

Supplementary Information for “Long-lasting effects of historical land use on the current distribution of mammals revealed by ecological and archaeological patterns”

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Contents

Supplementary Methods Technical details for estimating indices of ancient land use using intrinsic

CAR models.

Supplementary Figure S1 Distribution maps of mammalian genera analysed.

Supplementary Figure S2 Maps of settlement during six historical periods.

Supplementary Figure S3 Maps of ironwork during four historical periods.

Supplementary Figure S4 Maps of kiln during four historical periods.

Supplementary Table S1 Traits and posterior mean (posterior standard deviation, lower and upper

95% credible limit) of the regression coefficients for each genus.

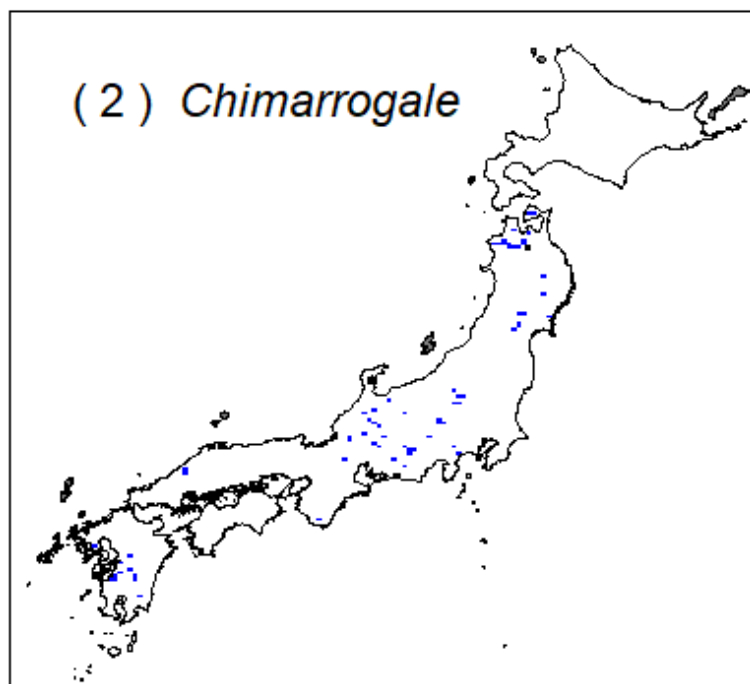
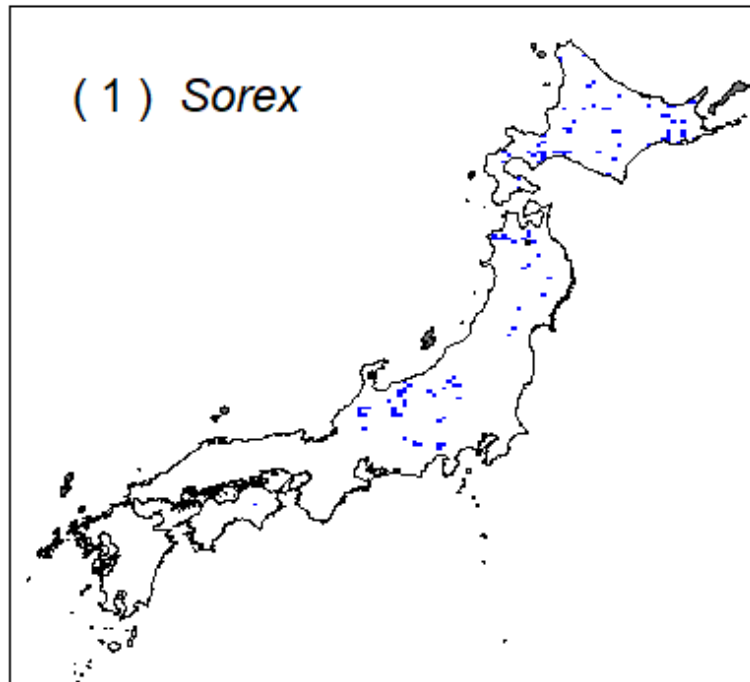
Supplementary Methods Technical details for estimating indices of ancient land use using intrinsic CAR models.

To obtain indices of ancient land use, we applied an intrinsic CAR model with the loglinear Poisson model. In the intrinsic CAR model, the spatial correlation of random effects is represented by the prior distribution for each grid cell whose mean is equal to average of the adjacent cells, (i.e. the prior distribution was conditional on adjacent cells). It acts as a penalty to constrain neighbouring random effects to take similar values, with a smooth surface of spatial random effects to trace spatial trends in observations. When it is applied to the smoothing of land use indices, it acts as a filter to tease out meaningful trends from observation noise. The number of archaeological sites in the i th grid Y_i is count data assumed to have a Poisson distribution with a mean λ_i , which was used as an index of ancient land use. To estimate spatially smooth λ_i , we assumed that λ_i is represented by the spatial random effect model shown in Eq. (A1):

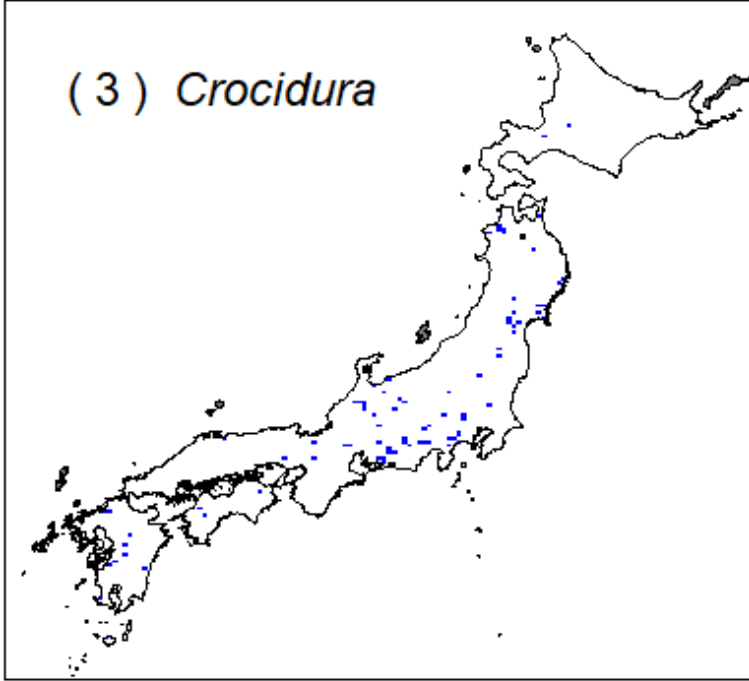
$$\log(Y_i) = \alpha + \rho_i \tag{A1}$$

where α is the logarithmic mean and ρ_i is the spatial random effect with an intrinsic CAR prior identical to Eq. (2) in the “Statistical analysis” section of the main text. We applied an inverse-gamma distribution with shape parameter 0.5 and inverse scale parameter 0.0005 as the prior distribution of the conditional variance of the intrinsic CAR prior. Similar to the ancient land use indices, the posterior median was calculated using WinBUGS 1.43 (Lunn *et al.*, 2000).

