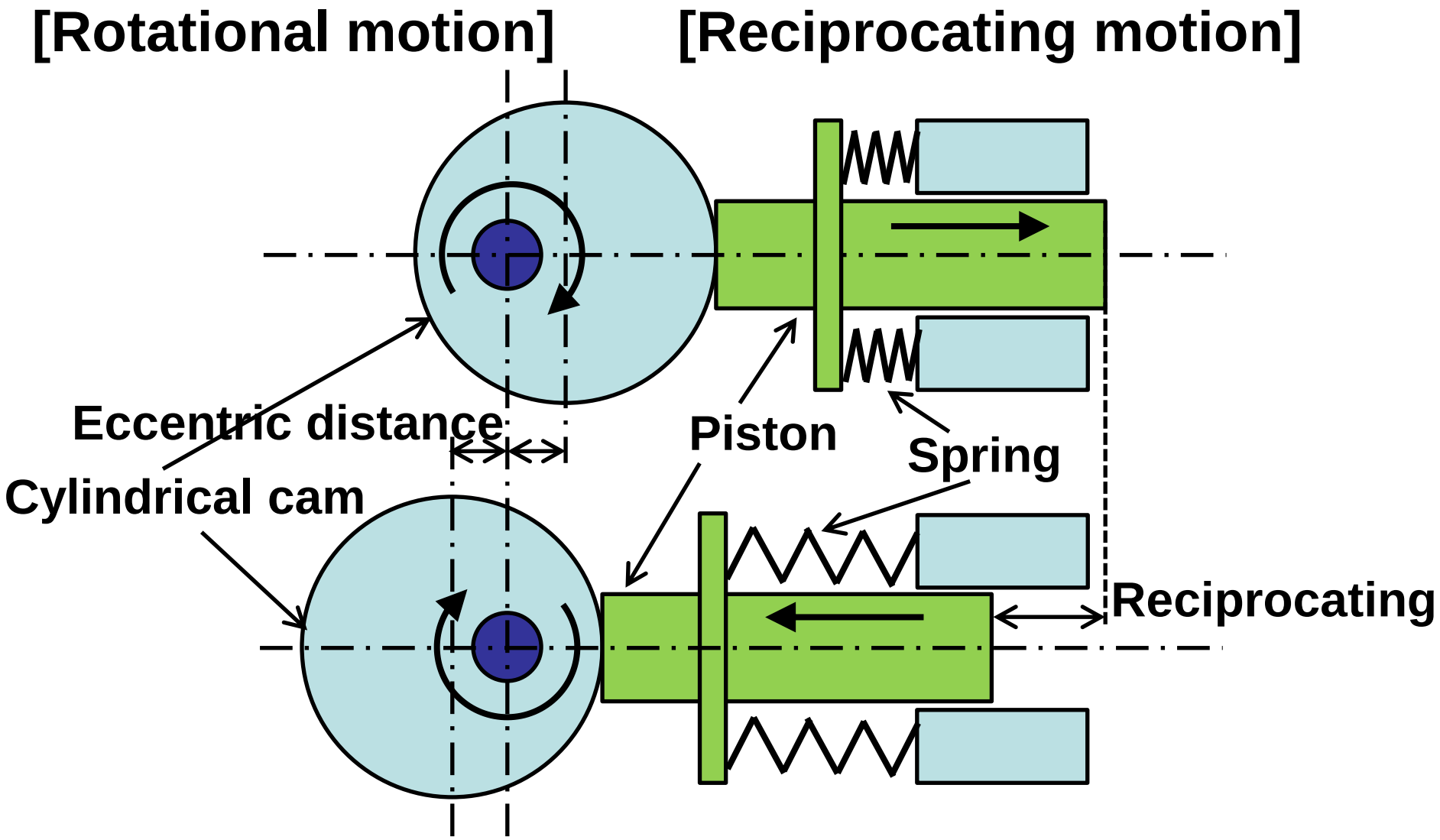


Fig. 6.11: Motion of piston

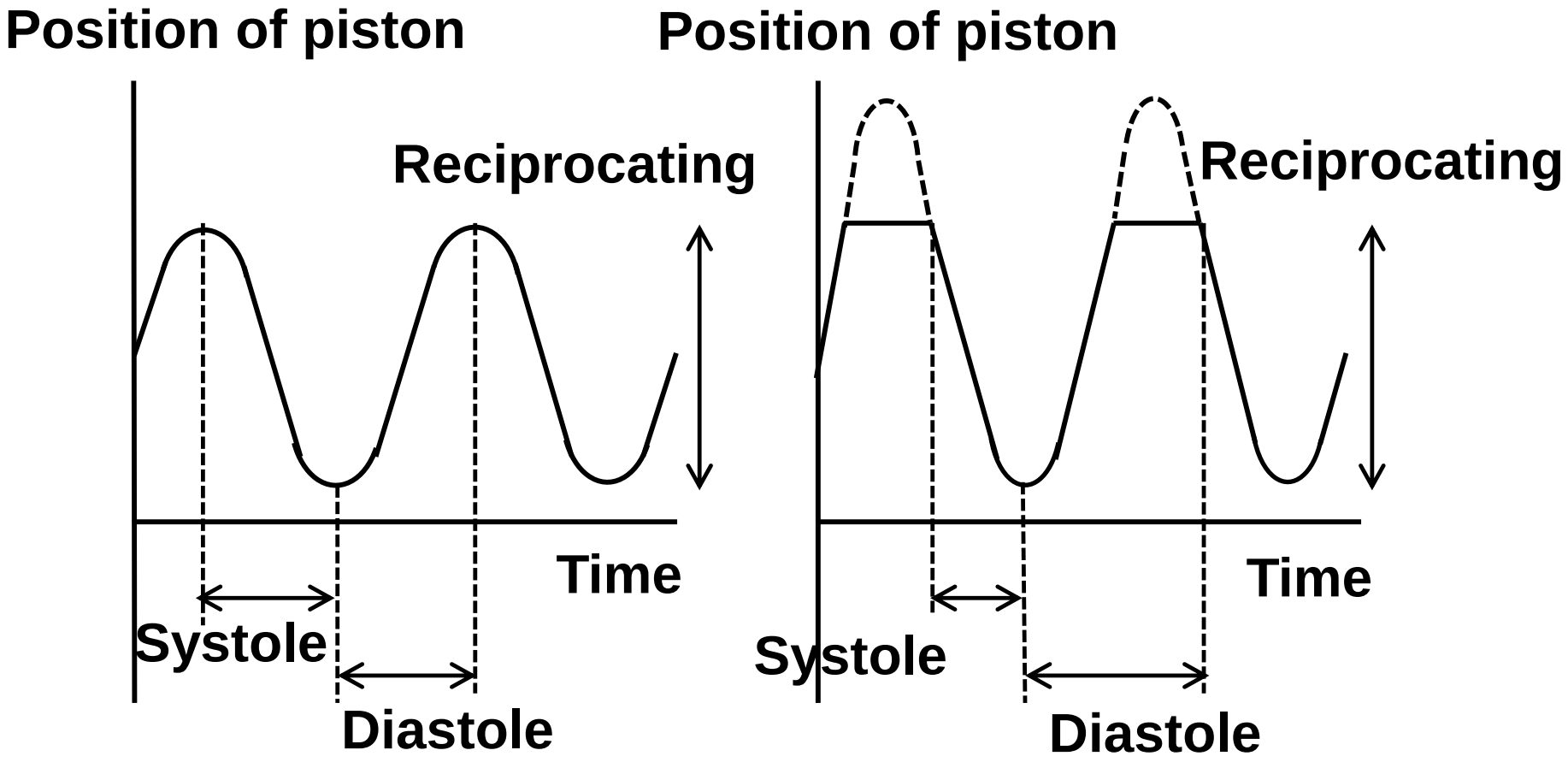
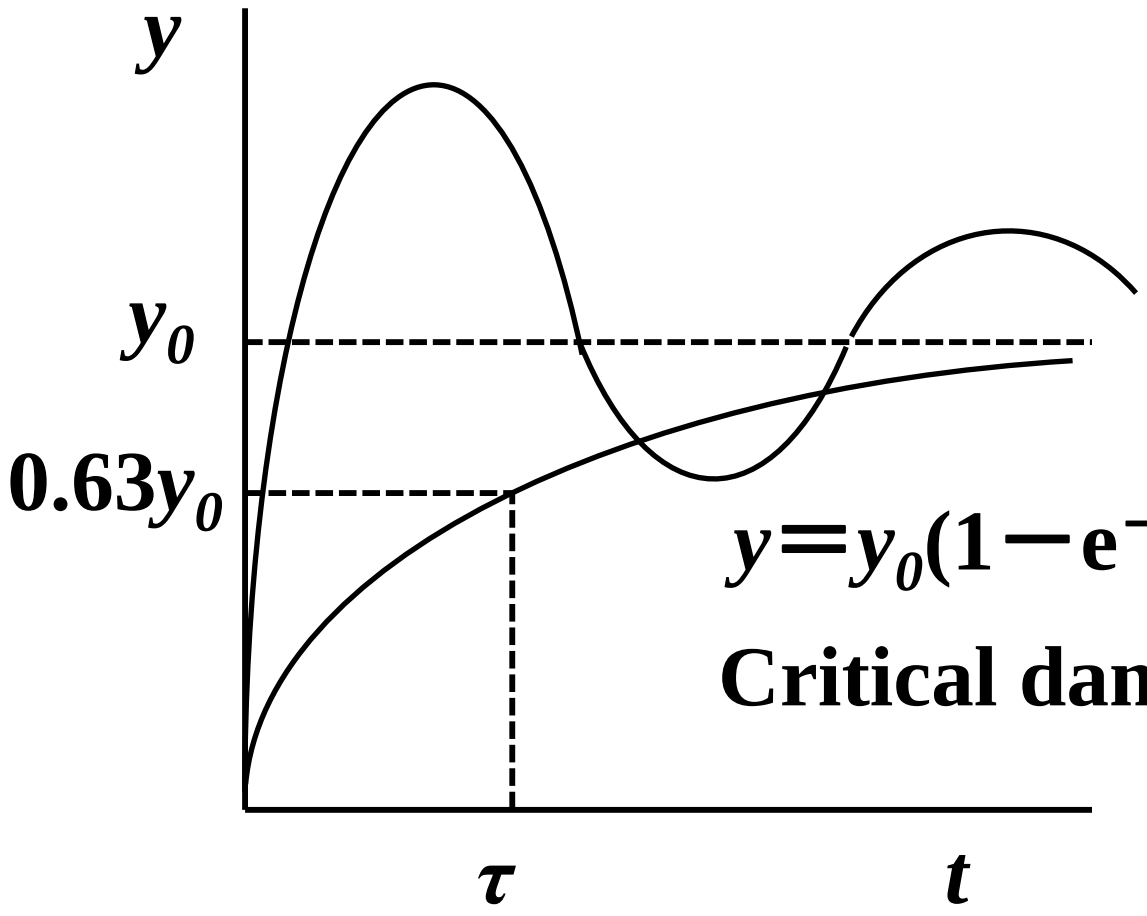


