



**FIGURE 21.36.** Hypercycles allow more genetic information to be replicated, but are unstable in several ways. (A) Several different replicating molecules (A, B, ... , E) can coexist in a population if they aid each others' replication: A helps B, B helps C, ... , and E helps A. This help could take many forms: provision of some metabolic product, directly aiding replication, etc. What is important is that B replicates faster as A increases in concentration, and similarly for the other links. Such diffuse mutualisms are a familiar feature of ecosystems (trees provide leaf litter for earthworms, which in turn improve silt structure and so aid trees) and are plausible for molecular ecosystems as well. (B) Hypercycles are vulnerable to invasion by variants. Compared with A, the variants (A') gain more from help by other species (E) and provide less help to others (B). (C) Hypercycles also tend to lose members (B, C), if variants (A'') arise that sustain a shorter cycle.