Science Advances

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Supplementary Materials for

The dogs of Chernobyl: Demographic insights into populations inhabiting the nuclear exclusion zone

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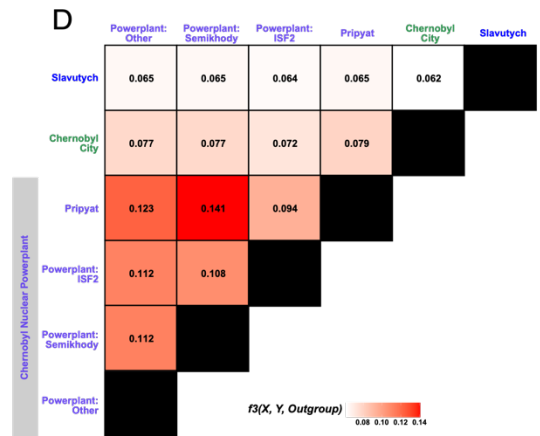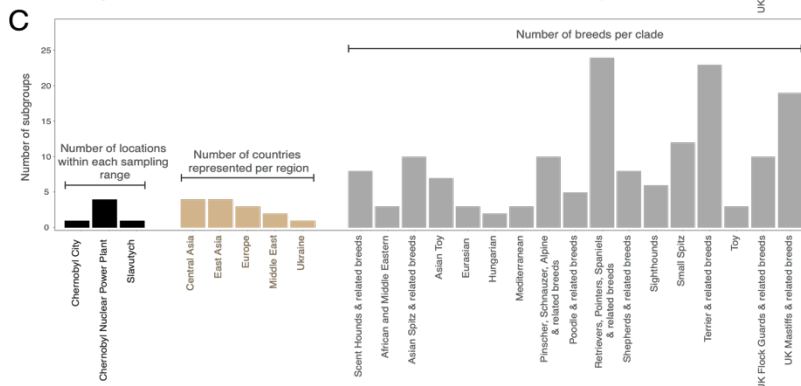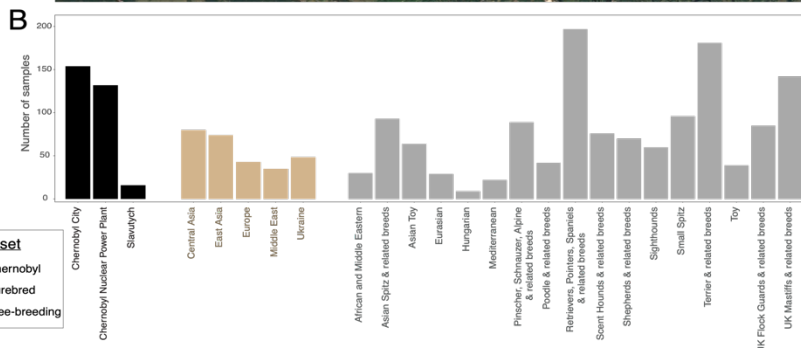Corresponding author: Elaine A. Ostrander, eostrand@mail.nih.gov

The PDF file includes:

Supplementary Text
Figs. S1 to S7
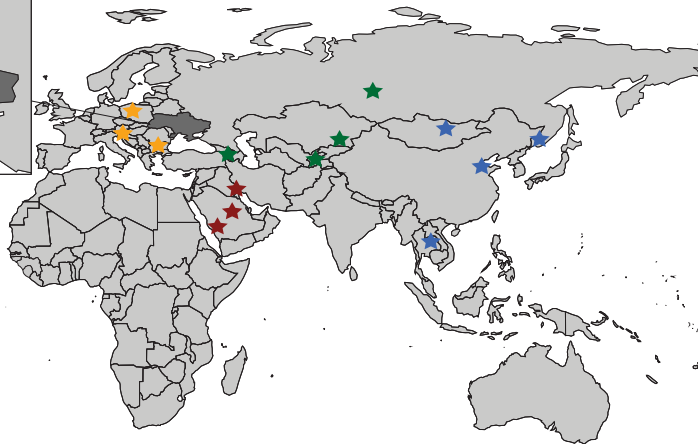Legend for table S1