Fig. 6.12: Damping of vibration



$$y = y_0(1 - e^{-(t/\tau)}) \qquad (6.4)$$

Critical damping

τ: Time constant

Fig. 6.13: Control

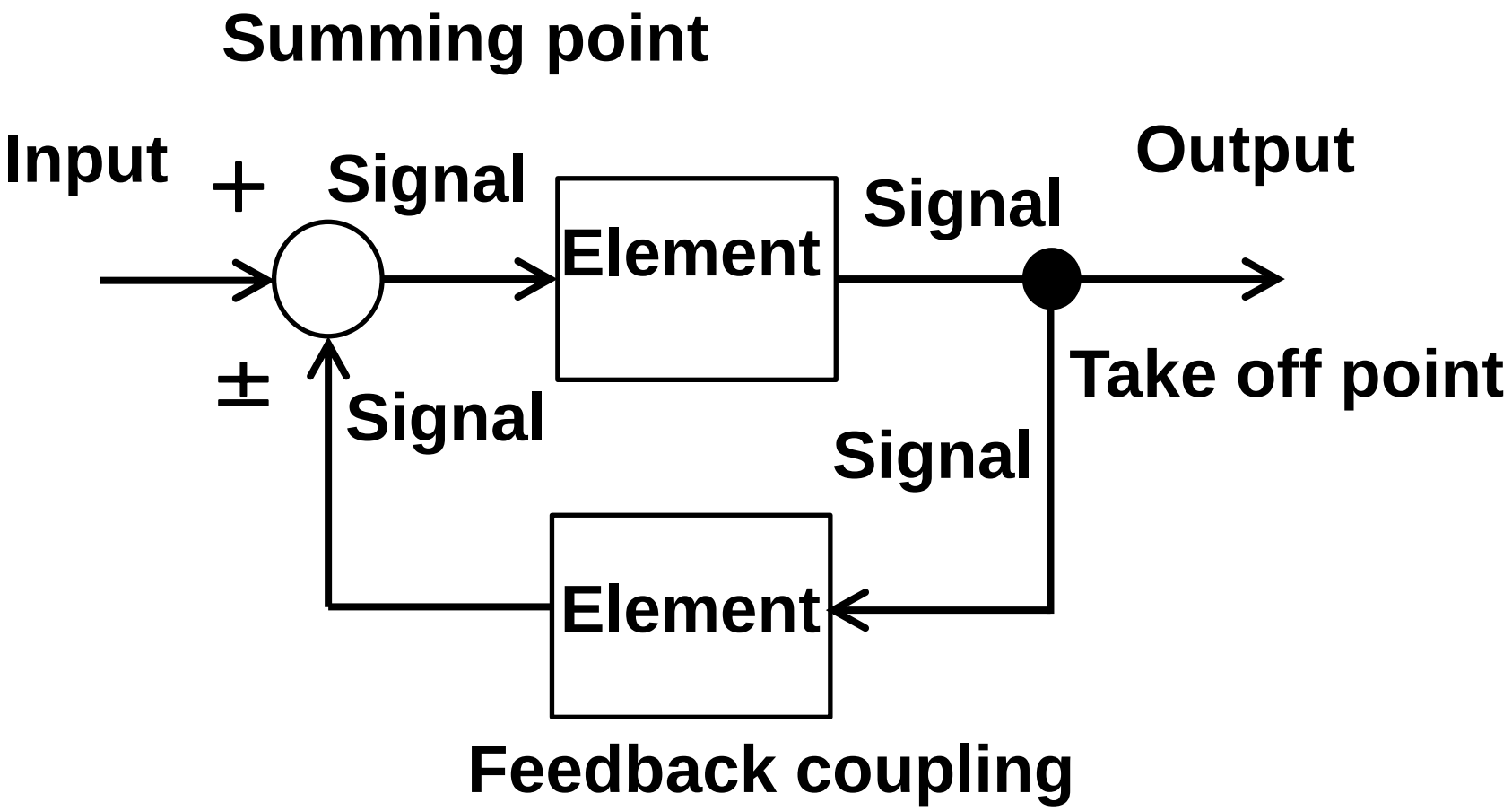


Fig. 6.14: Biological cell

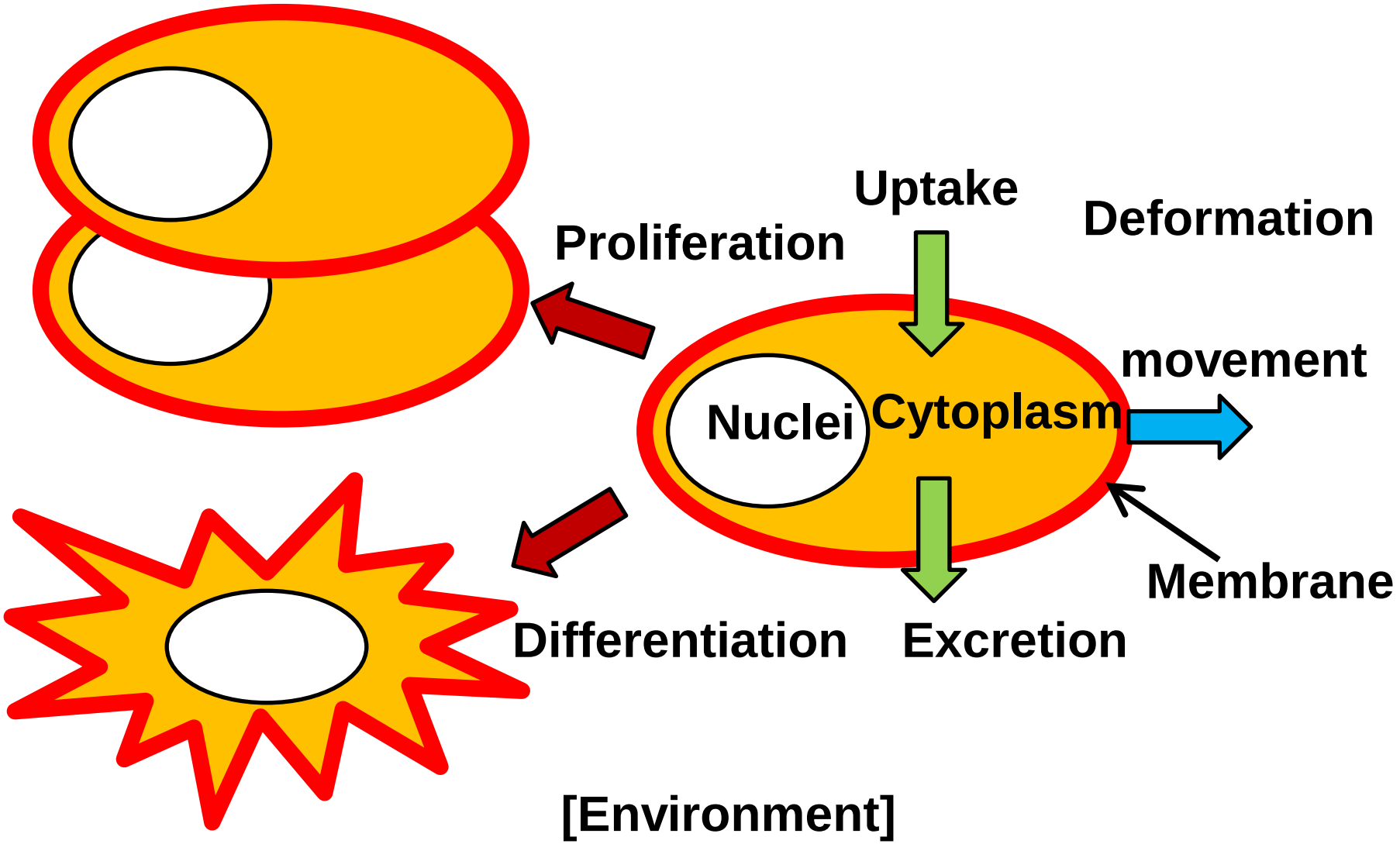


Fig. 6.15: System in organ

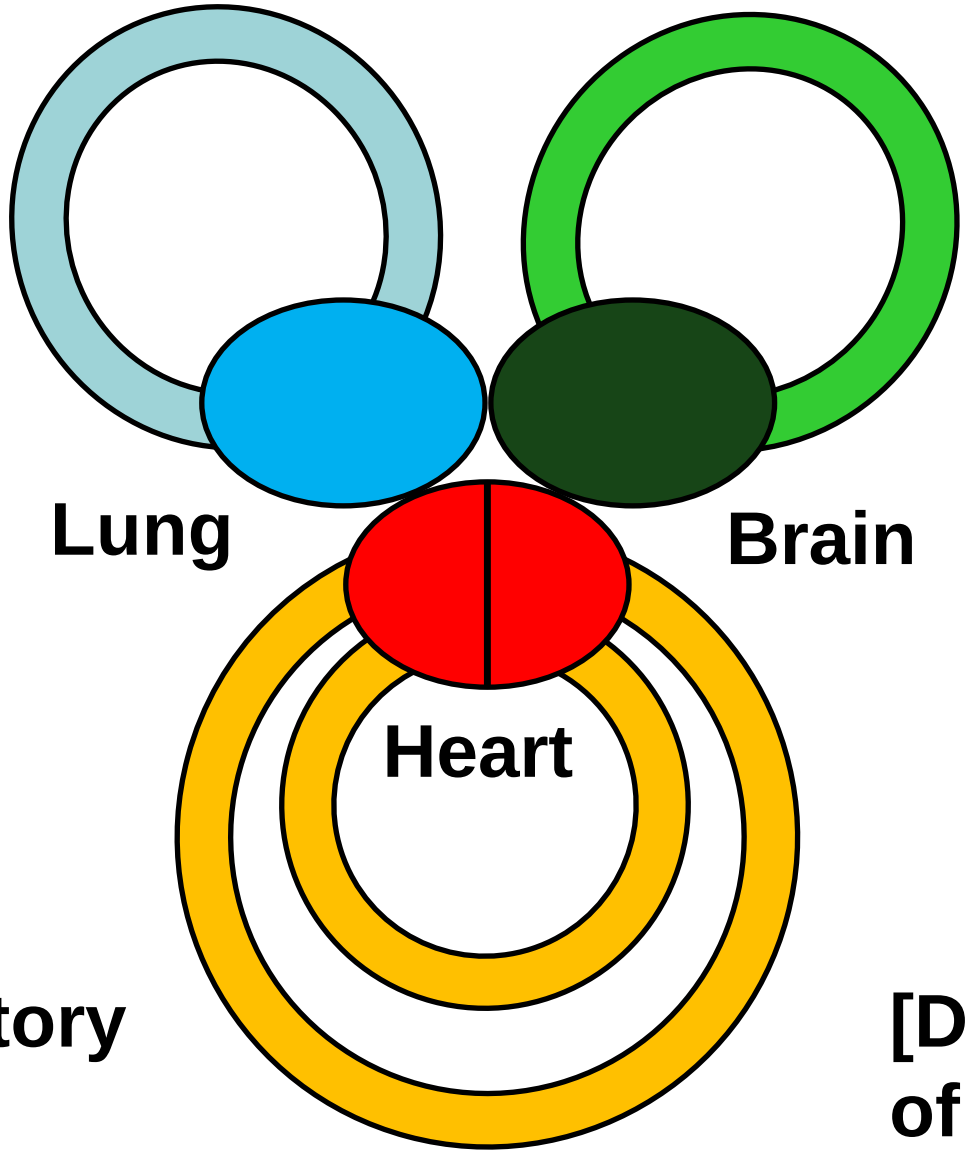
