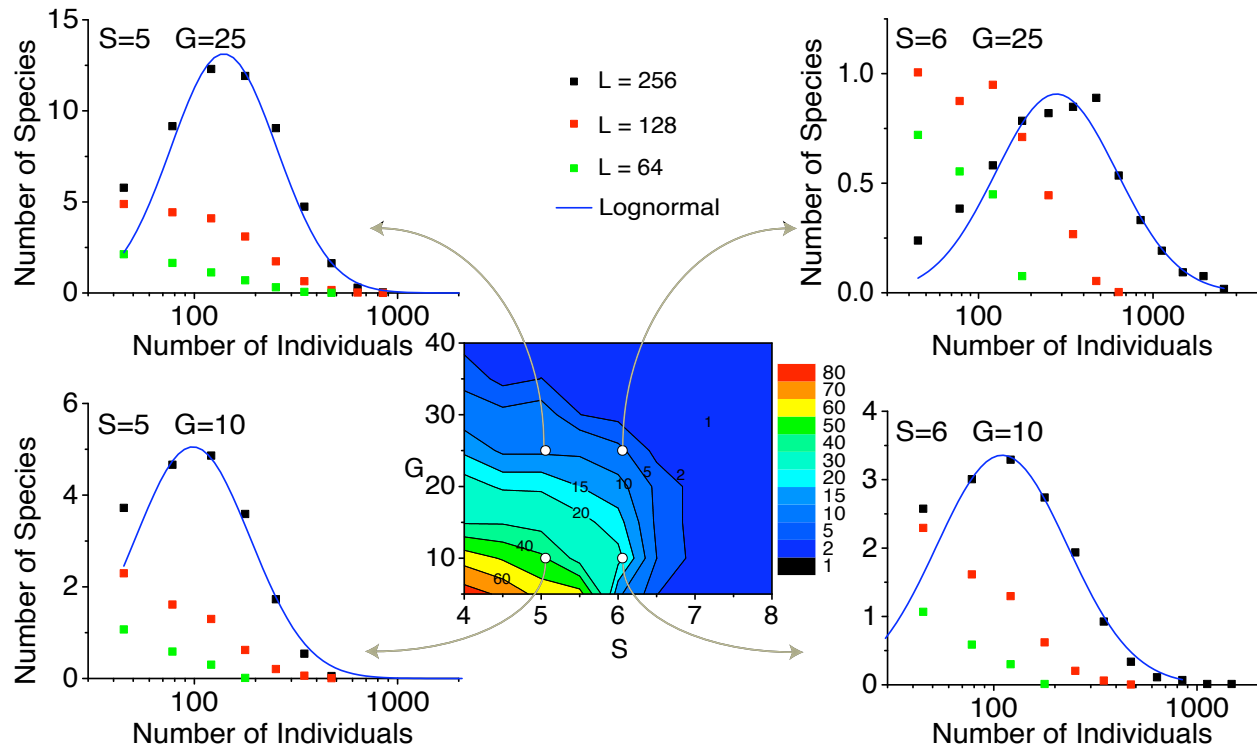
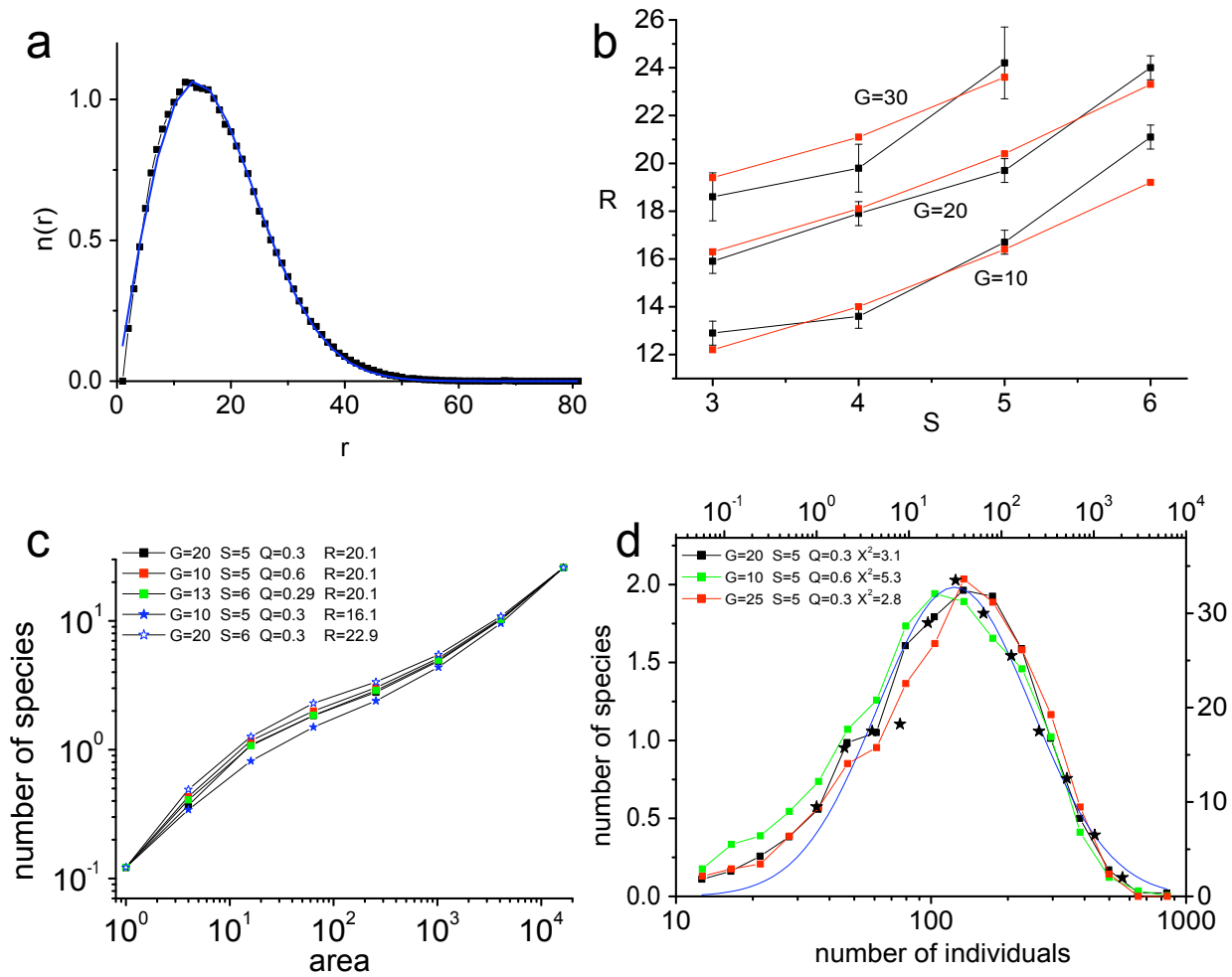