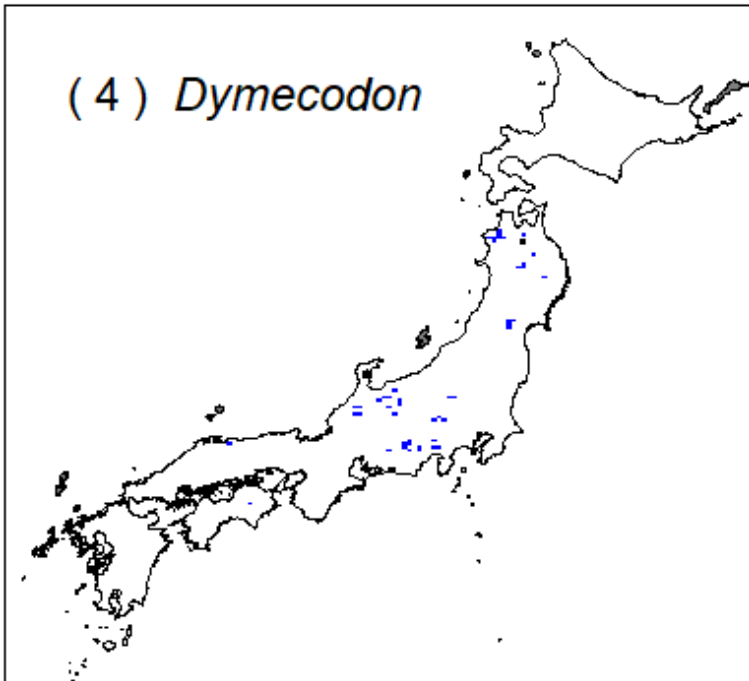
Supplementary Figure S1 Distribution maps of mammalian genera analyzed.