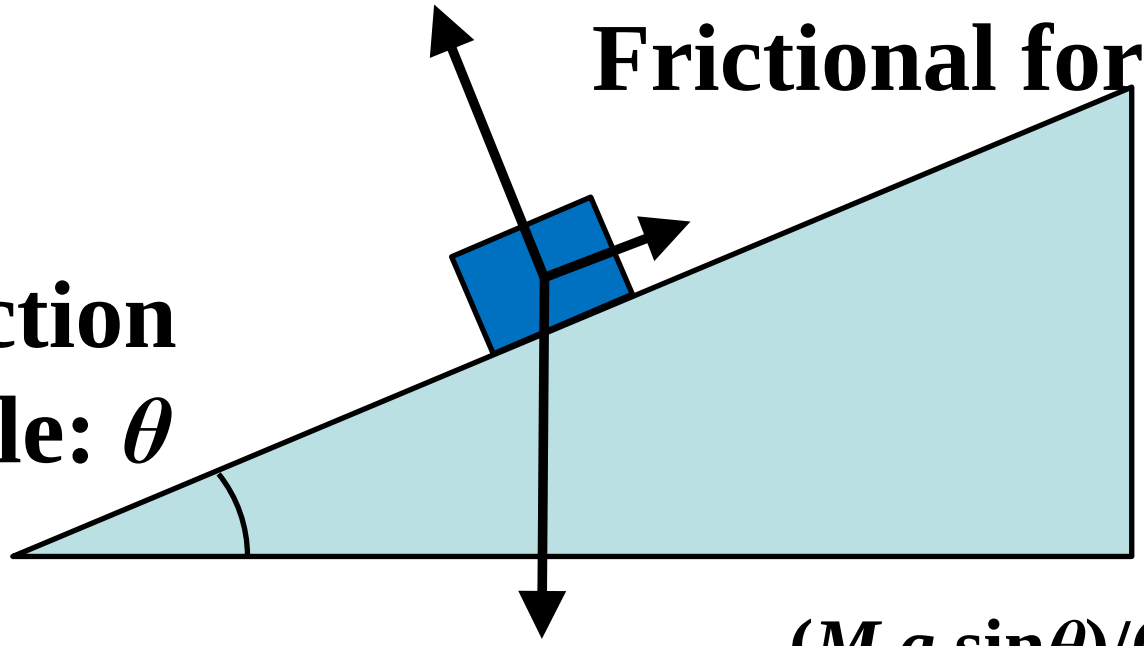


Fig. 6.16: Friction angle

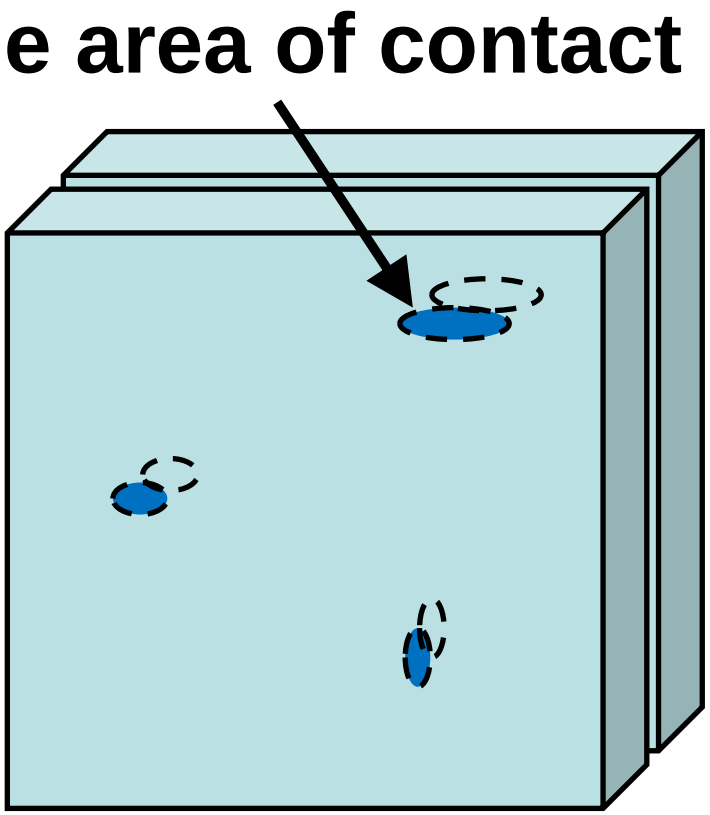


$$(M\,g\,\sin\theta)/(M\,g\,\cos\theta) = \tan\theta = \mu \qquad (6.6)$$

Coefficient of friction

$$\mu = Fs / Fn \qquad (6.5)$$

Fig. 6.17: True area of contact



[Apparent area of contact]

