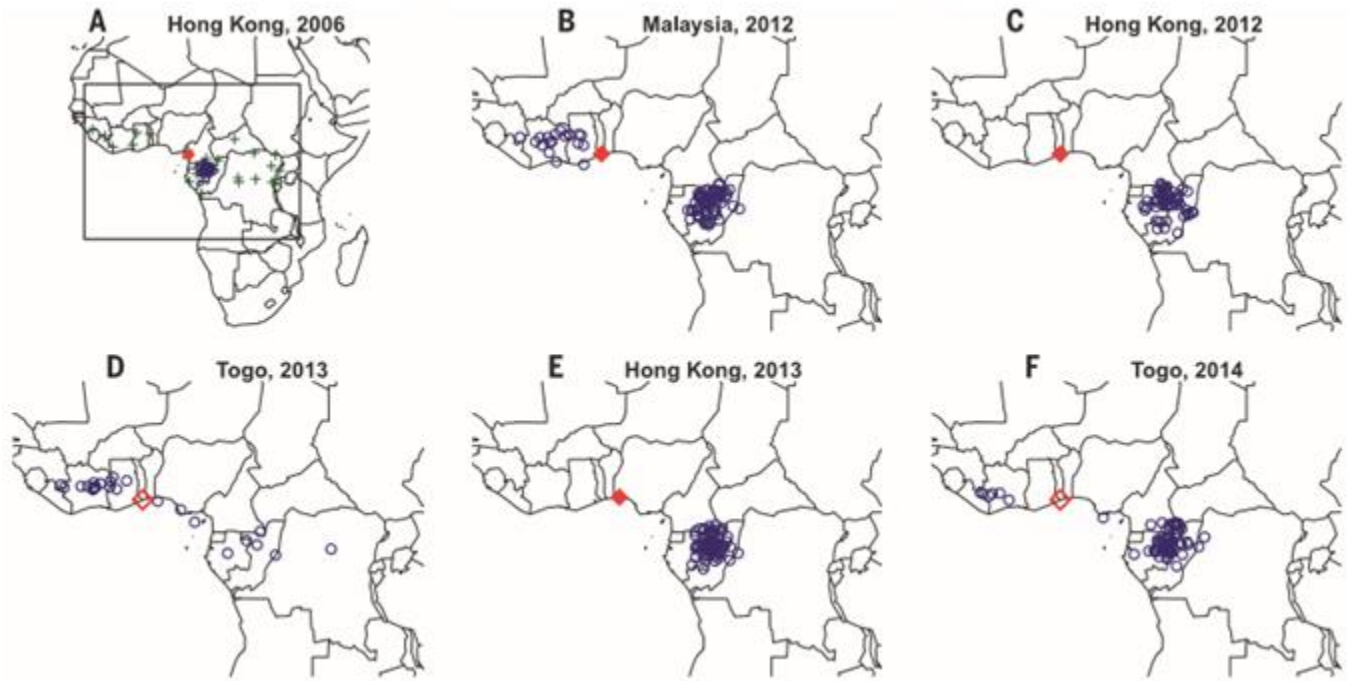




Using Genetic Evidence to Identify Ivory Poaching Hotspots



Caption: Series of maps showing the locations where forest elephants were likely poached, based on genetic evidence from ivory seizures conducted between 2006 and 2014. Each panel indicates the location and date of the ivory seizure. In panel A, the green crosses indicate locations where several forest elephant dung samples were collected to determine population-based genetic profiles. The black box represents the area enlarged in the maps shown in panels B-F. Blue circles represent the most likely origin of the ivory based on comparing the genetic profile of the seized ivory to those of the sampled populations. Solid red diamonds indicate the port from which the ivory was shipped before it was confiscated overseas. Open red diamonds represent the port where ivory was confiscated before it was shipped.

BACKGROUND INFORMATION

The international trade of ivory has been banned since 1989, yet African elephants continue to be poached for their ivory at alarming rates. It is estimated that as many as 50,000 African elephants are killed each year for their ivory tusks, out of a population of less than 400,000. Dr. Sam Wasser and colleagues analyze the DNA from seized ivory to determine where the ivory came from. This information is extremely valuable for law enforcement officials to protect vulnerable elephant populations.

The researchers began by creating a map of genetic profiles of different elephant populations across Africa. To do this, they collected 1,350 elephant dung samples from 71 locations, each location representing a different elephant population. They analyzed the DNA from each sample to construct a genetic map of allele frequencies at 16 loci for each population they sampled. Populations that are closer to one another geographically are more likely to have similar genetic profiles and allele frequencies than populations that are farther apart. The researchers used this knowledge to build a statistical model that allows them to predict the genetic profiles of

populations for which they do not have DNA samples. Next, they obtained DNA samples from 28 large shipments of illegal ivory that were seized at ports in Africa and Asia between 1996 and 2014. They compared the pattern of alleles from each ivory sample to their population-based map and assigned the origin of that ivory sample to the most likely location. The figure above only shows the data related to populations of forest elephants in Africa. Other figures in the original publication show the data for savanna elephants.