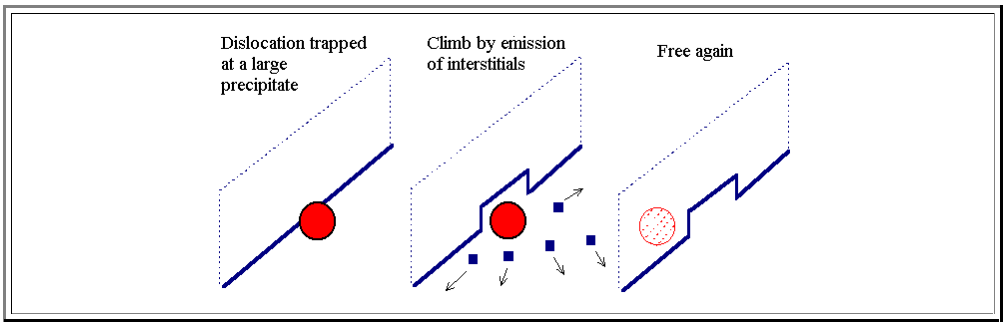
5.3.3 Climb of Dislocations

- As we have already seen, **dislocation climb** couples point defects and dislocations in a very direct way. This has the immediate consequence that climb processes will depend on *temperature*, because:
  - The types and concentration of equilibrium point defects are temperature dependent.
  - The supersaturation, which is the driving force for point defect reactions including ***climb***, is temperature dependent.
  - The mobility of point defects, i.e. their diffusion coefficient, is temperature dependent.
- Unfortunately for most applications, climb makes immobile dislocations mobile again (albeit they may move v e r y s l o w l y).
  - Coupled to the slow dislocation movement by climb is a slow plastic deformation with a strong temperature dependence, which would not occur without point defects - we have an **ageing mechanism**. If screws lose their tension, cables start to bow, and metals suddenly fracture after years of dutiful service, you are probably looking at the results of climb processes.
  - The major mechanism by which climb processes enable dislocations to move, is the circumvention of otherwise insurmountable obstacles, as shown below.



- Screw dislocations can climb, too, turning into a helix shape. Examples of climbed screw dislocations are provided in chapter 6