Fig. 6.18: Surface of solid

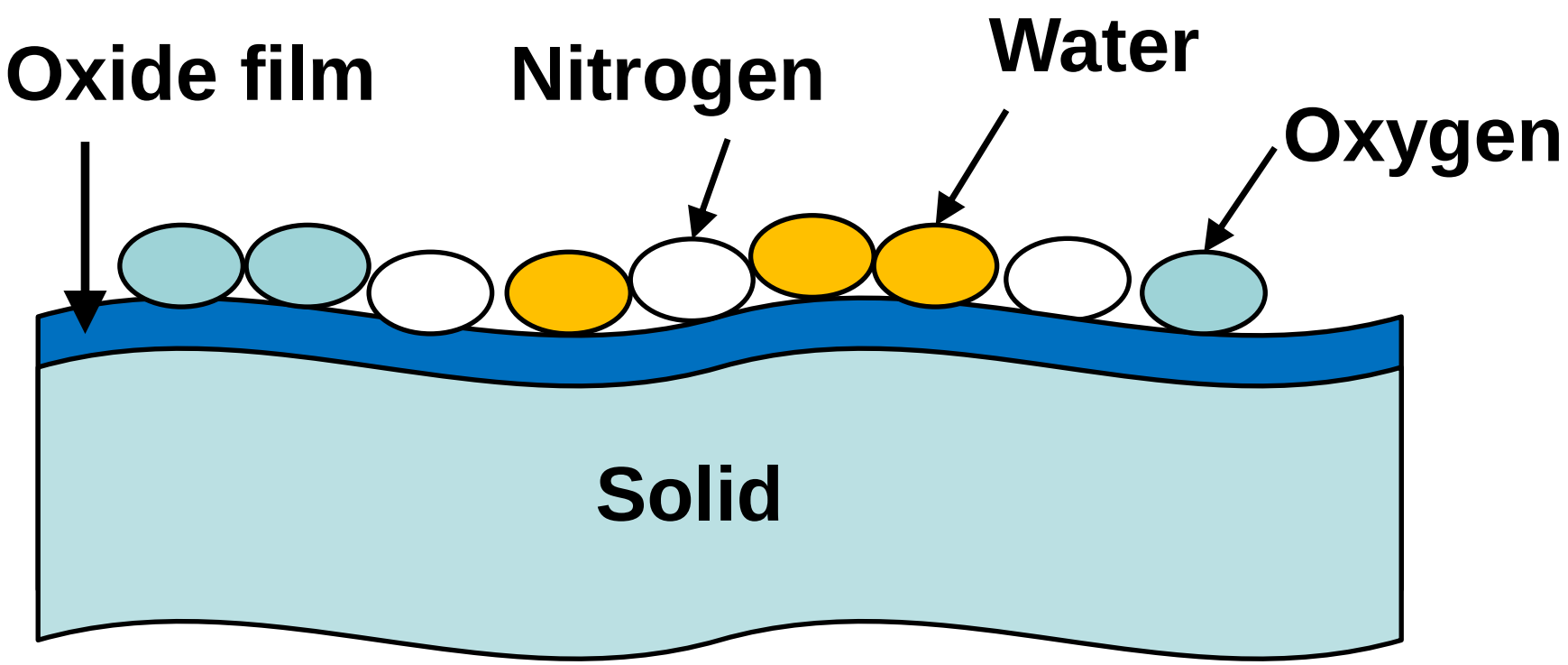


Fig. 6.19: Roller pump

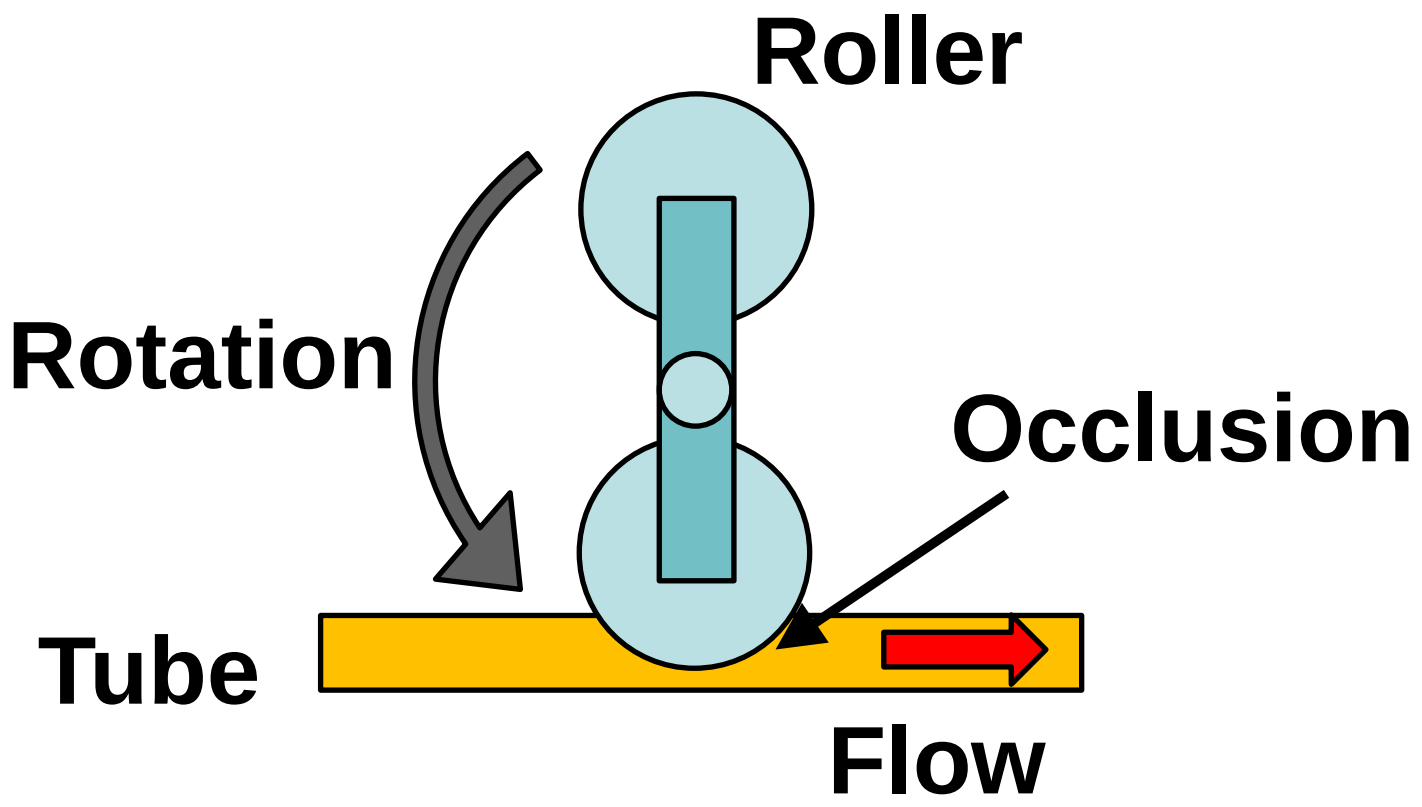


Fig. 6.20: Screw pump

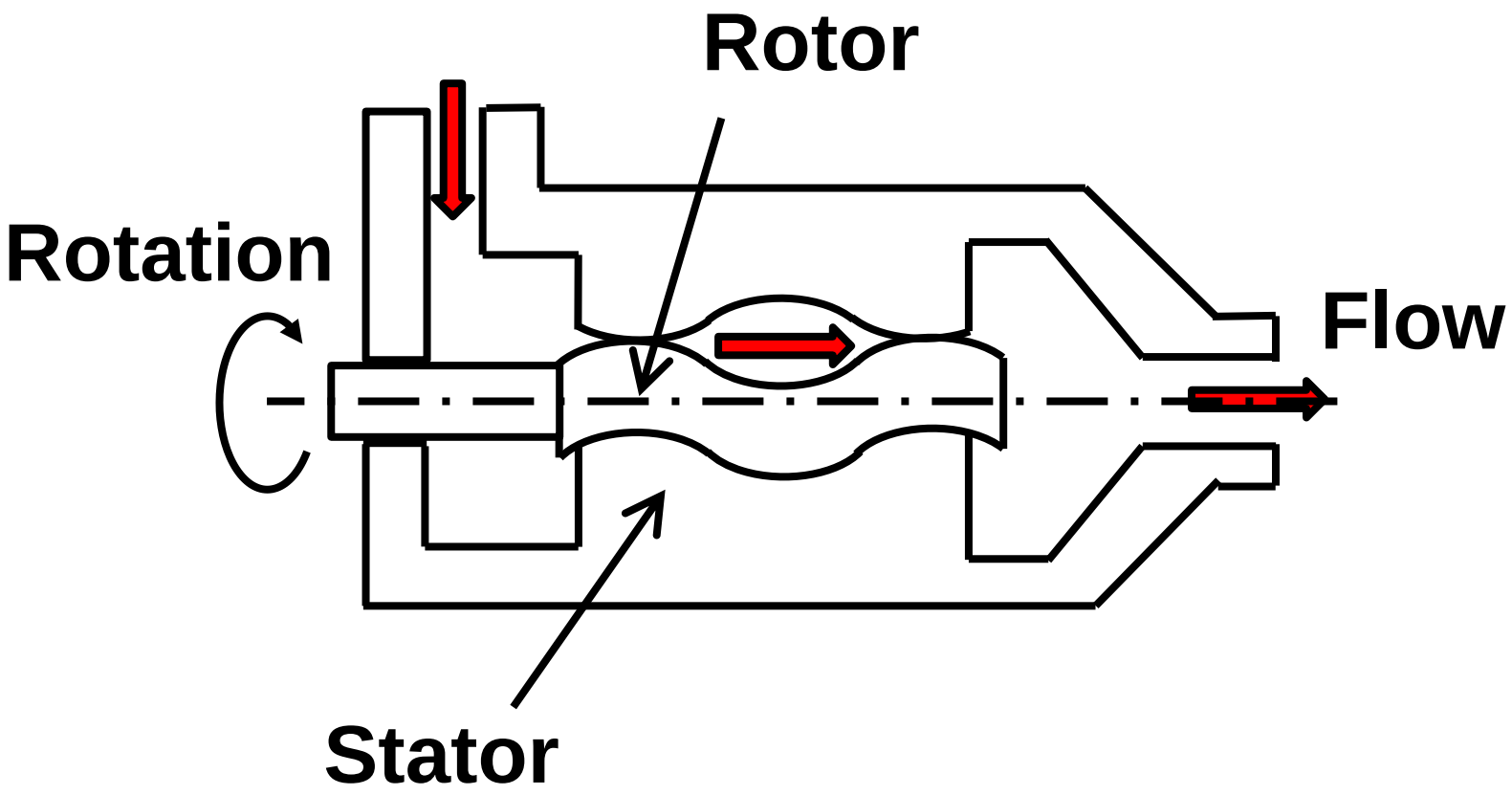


Fig. 6.21: Contact angle: θ

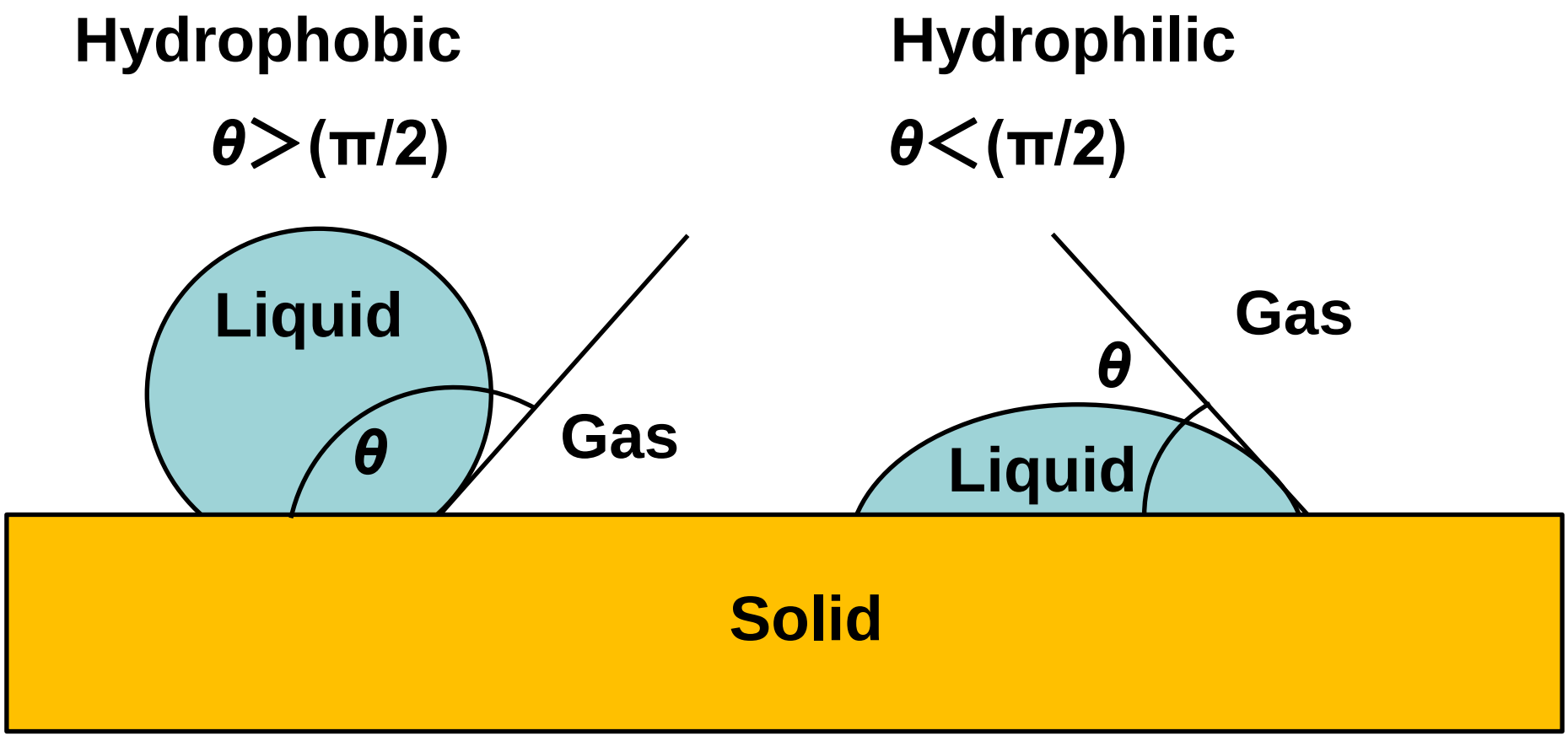


Fig. 6.22: Clot