Other Supplementary Material for this manuscript includes the following:

Table S1
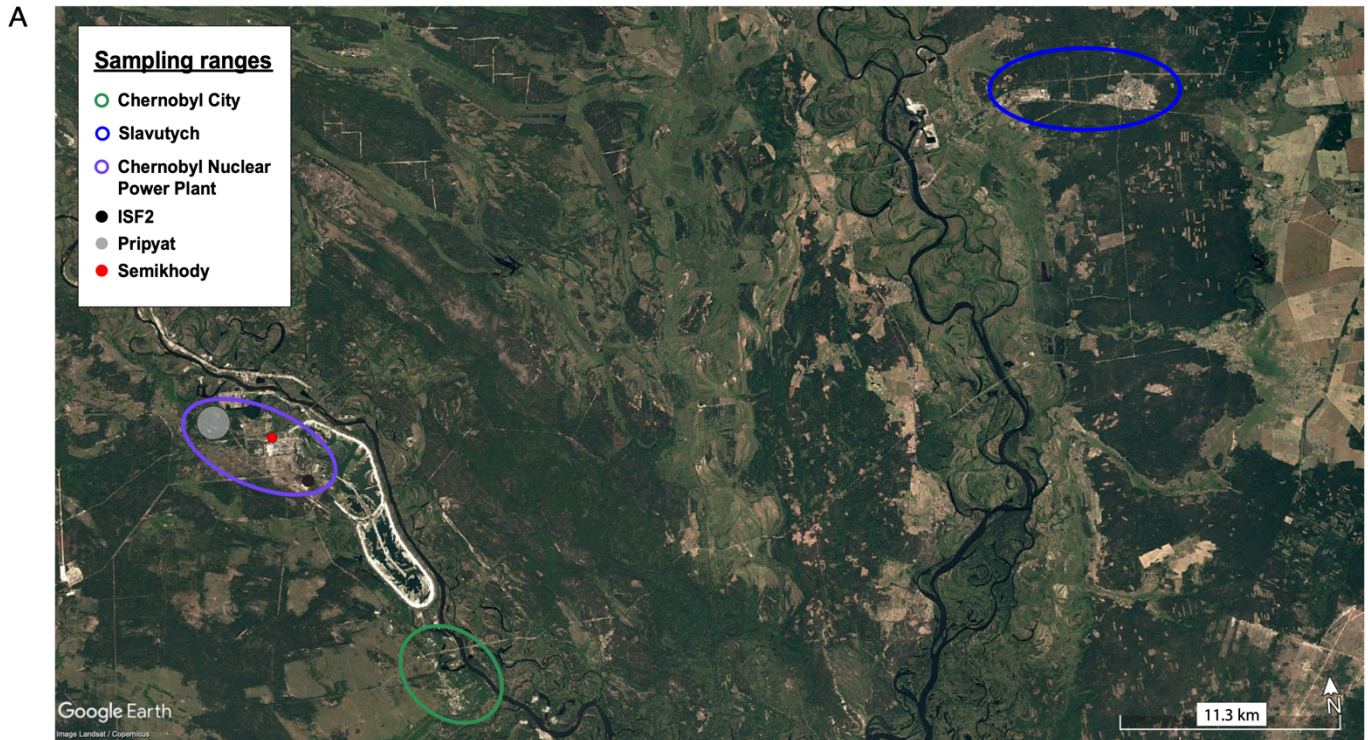
Fig. S1. Description of samples. (**A**) Satellite image of the Chernobyl area with sampling ranges outlined. (**B**) Bar plots showing the number of purebred dog samples per clade, free-breeding dog samples per geographic region, and Chernobyl dogs per population. (**C**) Bar plots showing