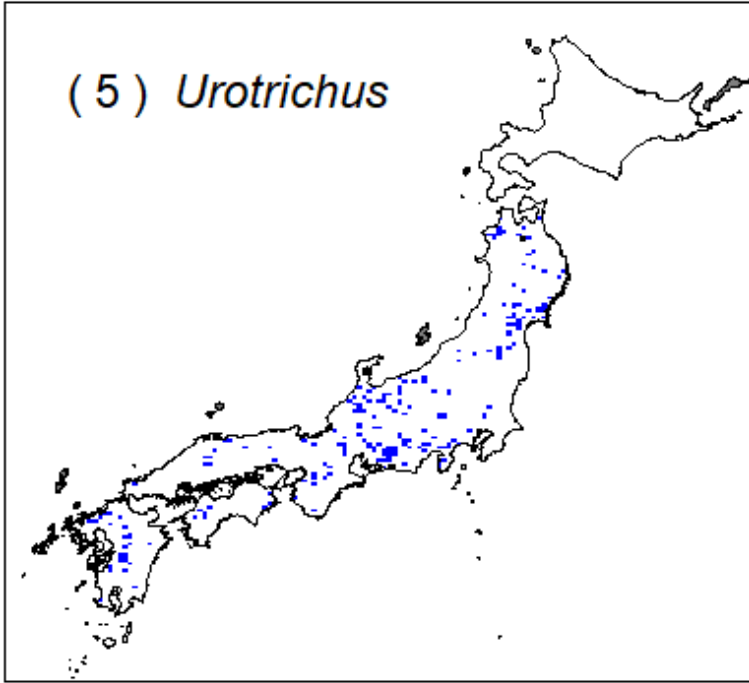
(3) *Crocidura*



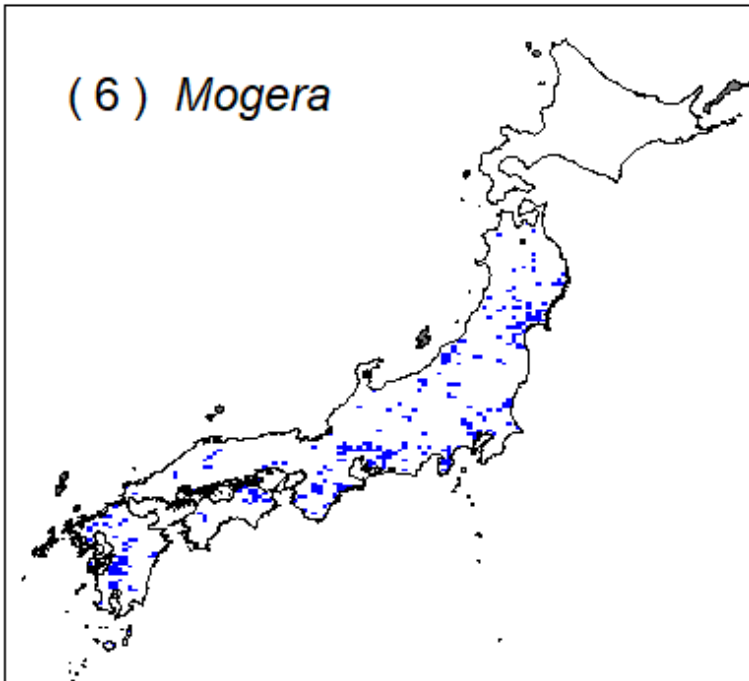
(4) *Dymecodon*



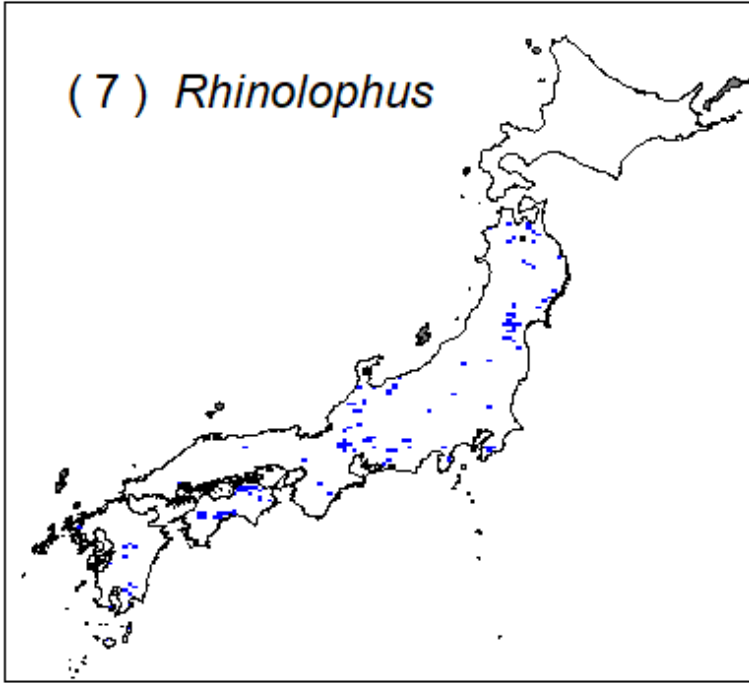
(5) *Urotrichus*



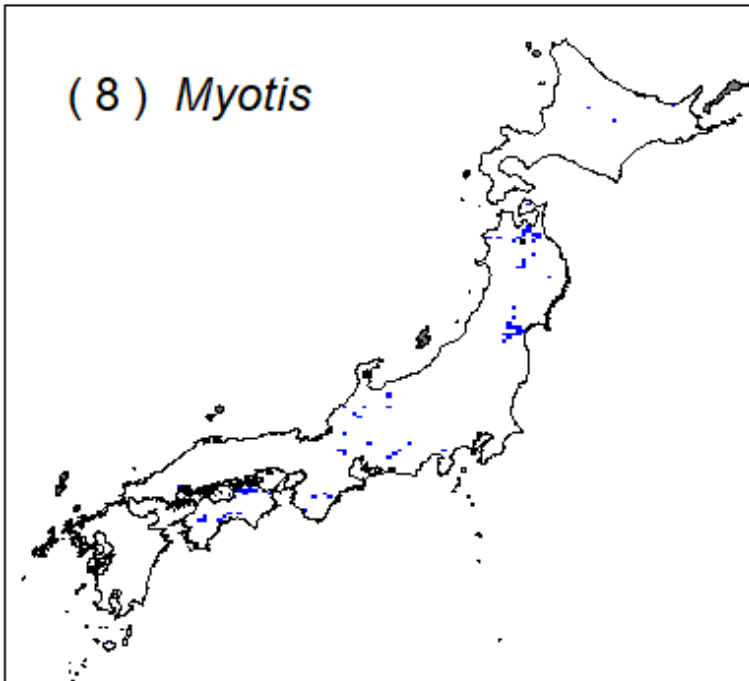
(6) *Mogera*



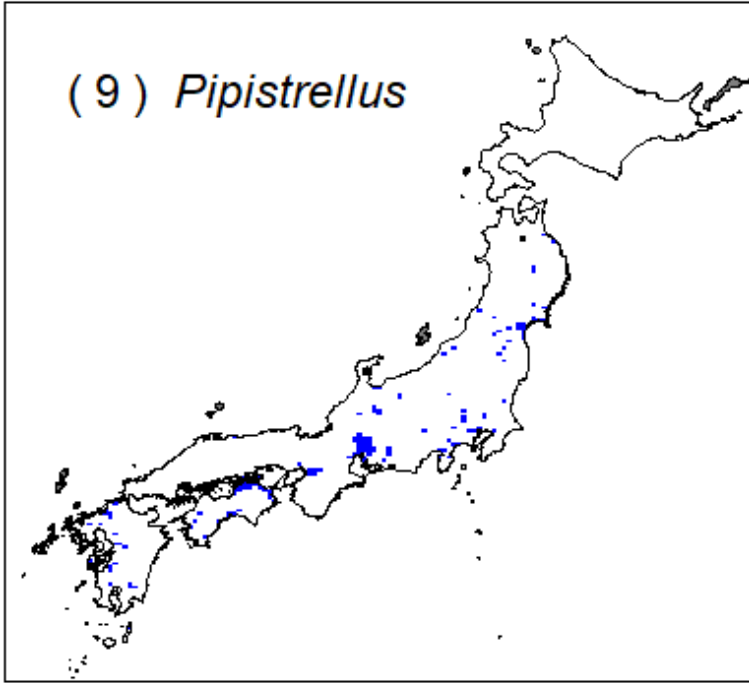
(7) *Rhinolophus*



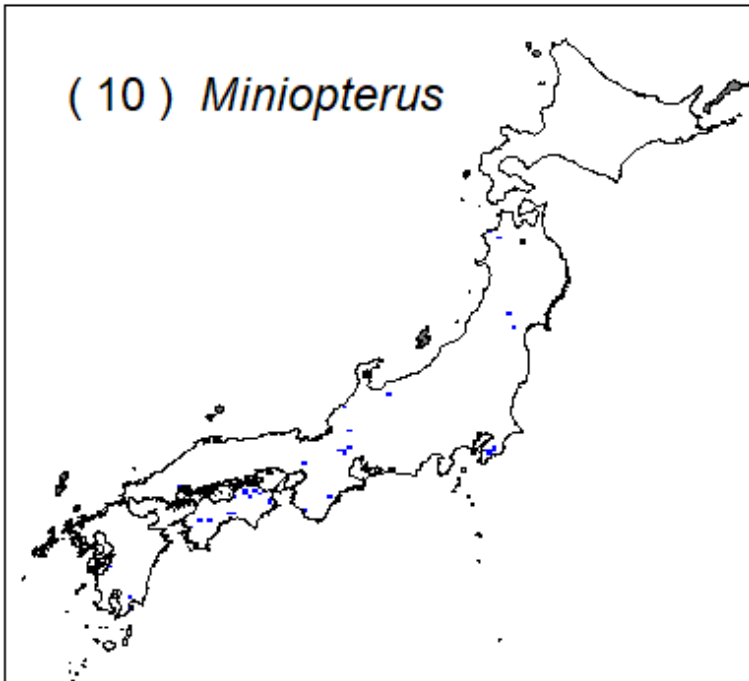