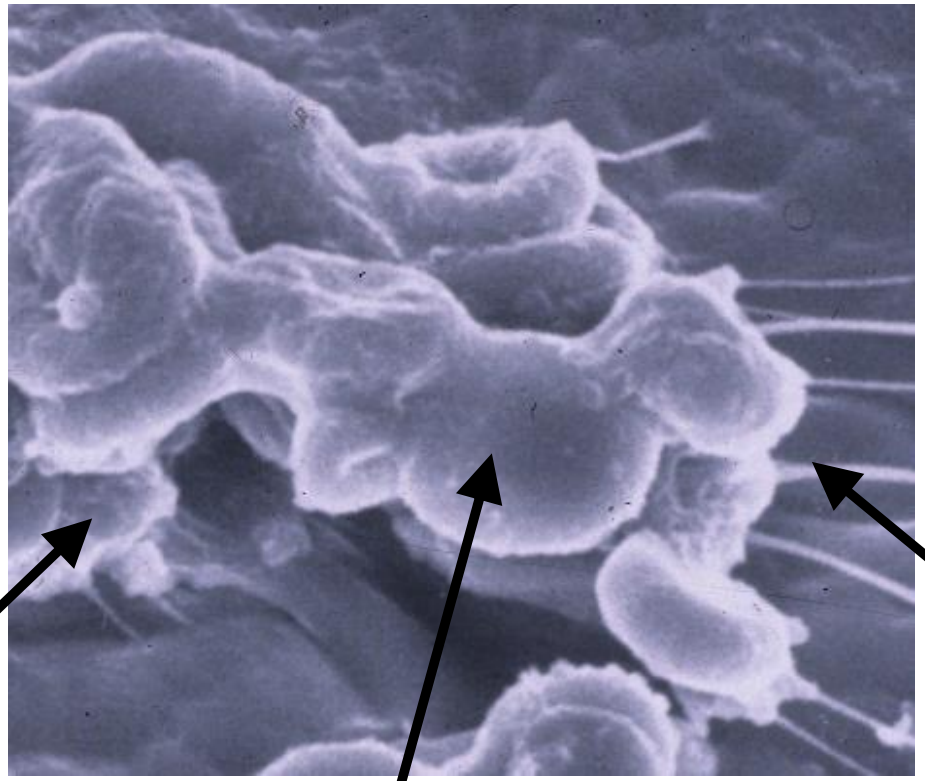


Fig.6.23: Clotting system

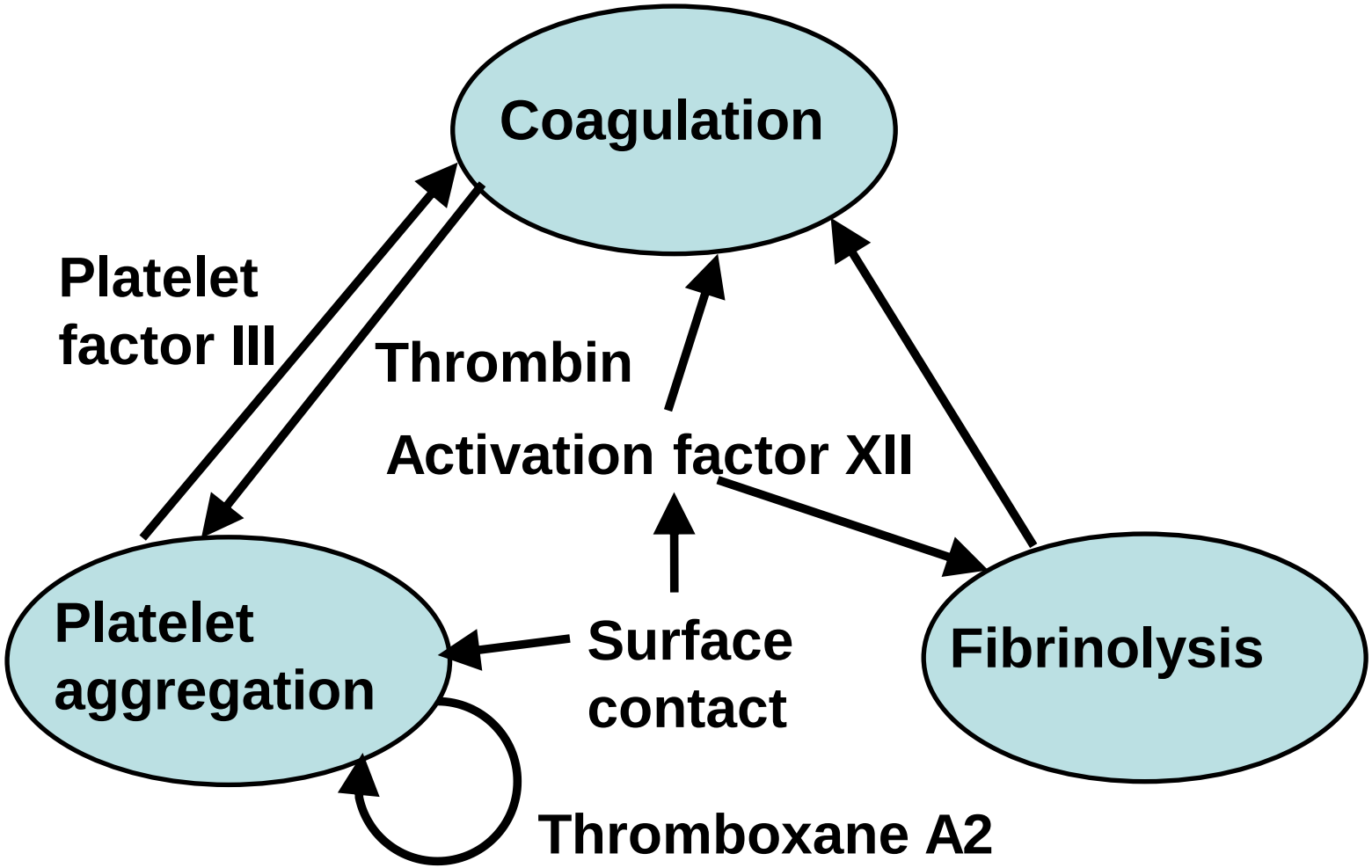


Fig. 6.24: Blood circulation circuit

Centrifugal type artificial heart

Fig. 6.25: Clot formation in tube (low flow)

Fig. 6.26: Clot formation in tube (high flow)