## SUPPLEMENTARY INFORMATION



**Supplementary Figure 1. Species abundance and sampling area.** We combine the species area relationship and species abundance distributions to show how the species abundance varies with sampled area for four different values of the parameters and three different size areas of observation. (Peripheral panels) Species abundance distributions for four sets of parameters and three sampling areas,  $L \times L = 64 \times 64$ ,  $128 \times 128$ , and  $256 \times 256$ , from simulations of 8000 individuals on a  $256 \times 256$  lattice (errors similar to fig. 3d and 3f). Species with less than 8 members are not included. (Central panel) Contour plot of the number of species formed as a function of the maximum spatial distance,  $S$ , and genetic distances,  $G$ . For intermediate values of  $S$ , the number of species is higher for intermediate values of  $G$ . Marked circles indicate the parameter values for the four species abundance panels.



**Supplementary Figure 2. Parameter variation and model analysis:** a) Average number of individuals of a species between  $r$  and  $r+1$  from its geographic center divided by the density of sites (number of lattice sites between  $r$  and  $r+1$  divided by  $r$ ) for  $S=5$ ,  $G=20$ , and  $L=256$ . The blue line is  $n(r)=A\exp[-(r/R)^2]$  with  $A=0.127$  (approximately  $N/L^2=0.122$ ) and  $R=19.5$ , corresponding to a Gaussian density distribution. b) The geographic radius of a species as a function of  $S$ ,  $G$ , (black) and as given by the analytic expression Eq. (2) in the text (red). c) Species area relationship (see Fig. 3c) illustrating the effect of parameter variation. The importance of the species radius  $R$  (Eq. (2)) to the species area relationship is apparent as black, red and green squares have the same  $R$  and nearly identical species area relationships, while solid and outline blue stars have lower and higher values respectively. Axes are rescaled to match initial and final values. d) Species - abundance distribution (see Fig. 3d) showing data for Panama trees (black stars) and three sets of simulations having  $\chi^2$  values as shown. The general shape does not change with parameters. The blue curve is the lognormal distribution.