(8) *Myotis*



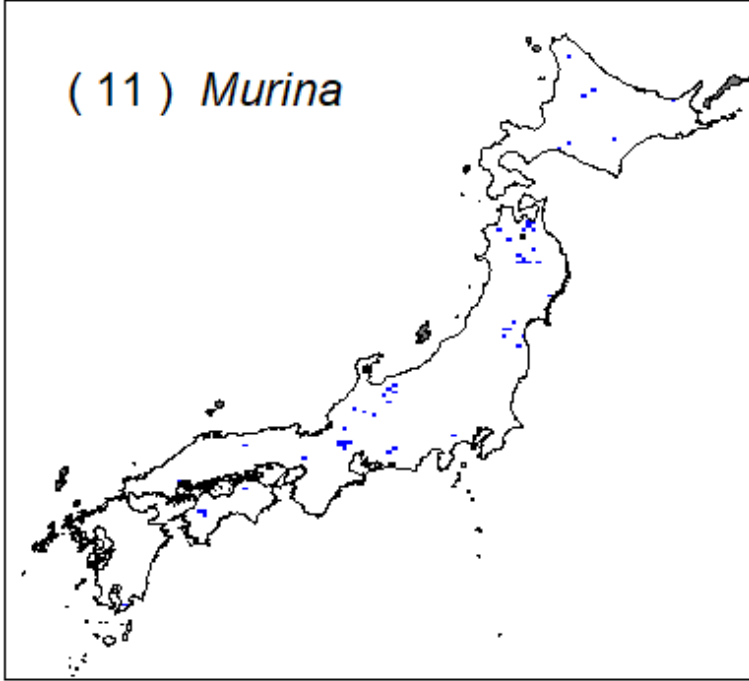
(9) *Pipistrellus*



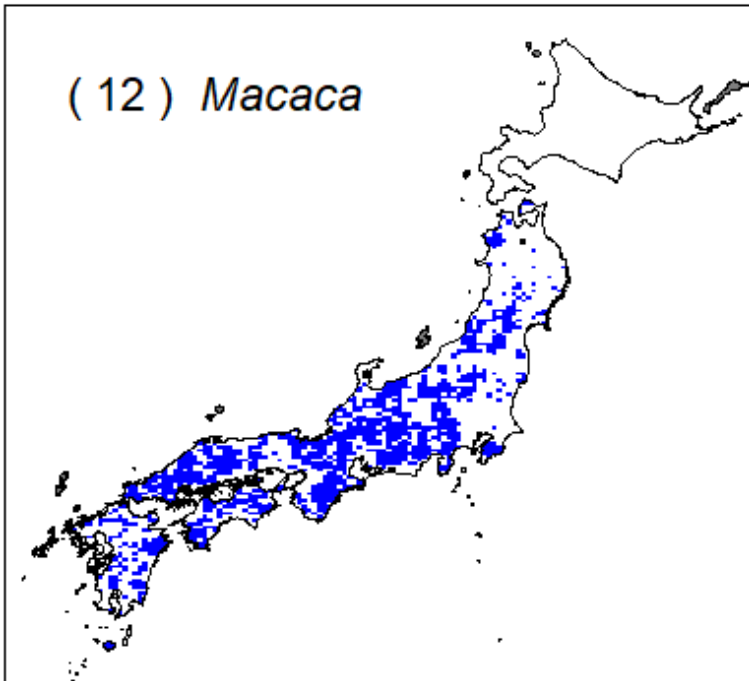
(10) *Miniopterus*



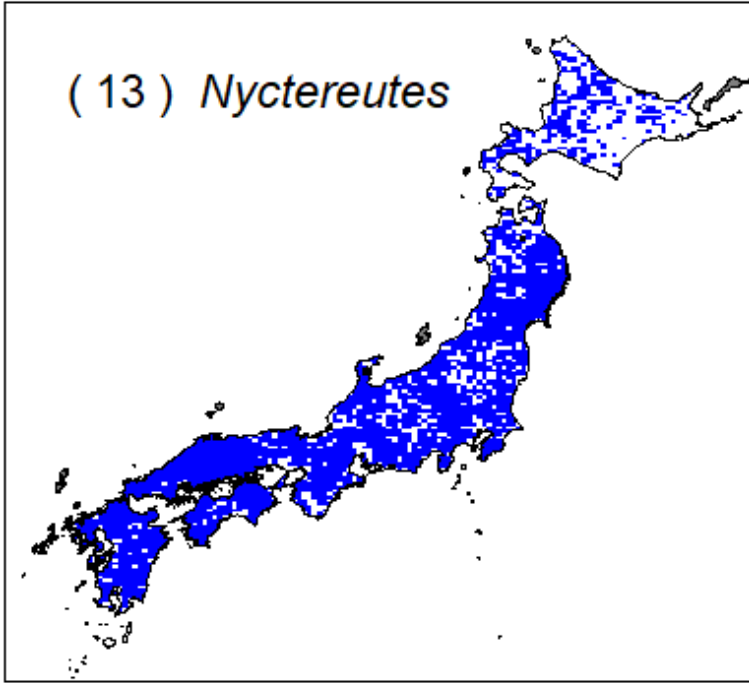
(11) *Murina*



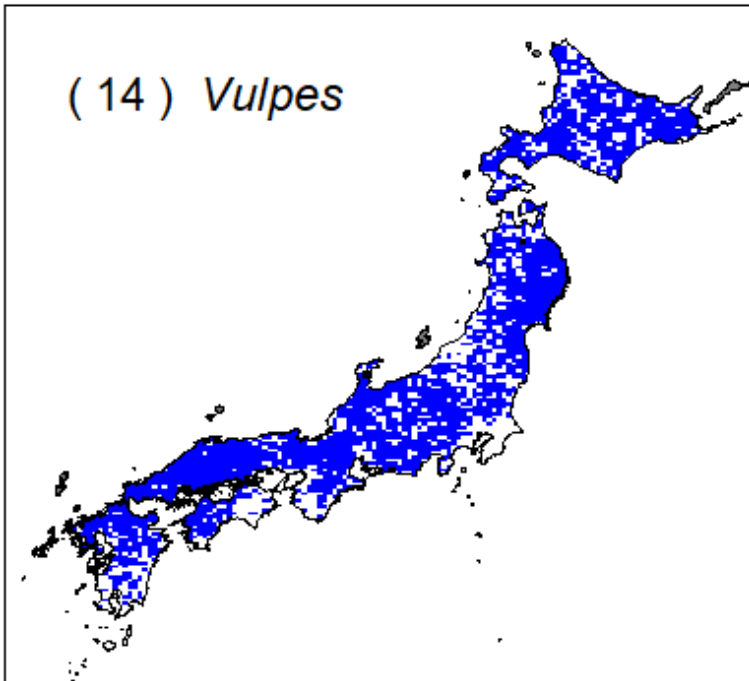
(12) *Macaca*



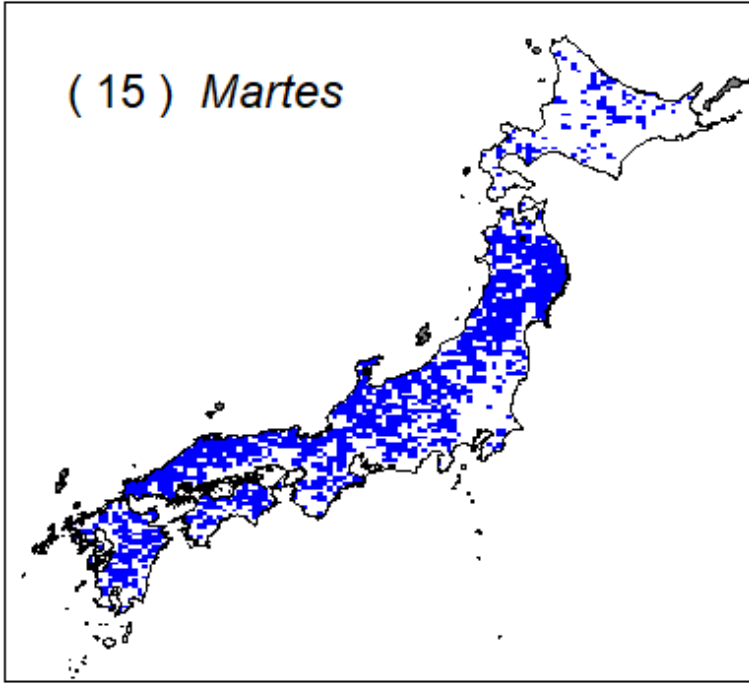