the number of breeds per clade, number of countries represented in each free-breeding dog geographic region, and number of specific locations analyzed within each Chernobyl sampling range. (**D**) F3 statistics showing levels of admixture between dogs from ISF2, Semikhody, Pripyat, other locations in the CNPP, Chernobyl City, and Slavutych. Middle eastern village dogs were used as an outgroup for all combinations.
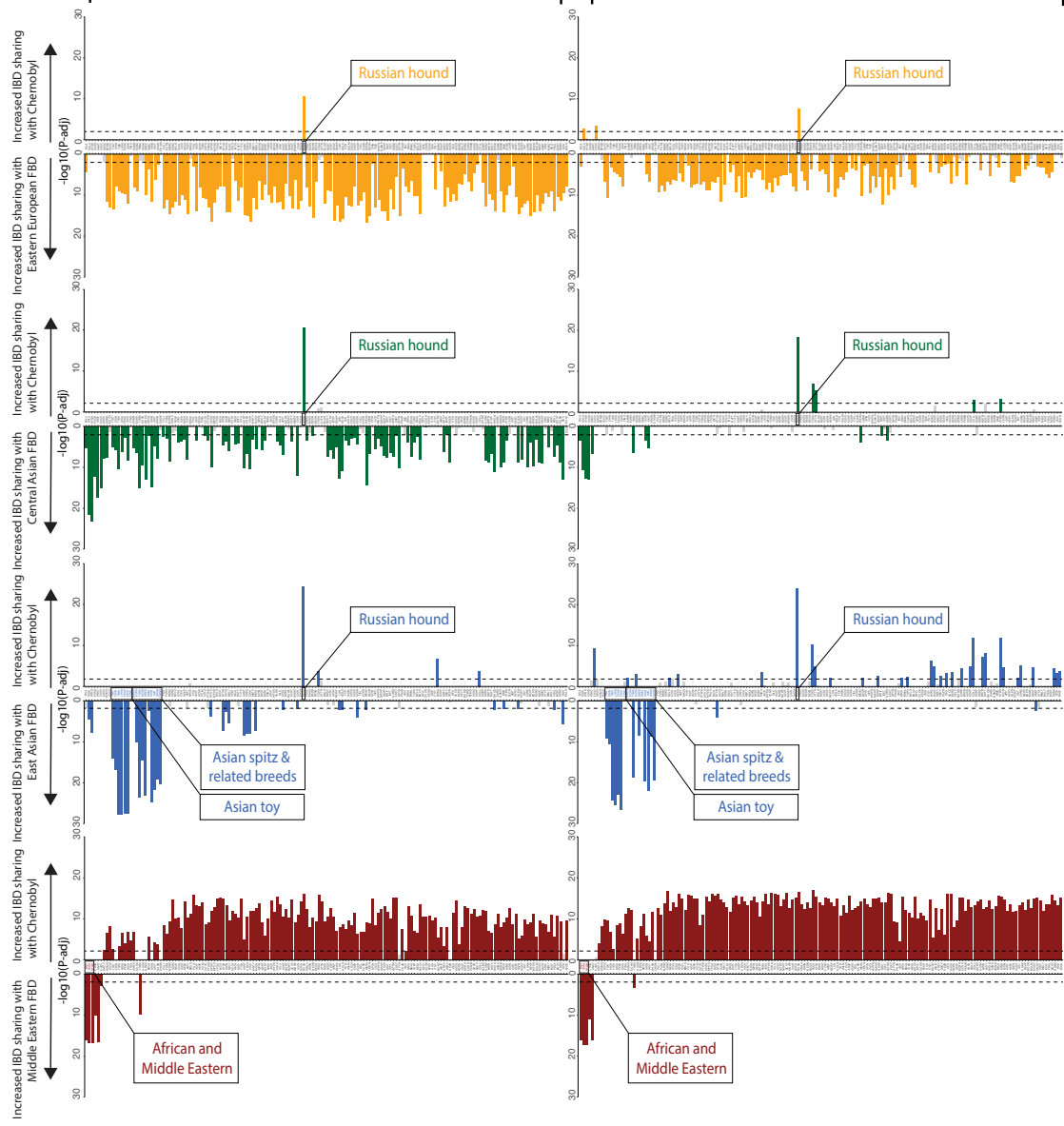
Free-Breeding Dog Sampling Locations

