



FIGURE 1.31. An example showing how the cumulative effect of selection can produce phenotypes that are never seen in the original population. Two true-breeding lines differ substantially in some trait, in this example by 20 standard deviations. This difference is due to ten unlinked genes, with equal and additive effects. The F_1 of a cross between two lines is intermediate between the two parents (*top*). If the F_1 individuals are crossed with each other to make an F_2 generation, recombination produces genetic variation (*middle*). In principle, every possible genotype is present in this population. However, the chance of recovering one of the parental genotypes is extremely small— 2^{-20} , or less than one in a million. Thus, the distribution in the F_1 generation does not appreciably overlap either parental phenotype. Nevertheless, a few generations of selection can reconstruct either parental genotype. The bottom panel shows that if the largest 10% of the population is selected in every generation, the original parental distribution is recovered after only five rounds of selection.