



**Figure S1** The posterior probabilities of the 19 ancestral origins obtained from the simulated datasets MAGIC-F5 (left panels) and MAGIC-F11 (right panels). The top and bottom panels denote the results obtained from RABBIT (jointModel) and HAPPY, respectively. The mode of HAPPY is diploid for the MAGIC-F5 and haploid for the MAGIC-F11. The probabilities are represented by gray levels, with white =0 and black =1. The red lines denote the true ancestral origins. The green vertical bars in the bottom panels denote the marker locations.