- Chernobyl ★ (yellow)
- Ukraine ★ (brown)
- Eastern Europe ★ (orange)
- Central Asia ★ (green)
- Eastern Asia ★ (blue)
- Middle East ★ (dark red)

Chernobyl Nuclear Power Plant vs. Free-breeding dogs

Chernobyl City vs. Free-breeding dogs

Increased IBD sharing with Chernobyl

Increased IBD sharing with Eastern European FBD

−log10(P-adj)

Russian hound

Increased IBD sharing with Chernobyl

Increased IBD sharing with Central Asian FBD

−log10(P-adj)

Russian hound

Increased IBD sharing with Chernobyl

Increased IBD sharing with East Asian FBD

−log10(P-adj)

Russian hound

Asian spitz & related breeds

Asian toy

Increased IBD sharing with Chernobyl

Increased IBD sharing with Middle Eastern FBD

−log10(P-adj)

African and Middle Eastern

Fig. S2. Differences between each Chernobyl population and each free-breeding dog geographic group in identical-by-descent haplotype sharing with breeds. Each vertical bar represents the -log10(P-adjusted) calculated for pairwise comparisons of average sharing with each breed between one of the Chernobyl populations and one of the free-breeding dog groups. Free-breeding dogs are grouped by geographic region. Vertical bars flipped above the zero line on each plot indicate increased haplotype sharing of a breed with one of the Chernobyl populations when compared to one of the free-breeding dog groups. Vertical bars flipped below the zero line indicate increased sharing with one of the free-breeding dog groups compared to the Chernobyl population. Comparisons that are not significant (p-adj. < 0.01) are colored light grey. The dotted line indicates the threshold for significance at 99% confidence for each comparison. Plots on the left side of the figure compare