FIGURE 18.22. Polymorphism can be maintained in a heterogeneous environment only under special conditions. (*A*) Juveniles settle into separate patches. There is competition within each patch, so that each patch produces a fixed number of adults. There are two types of organism (a, b) and two kinds of patch (A, B); survival of type x on host Y is V_{xY}. (*B*) If juveniles settle at random on the two kinds of patch (A, B), then polymorphism is possible if one type survives much better on one patch and the other much better in the other patch (i.e., $V_{aA}/V_{bA} \gg 1$, $V_{aB}/V_{bB} \ll 1$ [*blue* area at *top left*] or $V_{aA}/V_{bA} \ll 1$, $V_{aB}/V_{bB} \gg 1$ [*blue* area at *bottom right*]). However, if selection is weak (*inset* area near $V_{aA}/V_{aB} \sim 1$, $V_{aB}/V_{bB} \sim 1$), polymorphism is possible only for a very limited range of parameters. (*C*) If the different types *choose* to settle in different habitats, polymorphism can easily be maintained even when selection is weak. Indeed, polymorphism is possible even when there is no selection within patches (around the *cross*, indicating equal survival).

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