(13) *Nyctereutes*



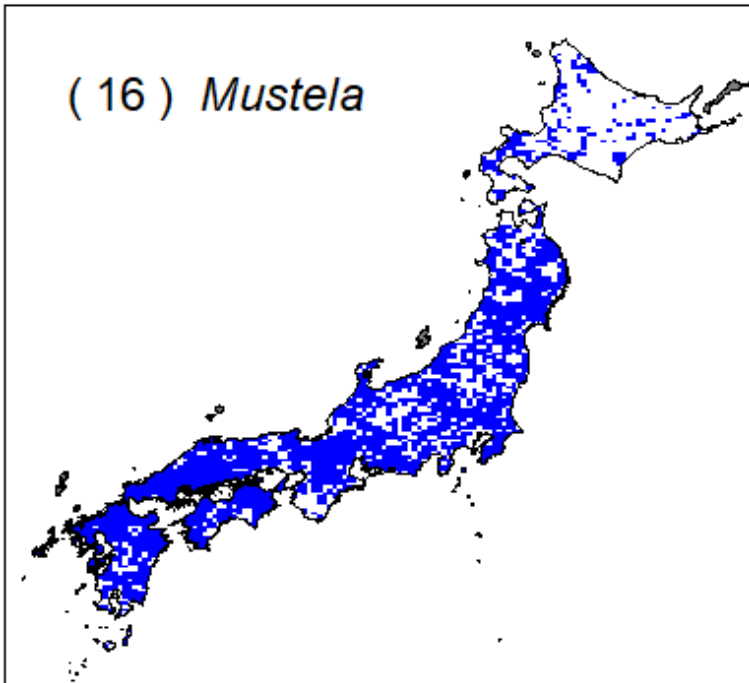
(14) *Vulpes*



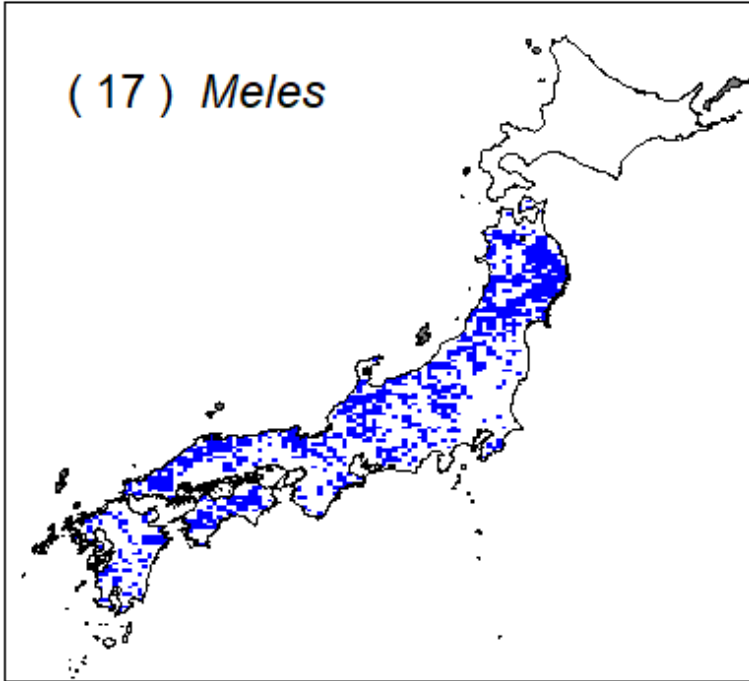
(15) *Martes*



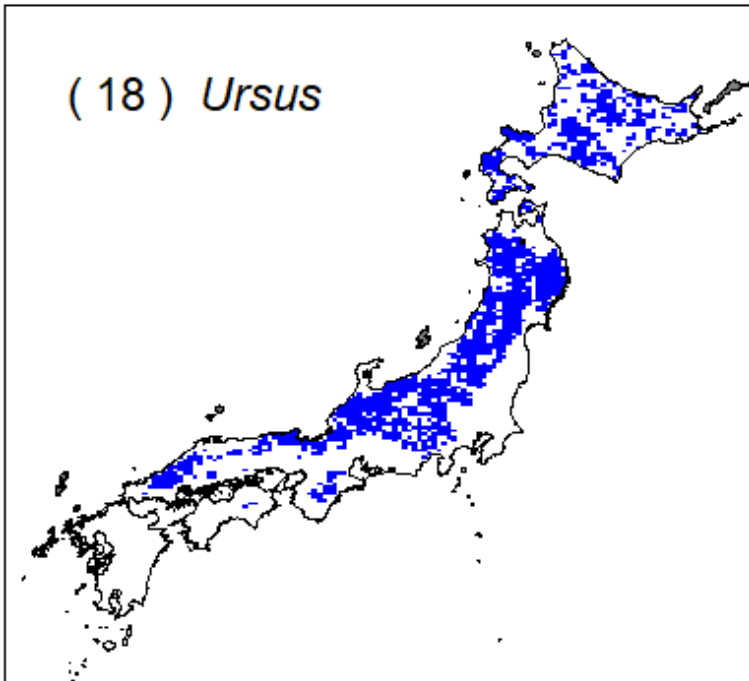
(16) *Mustela*



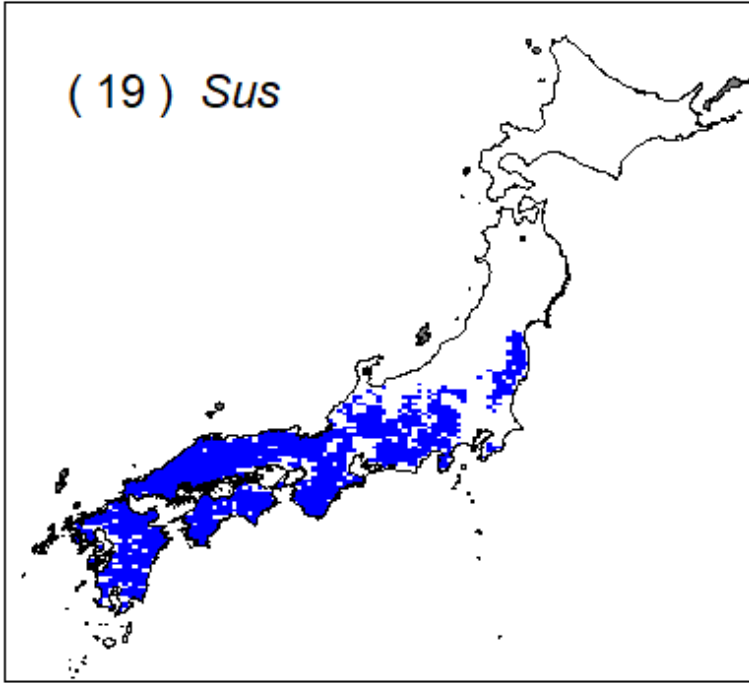
(17) *Meles*



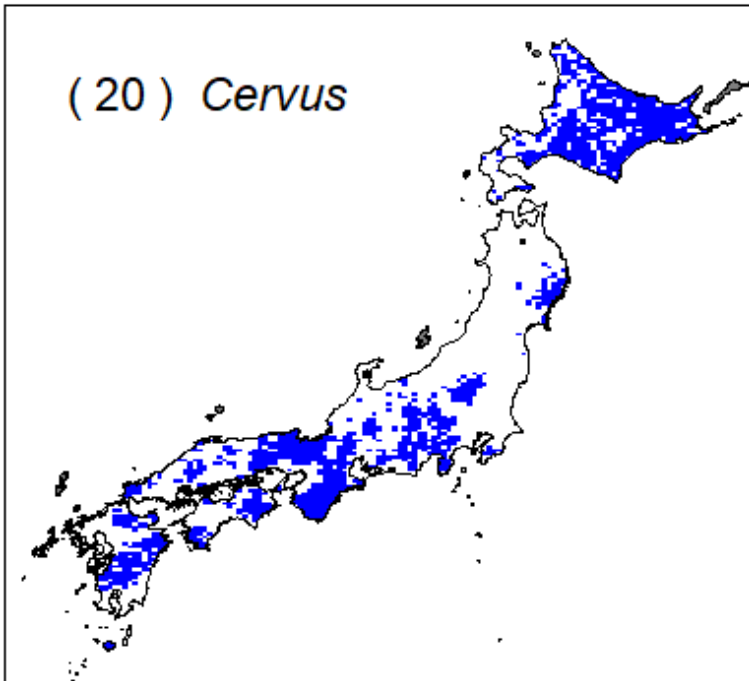
(18) *Ursus*



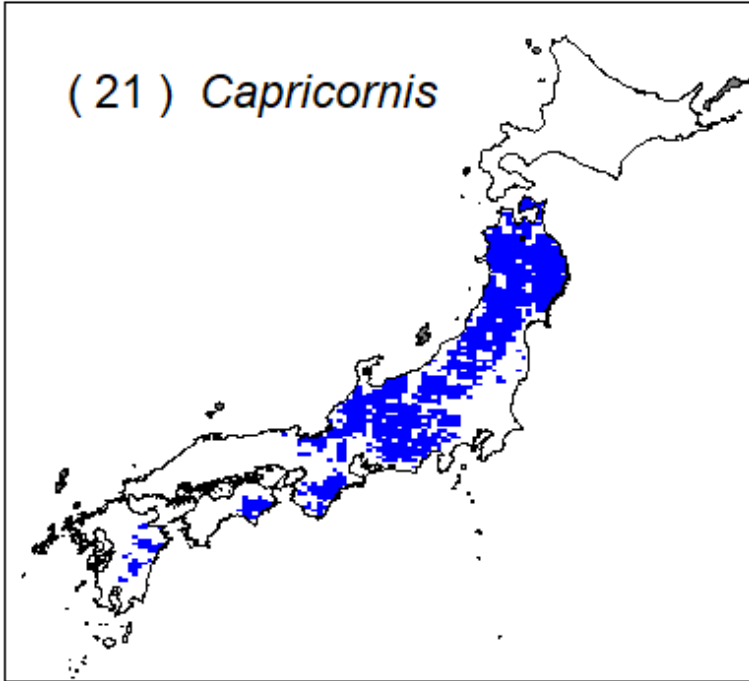