average haplotype sharing of CNPP dogs with purebred dogs to average sharing of free-breeding dogs with purebred dogs. Plots on the right side of the figure compare average haplotype sharing of Chernobyl City dogs with purebred dogs to average sharing of free-breeding dogs with purebred dogs. Breeds on the x-axis of each plot are ordered according to their placement on a bootstrapped phylogenetic tree found in SI Appendix, Fig S2. Breed abbreviations are defined in Table. S1. Bars are colored according to the free-breeding dog group being compared.
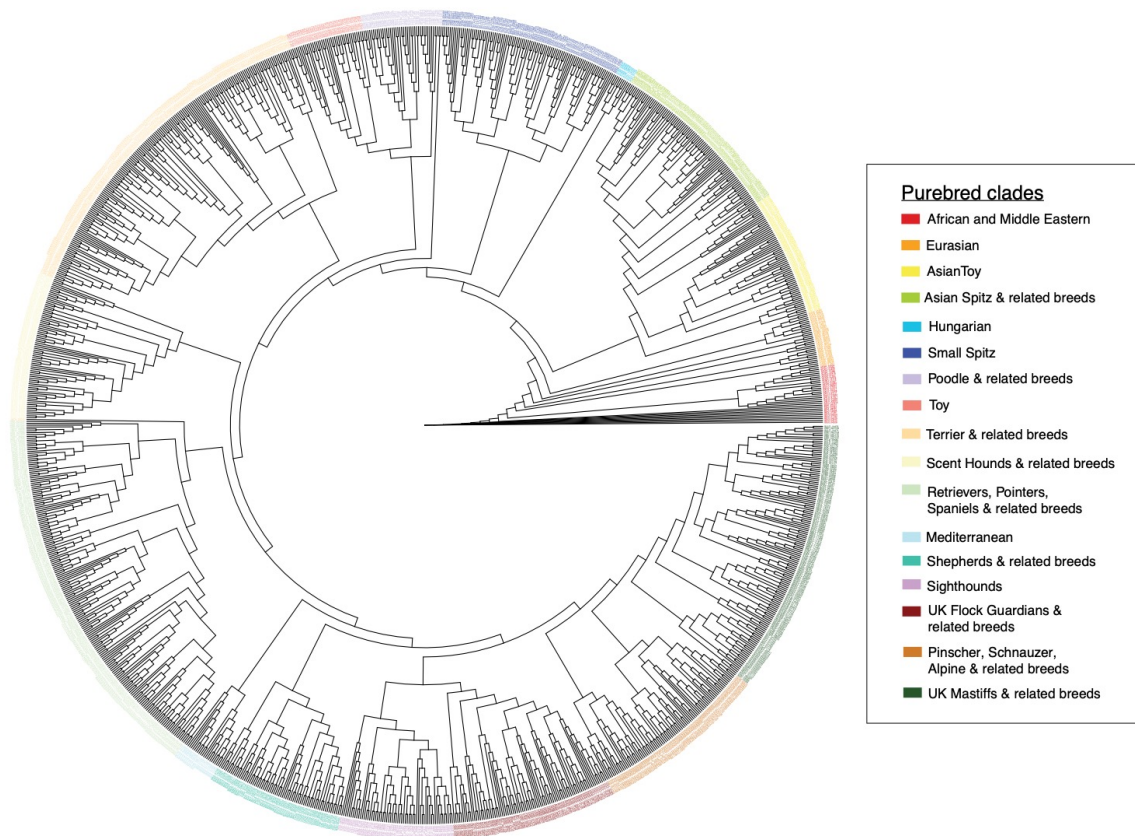
Fig. S3. Bootstrapped neighbor-joining phylogenetic tree including all purebred dogs in the dataset. Individuals are colored by clades.
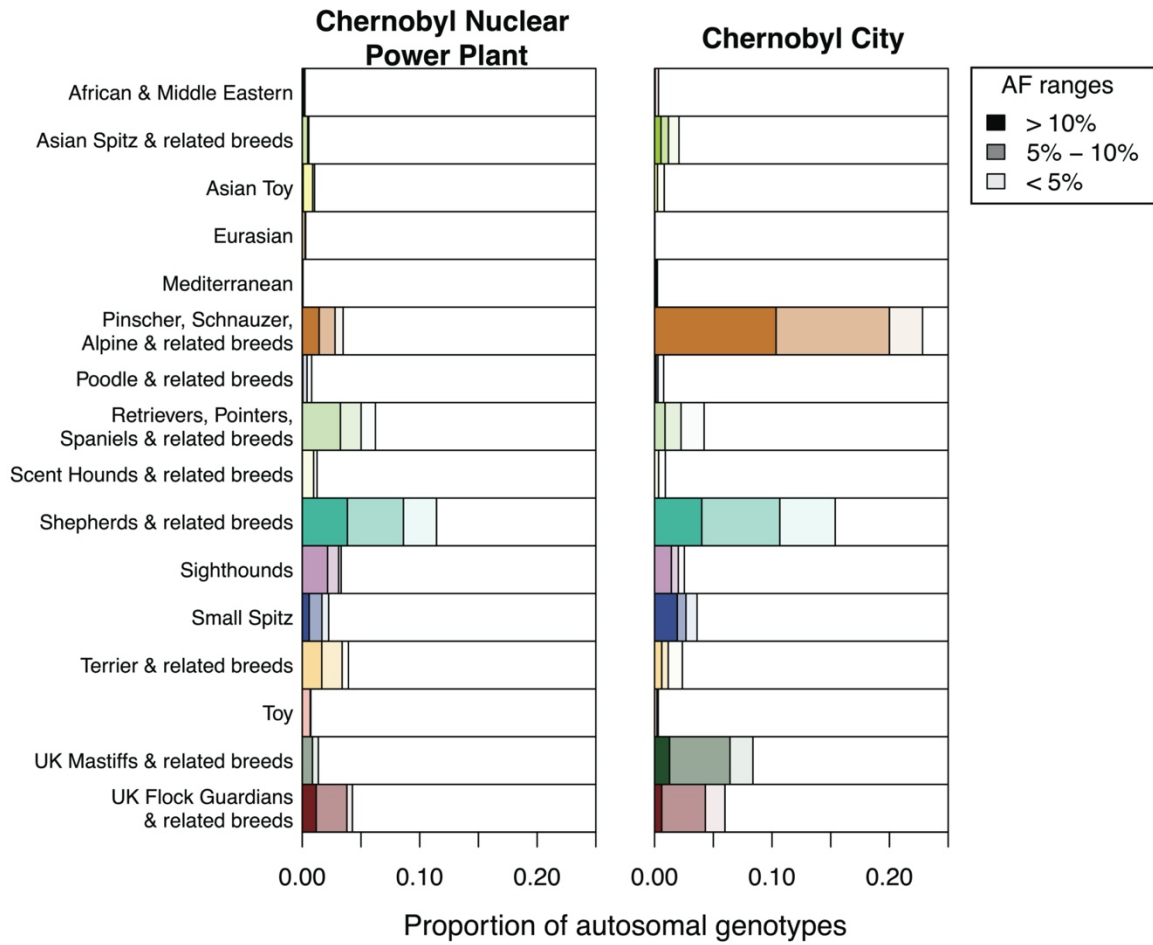