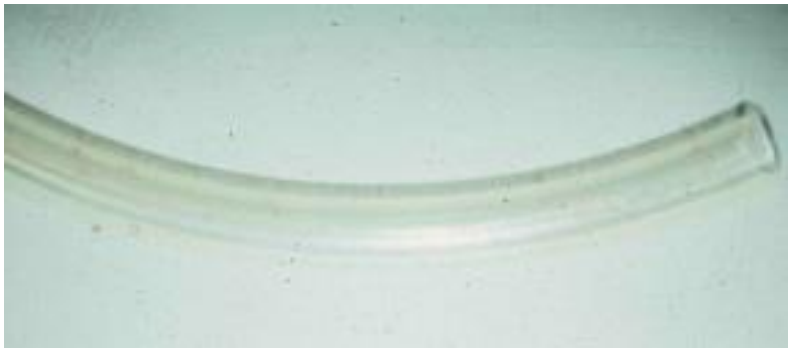


Fig. 6.27: Clot at bearing

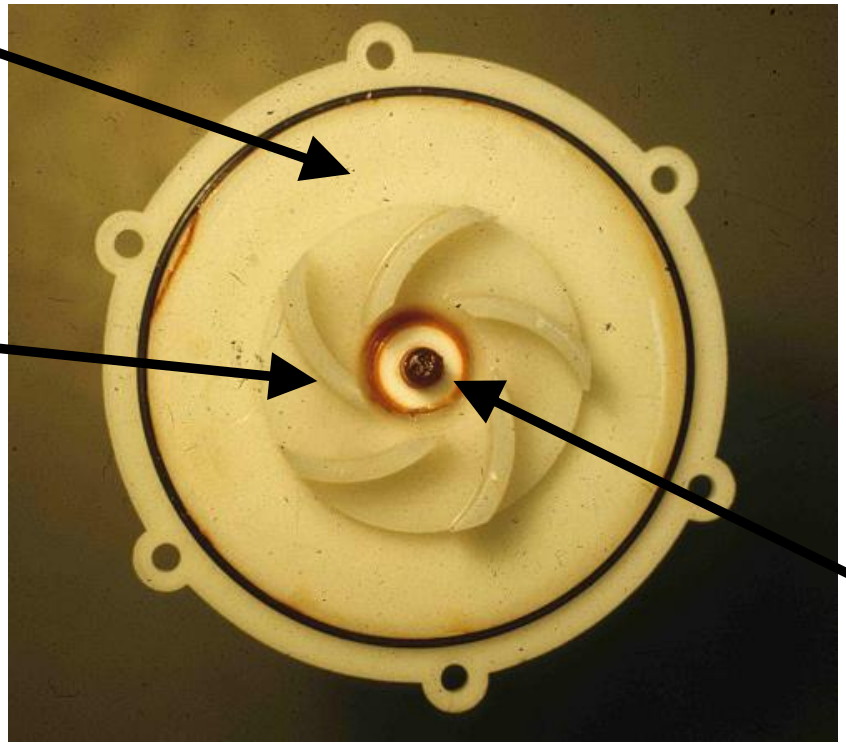


Fig. 6.28: Clot behind impeller

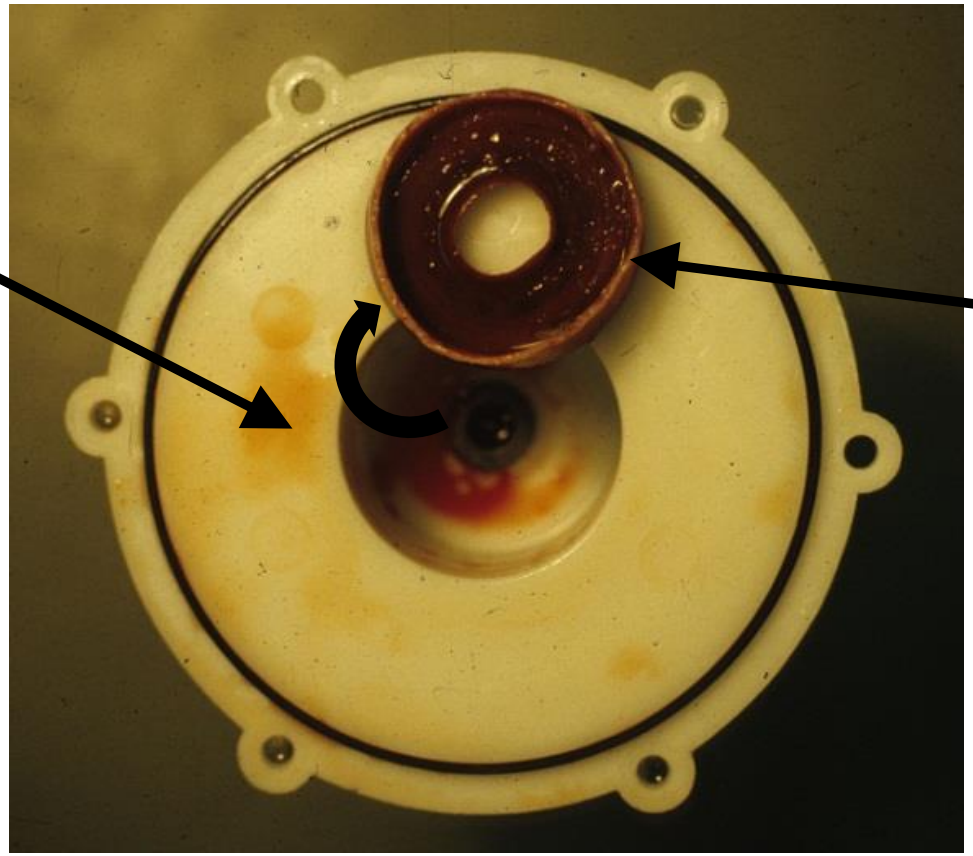
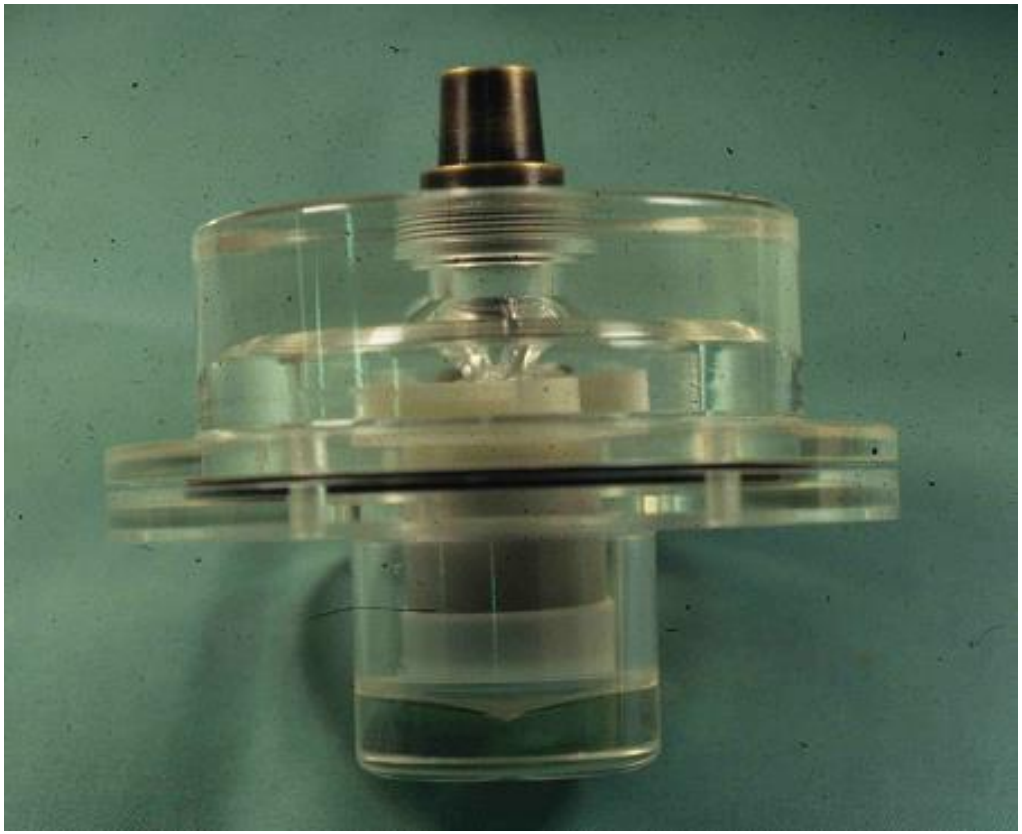