(19) *Sus*



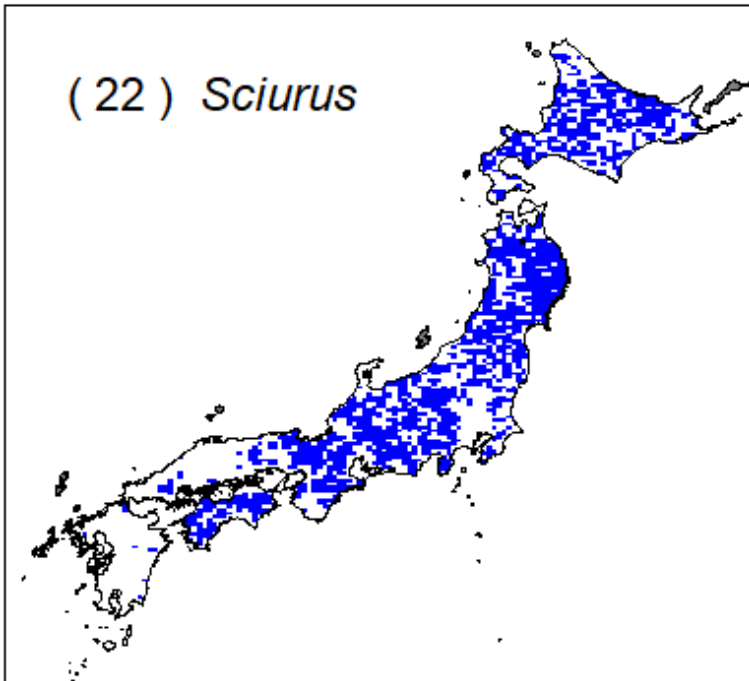
(20) *Cervus*



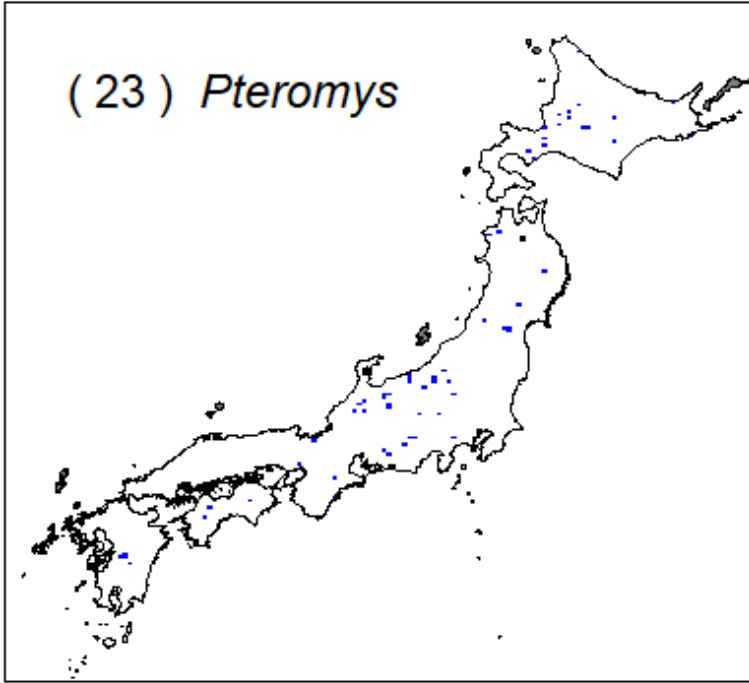
(21) *Capricornis*



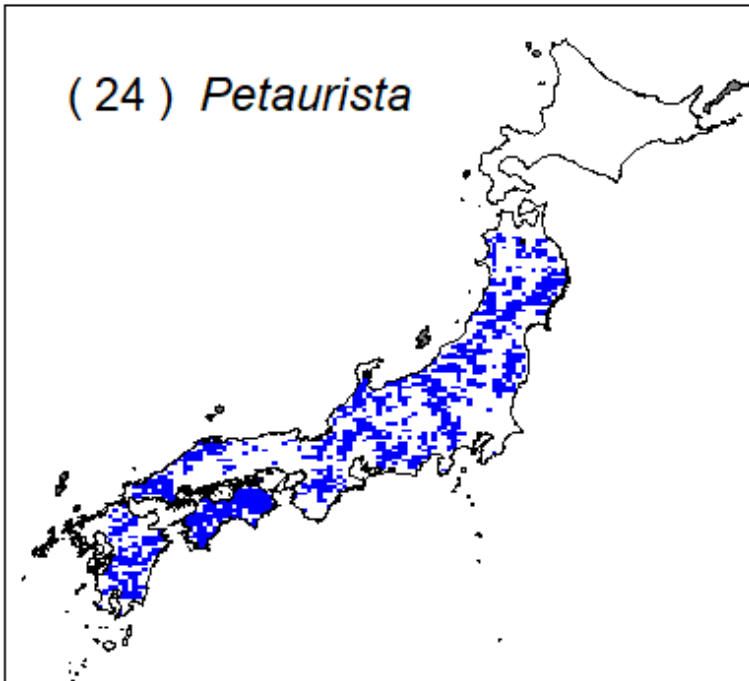
(22) *Sciurus*



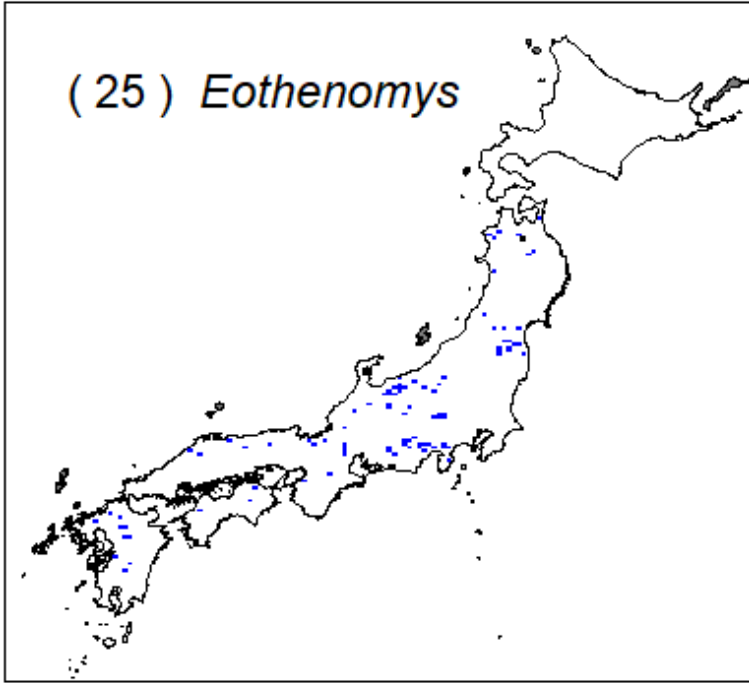
(23) *Pteromys*



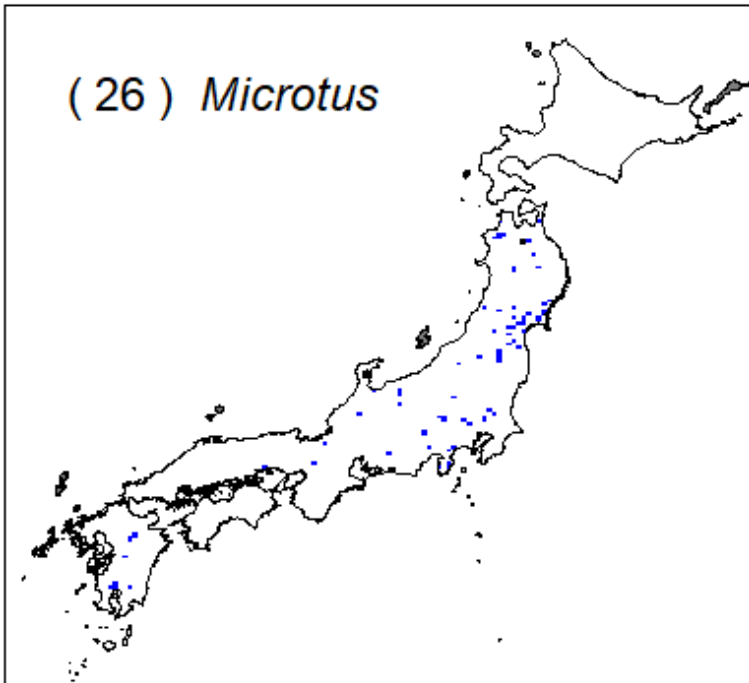
(24) *Petaurista*