Fig. S4. Proportion of genotypes in each Chernobyl population belonging to breed-specific IBD segments. Breed-specific IBD segments were grouped by clade and genotypes were categorized according to the frequencies of the IBD segments they belong to. Haplotype frequency ranges are depicted as depth of shading.
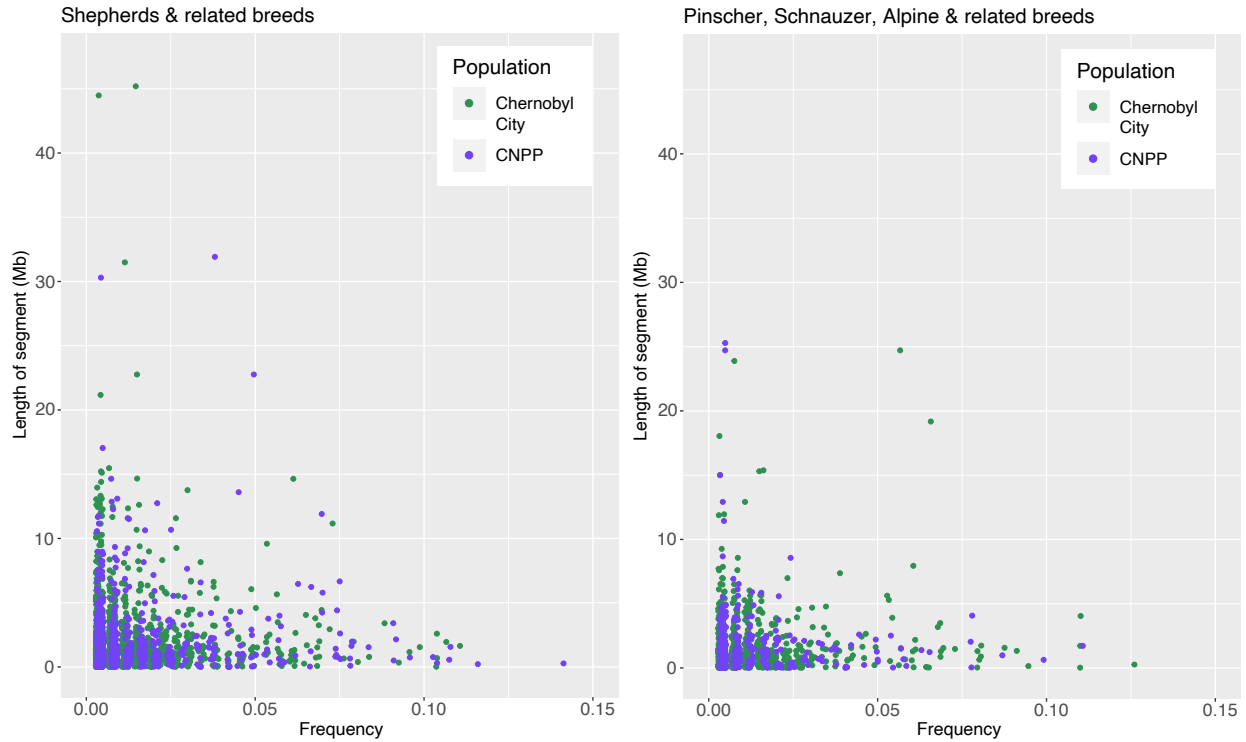
Fig. S5. Lengths of breed-derived haplotype segments. Left plot shows the length and frequency of breed-derived haplotype segments shared with shepherds and related breeds. Right plot shows the length and frequency of breed-derived haplotype segments shared with pinscher, schnauzer, alpine, and related breeds. Green points indicate segments shared with Chernobyl City dogs and purple points indicate segments shared with CNPP dogs. The Slavutych population was excluded from this analysis because of its relatively small sample size (n = 16 in Slavutych vs n = 131 and 121 in Chernobyl City and