



**FIGURE 20.6.** Optimization with constraints leads to trade-offs between different components of fitness. The figure shows the set of possible phenotypes (*green area*), together with contours of increasing fitness (*blue*). The two axes represent two traits that are each components of fitness. A shows the trait combination that gives the highest possible fitness. The *inset* shows the region around this global optimum. The boundary of the *shaded area* slopes downward, so that an increase in one component of fitness cannot be made without decreasing the other. This is what is meant by a trade-off. B is another local optimum, corresponding to a second adaptive peak, with lower fitness than A, but showing a similar trade-off between the two traits.