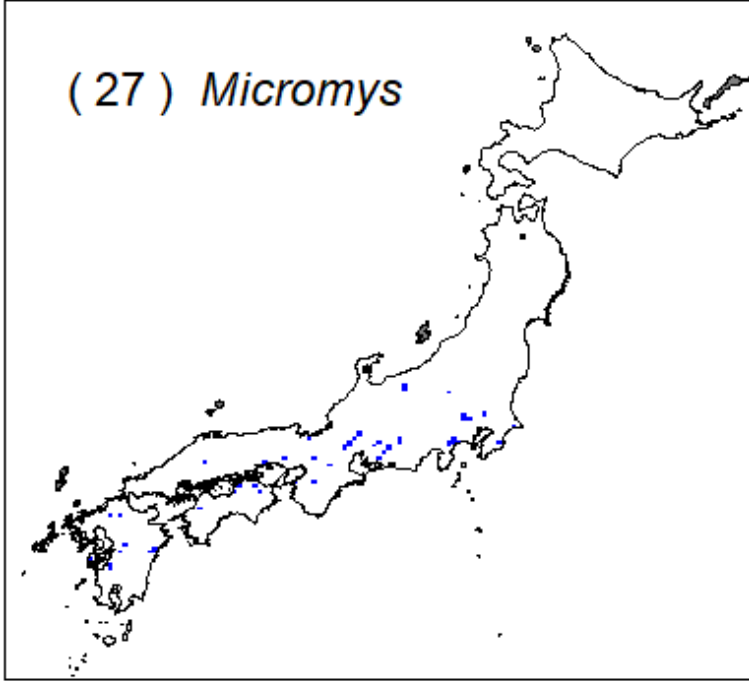
(25) *Eothenomys*



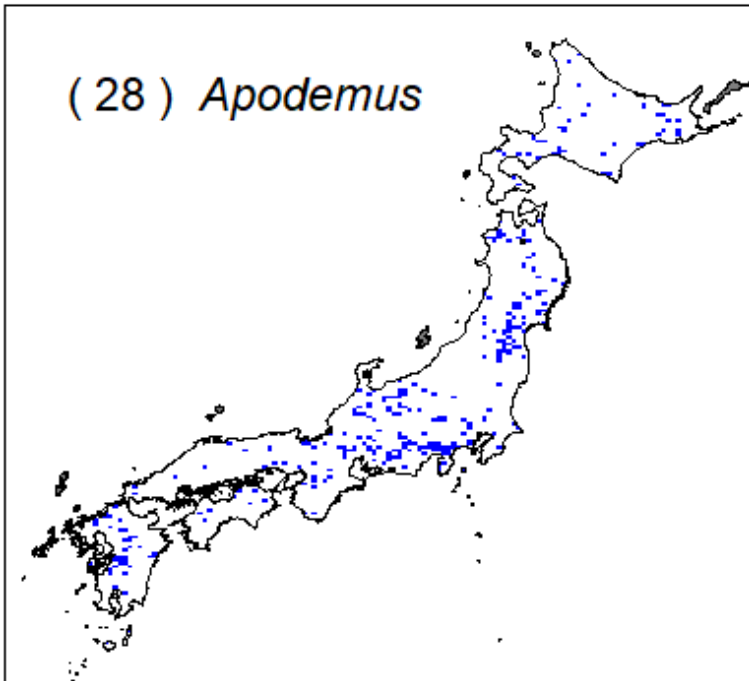
(26) *Microtus*



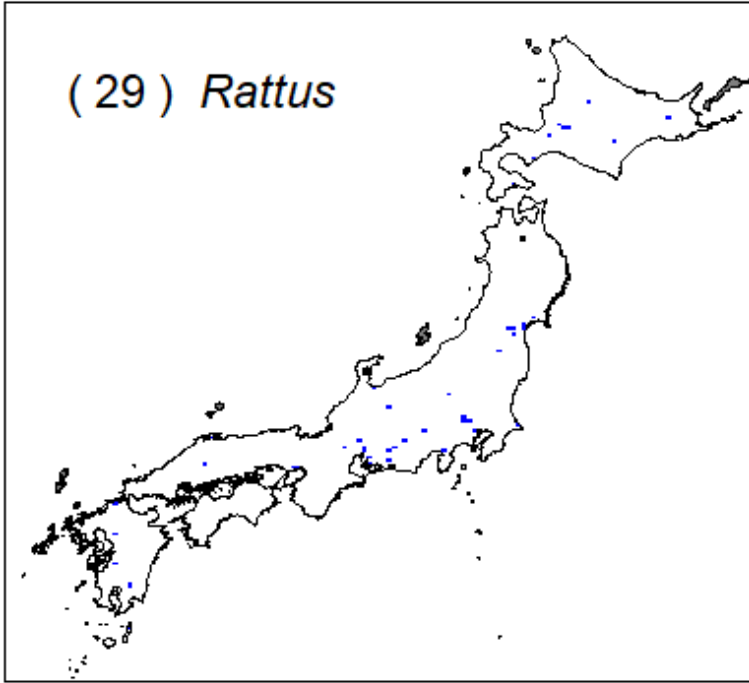
(27) *Micromys*



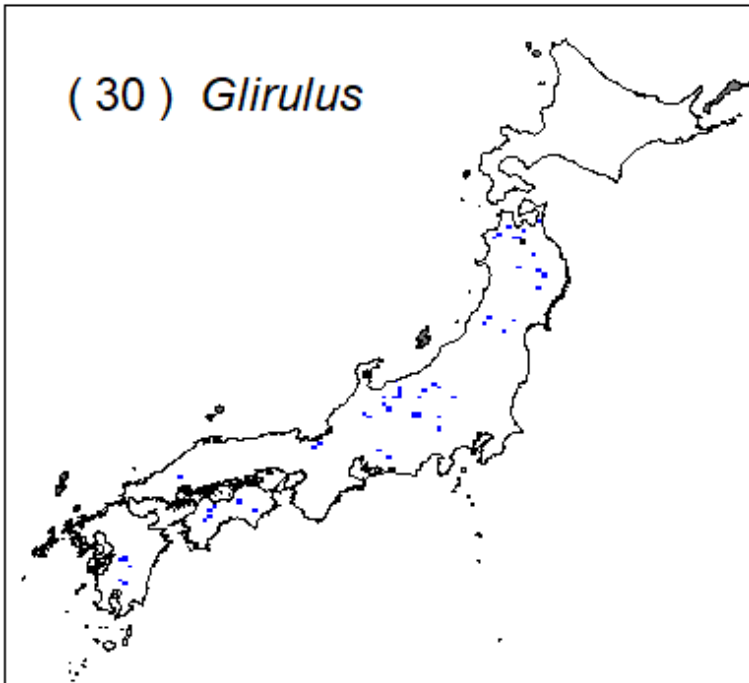
(28) *Apodemus*



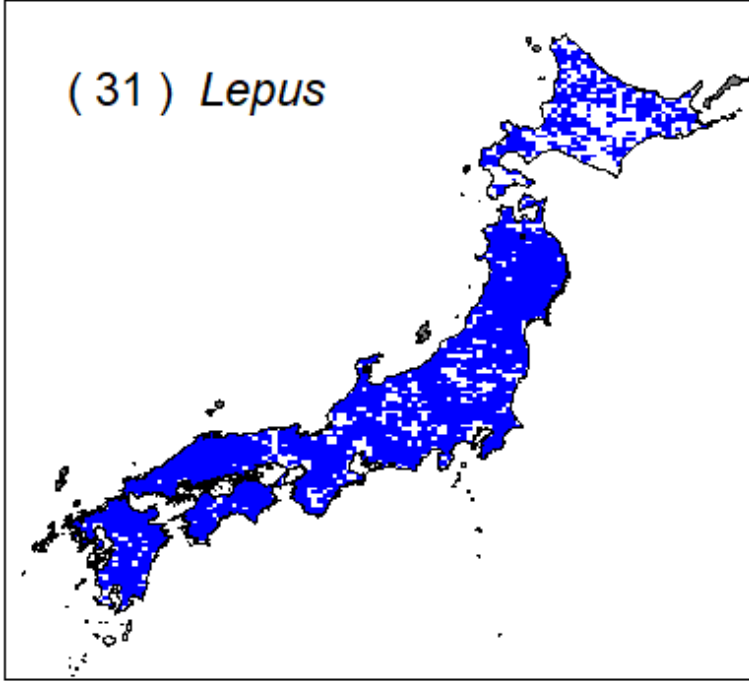
(29) *Rattus*