CNPP) and distinct ancestry that shows large signatures of purebred ancestry different from Chernobyl City and the CNPP populations (Fig. 4A, Fig. 5A).
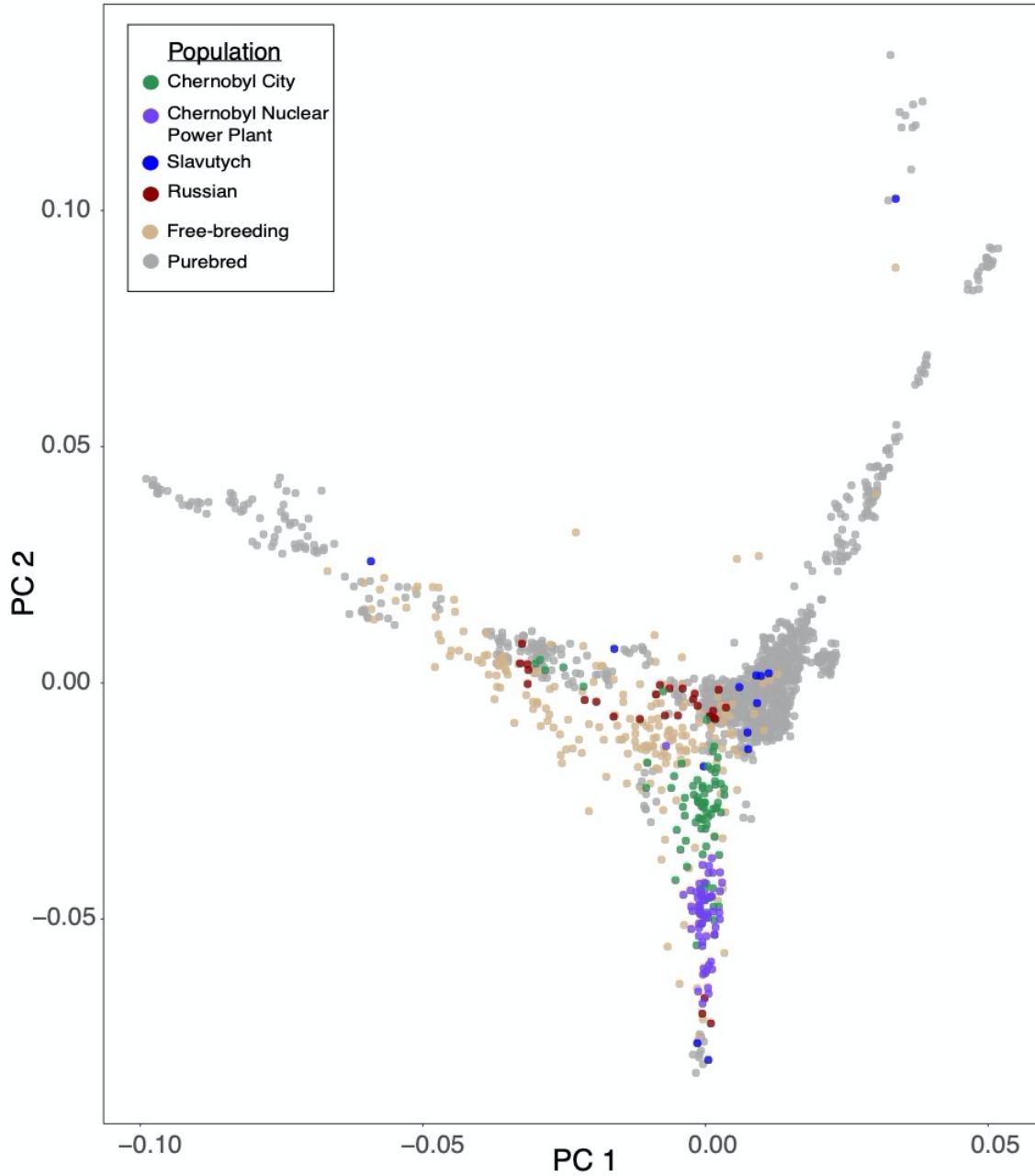
Fig. S6. Principal component analysis excluding closely related individuals. PCA including purebred, Ukrainian/Russian breed, global free-breeding, Slavutych, and Chernobyl dogs. Samples are colored by population.
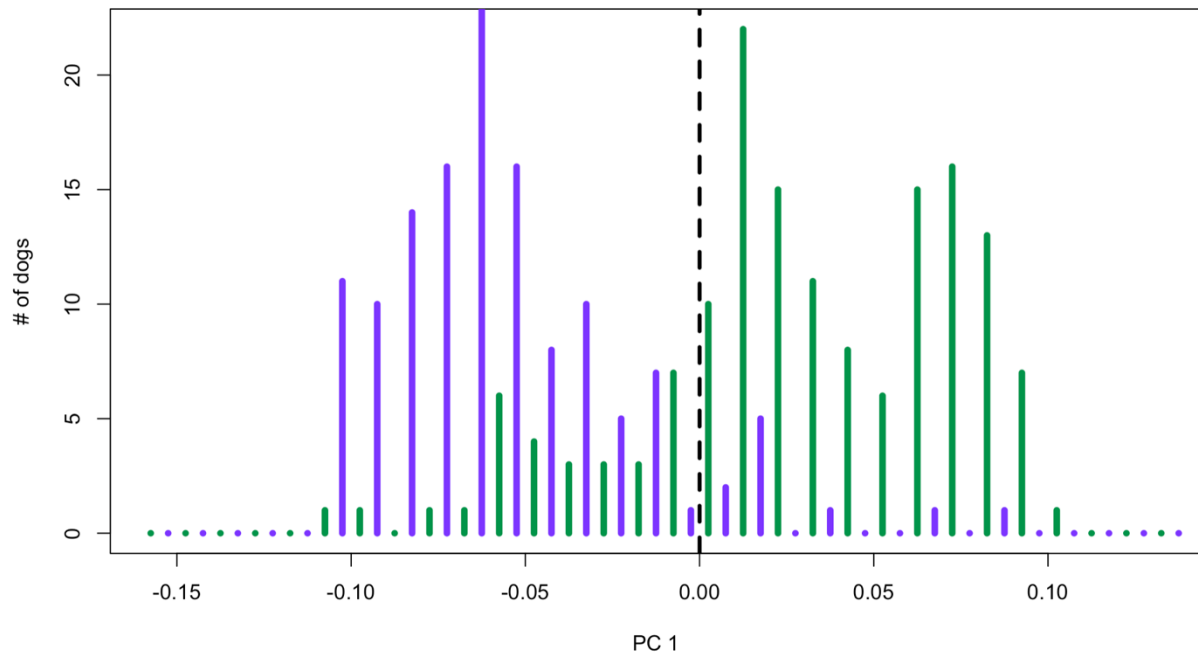
Fig. S7. Distribution of CNPP (purple) and Chernobyl City (green) genetic profiles according to PC1. CNPP samples with PC1 scores > 0 and Chernobyl City samples with PC1 scores < 0 are removed from analyses comparing breed-specific genomic regions between the two populations.

Table. S1. Sample information. List of samples with corresponding metadata including populations, locations, breeds, and genotyping methods.