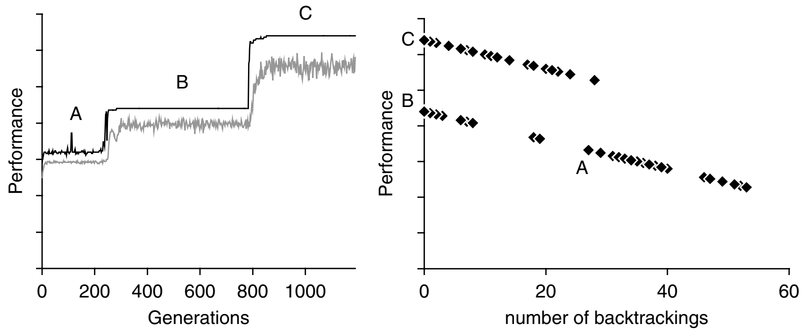

Fig. 6.1 The genetic algorithm as illustrated here tries to get out of a maze. It selects individuals which best avoid backtracking. On the left, the curves show the evolution of performances from one generation to the next. On the right are shown the best individuals in each generation.

The levels in the left-hand diagram, marked A, B, and C, correspond to three different strategies. At A, the best individuals follow a direct path, but it comes to a dead end. At B, the best individuals in the population are those that take a cyclic trajectory, which means they never backtrack. At C, the algorithm has found a way out. Individuals that manage to get out receive the bonus mark, which explains the difference in performance between levels B and C.

It is striking to observe the similarity between this type of evolution and the one that predicts the theory of punctuated equilibria. The algorithm stagnates for long periods, which are interrupted by sharp jumps leading to notable differences in performance. If one accepts this experiment as an indication of what natural evolution might be like, it would appear that we must also accept Gould's saltationism with its idea that nature does make jumps, despite its contradiction of Darwin and his dictum borrowed from Leibnitz. However, such a conclusion would be premature. The curve implies that the population exists in three successive forms, which we are tempted to see as three species. The performances of these species get better, in accordance with the marks given by the algorithm in recognition of the number of backtrackings avoided in the allotted time. The presence of abrupt jumps in performance suggests that evolution does proceed by 'hopeful monsters' as in the theory that Gould wishes to rehabilitate. In the context of the maze, a hopeful monster would be an individual so radically different from its fellows as to find straightaway a