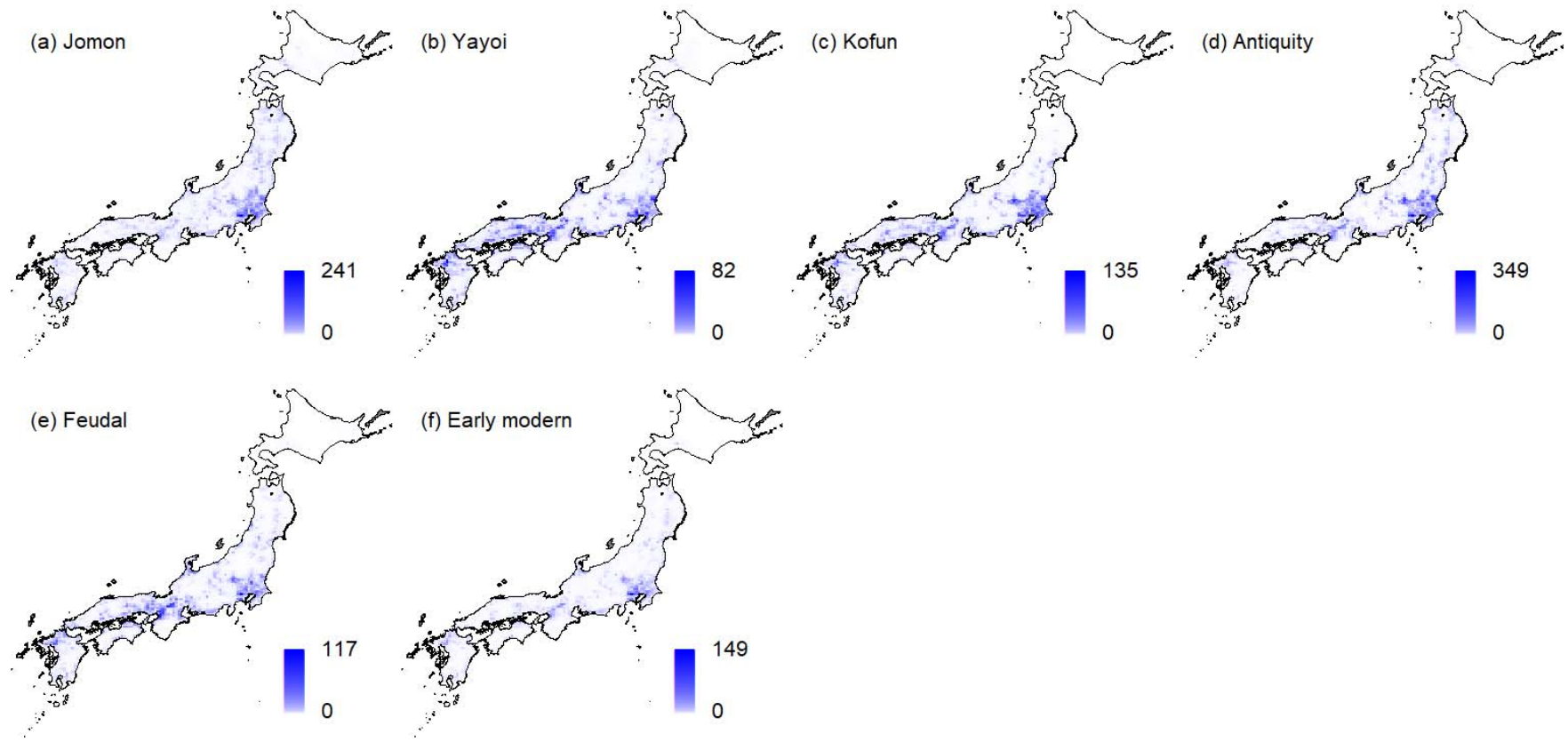
(30) *Glirulus*



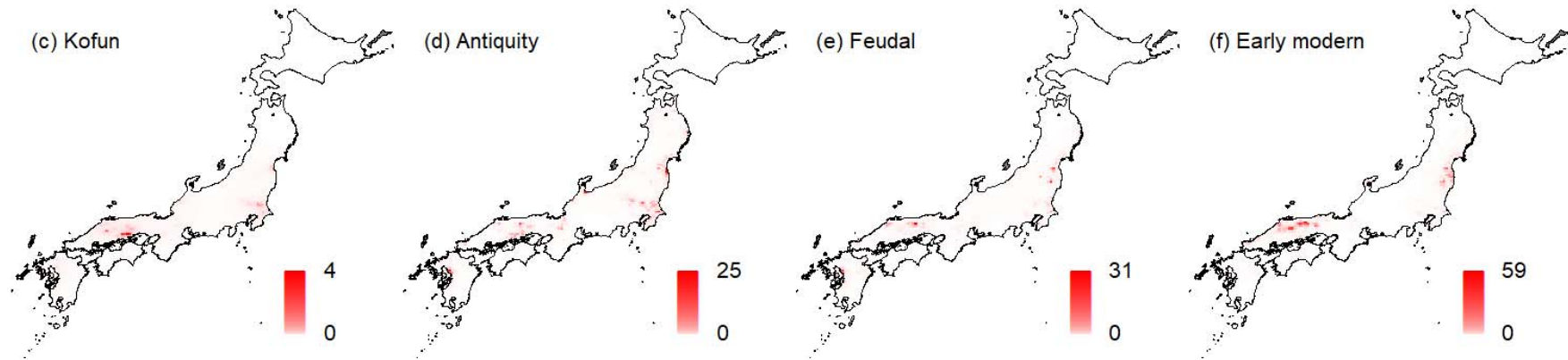
(31) *Lepus*



Supplementary Figure S2 Maps of settlement during six historical periods.



Supplementary Figure S3 Maps of ironwork during four historical periods.



Supplementary Figure S4 Maps of kiln during four historical periods.