Fig. 6.29: Modified pivot of Artificial Heart



50 mm

Fig. 6.30: Concave and convex cones

50 mm

Segmented polyurethane

Fig. 6.31: Wear

(a) Abrasive wear

(b) Adhesive wear

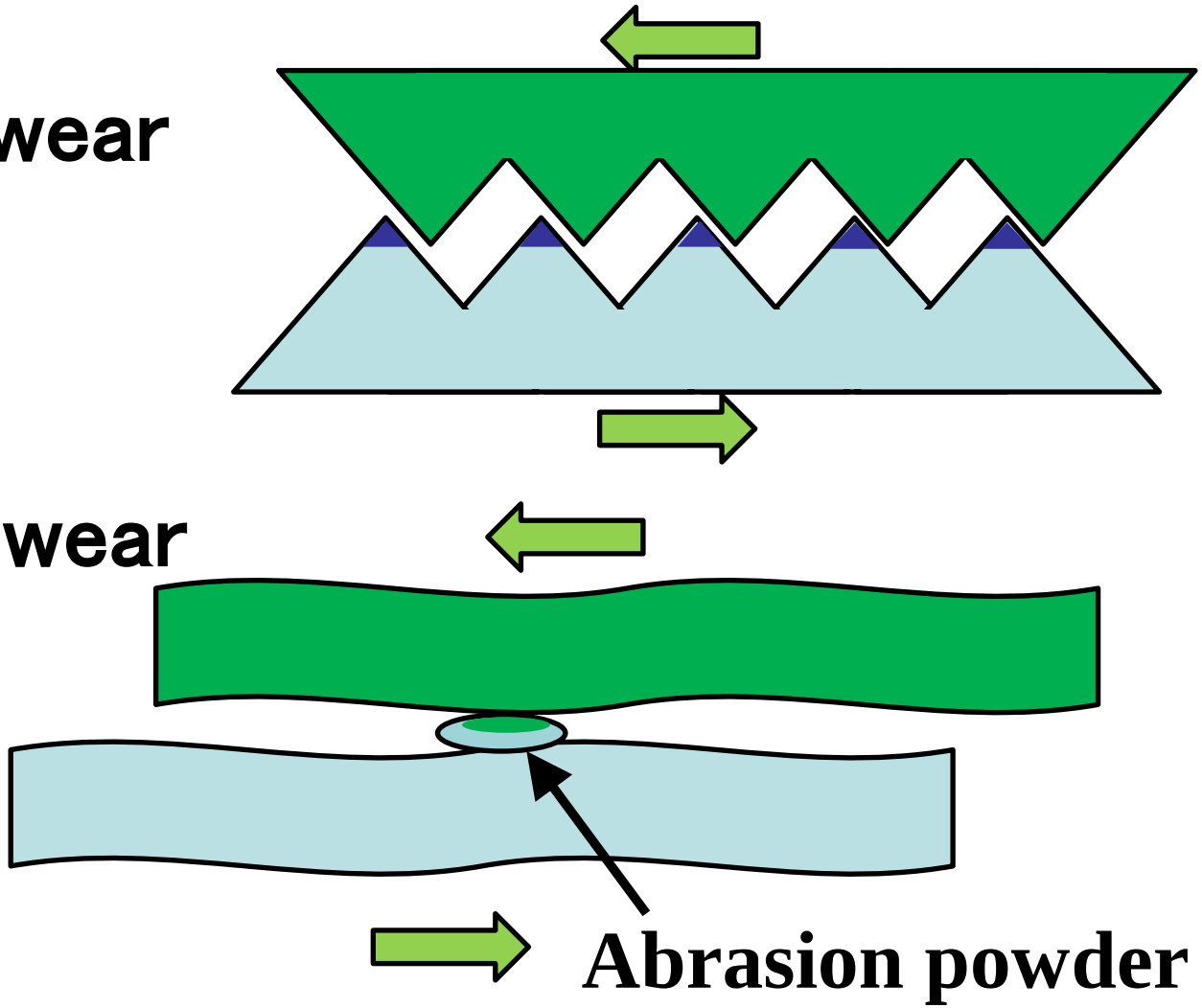


Fig. 6.32: Transition of wear

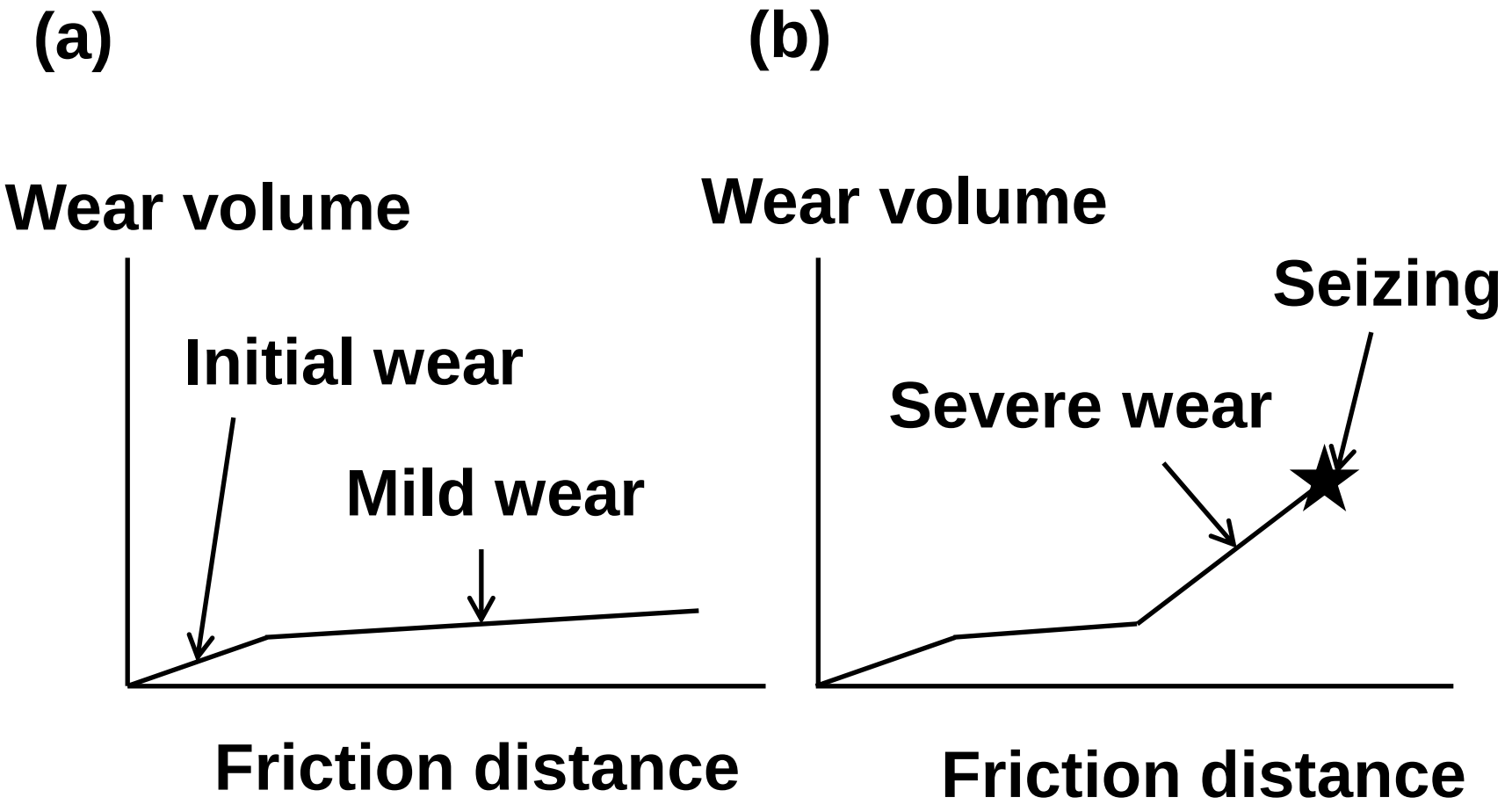


