Where \( \alpha = 0.2 \). The energy of a jog is about 0.5 to 1.0 eV in metals

\[
U_j = \alpha G b_1^2 b^2
\]  

(15.1)
Figure 15-6. Movement of jogged screw dislocation. (a) straight dislocation under stress; (b) dislocation bowed out in slip plane between the jogs due to applied shear stress; (c) movement of dislocation leaving trails of vacancies behind the jogs.
Where \( \alpha \approx 1.0 \) for an interstitial atom and 0.2 for a vacancy. The work done by the applied stress in moving the jogs forward on atomic spacing by the formation of vacancies of interstitial is

\[
W = (\tau b l) b = \tau b^2 l \tag{15.3}
\]

Where \( l \) is the spacing between jogs. By equating Eqs. (15.) and (15.), we obtain the shear stress required to generate a defect and move the dislocation in the absence of thermal activation.

\[
\tau = \alpha_1 \frac{Gb}{l} \tag{15.4}
\]