Fig. 6.33: Joint prosthesis

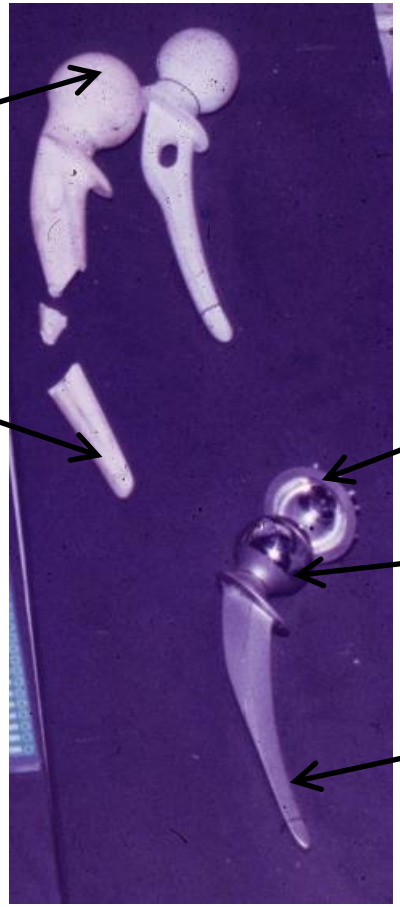


Fig. 6.34: Cardiac valve prosthesis

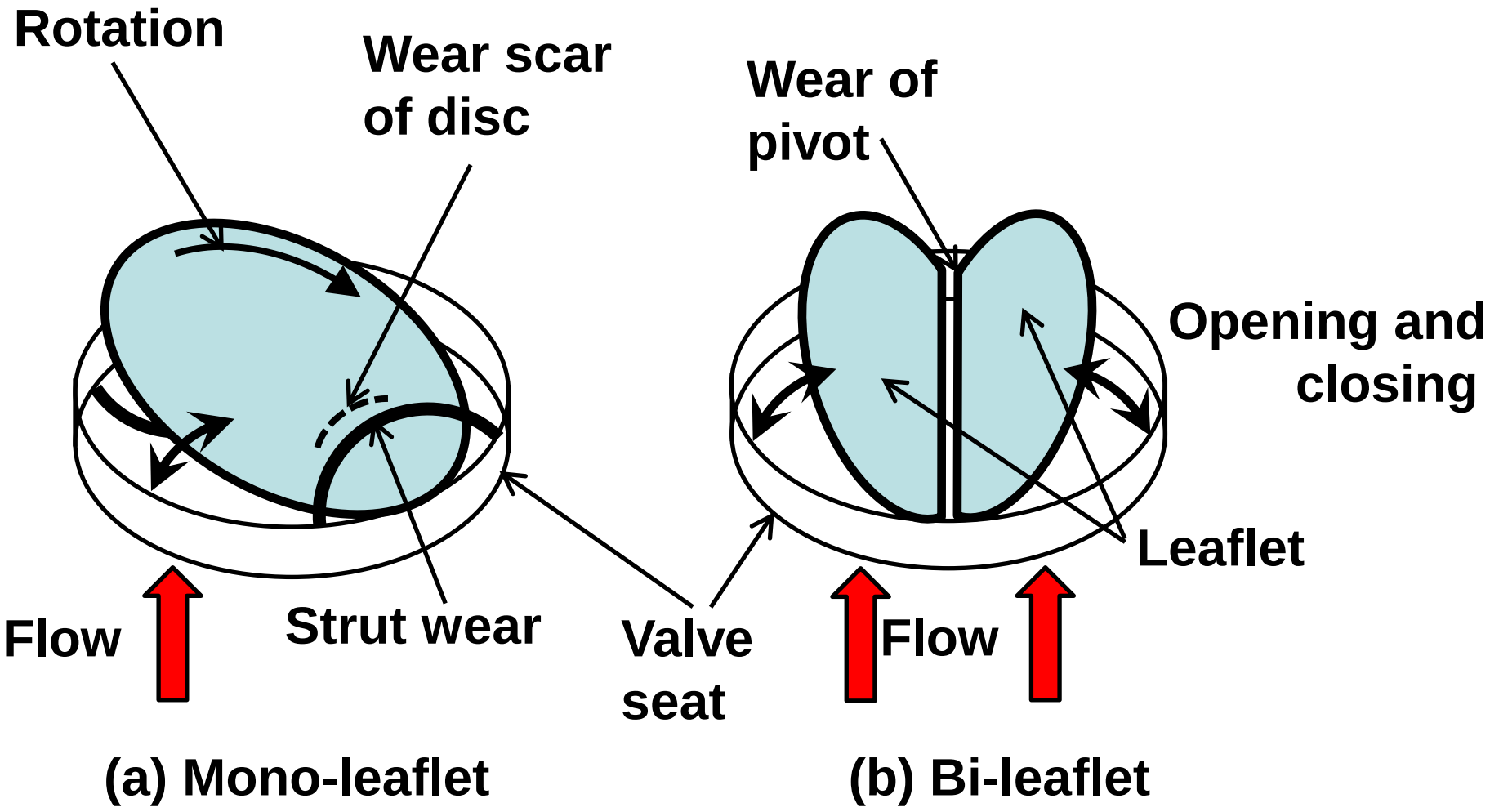
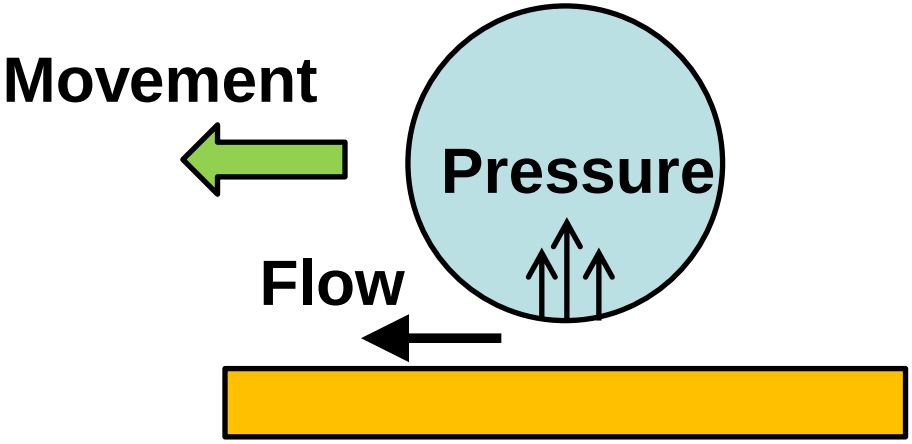


Fig. 6.35: Articular surface lubrication

(a) Wedge film lubrication



(b) Squeeze film lubrication